# Report of the Scientific Committee

This meeting (SC/65b) was held at the Golf Hotel, Bled, Slovenia from 12-24 May 2014 and was chaired by Toshihide Kitakado. The next meeting of the Commission (IWC/65) will take place during September 2014 and the next meeting of the Scientific Committee will be SC/66a in 2015. The list of participants is given as Annex A.

## 1. INTRODUCTORY ITEMS

### 1.1 Chair's welcome and opening remarks

Kitakado welcomed the participants to the 2014 Annual Scientific Committee meeting. He thanked the Government of Slovenia for hosting the meeting and for providing the excellent facilities in the beautiful town of Bled.

Secretary of State at the Ministry of Agriculture and the Environment, Andreja Jerina, underlined the importance of nature preservation which, in many cases, is not an easy task. She highlighted that size, 'charisma' or unfamiliarity of a species alone should not play a role in nature conservation – what counts for conservation of any species is knowledge, perseverance and enthusiasm. She also stressed the importance of knowledge and good scientific propositions for political decisions in this field. She wished the participants a lot of success in their preparation of a decision basis for the September meeting in Portorož.

On behalf of the Commission, Brockington thanked the State Secretary for the invitation for the Scientific Committee to meet in Slovenia. He expressed his thanks for the excellent work of Andrej Bibic, the Commissioner for Slovenia, and his colleagues at the Ministry of Agriculture and Environment and the Ministry of Foreign Affairs. Their hard work, along with that of the staff at Sava Resorts and Hotels meant that making the preparations for this meeting had been extremely smooth and pleasant. He also referred to the great value of the work of the Scientific Committee and the wide range of topics it covers when providing its advice to the Commission.

### 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

The Committee agreed to the meeting procedures and time schedule outlined by the Chair.

### 1.4 Establishment of sub-committees and Working Groups

As agreed last year (IWC, 2013a) and included in the draft agenda, two pre-meetings took place in Bled prior to the Annual Meeting. A pre-meeting of the sub-committee on the Revised Management Procedure (RMP) met on 9-11 May 2014 to continue the *Implementation Review* for North Atlantic minke whales. Its report is given as Annex D, Appendix 5. The sub-committee on Other Southern Hemisphere Whale Stocks met 10-11 May 2014 to work towards the completion of the assessment of humpback whale Breeding Stocks D, E and F. It continued its work during the meeting and its report is subsumed into Annex H.

A number of sub-committees and working groups were established. Their reports were either made Annexes to this report (see below) or, in the case of that on Sanctuaries, was incorporated directly into the plenary report.

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

Annex E – Standing Working Group on Aboriginal Subsistence Whaling Management Procedures;

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

Annex G – Sub-Committee on In-Depth Assessments;

Annex H – Sub-Committee on Other Southern Hemisphere Whale Stocks;

Annex I – Working Group on Stock Definition;

Annex J – Working Group on Non-deliberate Human-Induced Mortality of Large Whales;

Annex K – Standing Working Group on Environmental Concerns;

Annex K1– Working Group to Address Multi-species and Ecosystem Modelling Approaches;

Annex L – Sub-Committee on Small Cetaceans;

Annex M – Sub-Committee on Whalewatching;

Annex N – Working Group on DNA;

Annex O – Working Group on Special Permits;

Annex P – Revisions to the Annex P Process;

Annex Q – *Ad hoc* working group on Progress Reports;

Annex R – Terms of reference for Sanctuary Reviews;

Annex S – Budget Related Matters;

Annex T – Intersessional Working Groups; and

Annex U – Statements on the Agenda.

### 1.5 Computing arrangements

Allison outlined the computing and printing facilities available for delegate use**.**

## 2. ADOPTION OF AGENDA

The adopted agenda is given as Annex B. A number of statements on the Agenda were received on items related to small cetaceans, whalewatching and the JARPA II programme. These are given in Annex U.

## 3. REVIEW OF AVAILABLE DATA, DOCUMENTS AND REPORTS

### 3.1 Documents submitted

The documents available are listed in Annex C. As agreed at the 2012 Annual Meeting, primary papers were only available at the meeting in electronic format (IWC, 2013a, pp.78-9).

Table 1
List of data and programs received by the IWC Secretariat since the 2013 meeting.

| Date | From | IWC reference | Details |
|---|---|---|---|
| **Catch data from the previous season** | | | |
| 17/03/14 | Iceland: A. Þormar | E115 Cat2013 | Individual catch records from the Icelandic commercial catch 2013. |
| 01/05/14 | St Vincent: J. Compton | E115 Cat2013 | Individual records from the 2013 aboriginal hunt by St. Vincent and The Grenadines. |
| 06/05/14 | Norway: N. Øien | E115 Cat2013 | Individual minke records from the Norwegian 2013 commercial catch. Access restricted (specified 14/11/00). |
| 12/05/14 | Japan: N. Okazoe | E115 Cat2013 | Individual data from Japan's catch in 2013 in the North Pacific (JARPN II) and 2012/13 in the Antarctic. |
| 15/05/14 | USA: R. Suydam | E115 Cat2013 | Individual data from the 2013 bowhead hunt in Alaska. |
| 13/02 and 23/05/14 | Canada: L. Vuckovic | E115 Cat2013 | Details of the Canadian bowhead harvest from the 2013 season and notification of the 2014 quota. |
| **Catch data from earlier seasons** | | | |
| 16/06/13 | Japan: L. Pastene | E111 | Corrected data from the Japan Antarctic catches 1987-2012 following a thorough comparison by Japan of IWC data (from annual data submissions) and the scientists' data. |
| 27/08/13 | Canada: B. Green | E108 Cat2012 | Details of the Canadian bowhead harvest for the 2012 season. |
| 09/10/13 | P. Best | E112 | Sierra records 1976-78 in the North Atlantic (as described in Best, 1992). |
| 17/10/13 | Greenland: N. Levermann | E113 | Individual catch data from Greenland 2007-12. |
| 18/04/14 | Iceland: T. Gunnlaugsson | E116 | Individual records of minke whales caught by Iceland 1973-85 and summaries of catches in earlier years. |
| **Sightings data** | | | |
| 02/12/13 | Japan: K. Matsuoka | E114 | POWER cruise sightings data from 2013 including photographs and data forms (electronic and paper). |
| 02/12/13 | Japan: K. Matsuoka | CD98 | Blue whale ID photographs from 2005/06-2012/13 JARPA II data; submitted under IWC data access Procedure B. |
| 23/04/14 | Japan: K. Matsuoka | E117 | Data from the JARPN II 2013 dedicated sightings survey. |

### 3.2 National Progress Reports on research

As agreed last year, all National Progress Reports were submitted electronically thought the IWC National Progress Reports data portal. This data portal now allows multiple levels of data entry users within each country and has been improved to address the recommended changes provided at last year's meeting (IWC, 2014m). The Committee again **thanks** Miller of the Secretariat for developing and enhancing the data portal.

This year, 16 countries provided National Progress Reports including data on bycatch, entanglement, ship strikes, direct and indirect takes, sampling, sightings and tracking studies. These countries were: Australia, Belgium, Brazil, Croatia, Denmark, Germany, Iceland, Ireland, Italy, Japan, Mexico, New Zealand, Republic of Korea, Spain, UK and the USA. Between 2010 and 2012, 22, 18 and 20 countries submitted national reports, respectively.

The National Progress Reports have their origin in Article VIII, Paragraph 3 of the Convention. All member nations are urged by the Commission to provide Progress Reports to the Scientific Committee following the most recent guidelines developed by the Scientific Committee and adopted by the Commission. The report is intended as a concise summary of the cetacean research undertaken in member countries as well as a summary of information on direct and incidental anthropogenic mortality.

The Committee again **recommends** that all member states submit National Progress Reports to the IWC through the IWC data portal (*http://portal.iwc.int*).

Further improvements were discussed in an *ad hoc* Working Group and the Committee **endorses** the report of that Group (see Annex Q) and its recommendations.

### 3.3 Data collection, storage and manipulation

*3.3.1 Catch data and other statistical material*

Data received by the Secretariat since the 2013 meeting are listed in Table 1, including catch data from the 2013 season.

*3.3.2 Progress of data coding projects and computing tasks*

Allison reported that work has continued on the entry of catch data into both the IWC individual and summary catch databases, including data received from the 2012 season. Additional information from earlier seasons has been entered, including catch records from British Columbia received from J. Ford in 2012, common minke whale catch data from Iceland for the period 1973-85 and some data from the catcher/factory *Sierra* in 1976-8 received from P. Best (Best, 1992). An exercise to reconcile the IWC Japanese Antarctic catch data 1987-2012 with that held by Japanese scientists has been completed. A new version of the catch databases will be released shortly.

Validation of the data from the 2011 POWER sightings cruise has been completed and validation of data from the 2012 cruise has commenced.

In response to a question about how a blue/fin whale hybrid identified in the Icelandic catch data should be recorded, Allison noted that at present this whale is included as a fin whale in the database, with a footnote to show that it is a hybrid.

Programming work during the past year has included the compilation of the final set of tables and plots from the Western North Pacific minke whale *Implementation Review* completed last year. Other work is described under the relevant sub-committee items.

## 4. COOPERATION WITH OTHER ORGANISATIONS

The Committee noted the great value of cooperation with other international organisations to its work. The observers' reports below briefly summarise relevant meetings of other organisations. The contributions of several collaborative efforts are dealt with in the relevant sub-committees.

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

The report of the IWC observer at the 32nd Meeting of the CCAMLR Scientific Committee (SC-CCAMLR), held in Hobart, Australia from 21-25 October 2013 is given as IWC/65/04(2014)A. The main items considered at the

CCAMLR meeting of relevance to the IWC included: (1) fishery status and trends of Antarctic fish stocks, krill, squid and stone crabs; (2) incidental mortality of seabirds and marine mammals in fisheries in the CCAMLR Convention Area; (3) harvested species; (4) ecosystem monitoring and management; (5) management under conditions of uncertainty about stock size and sustainable yield; (6) scientific research exemption; (7) CCAMLR Scheme of International Scientific Observation; and (8) new and exploratory fisheries.

Reports of SC-CCAMLR and its Working Groups on Ecosystem Monitoring and Management (WG-EMM) and Fish Stock Assessment (WG-FSA) and their various subgroups are available through the CCAMLR secretariat and on the CCAMLR website[1].

The CCAMLR Working Group on Incidental Mortality in Fisheries (WG-IMAF) did not meet in 2013 and no new information on cetacean-fisheries interactions in the Southern Ocean became available to CCAMLR. The next meeting of the Working Group is likely to take place prior to the annual meeting of CCAMLR in 2014.

The Committee **thanks** Koch for attending on its behalf and for his service in this position for the past 24 years. The Committee **appoints** Currey to represent the Committee as an observer at the next SC-CCAMLR meeting.

### 4.2 Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)[2]

The Conference of the Parties did not occur during the intersessional period.

### 4.3 Convention on the Conservation of Migratory Species (CMS)[3]

*4.3.1 Scientific Council*

There was no meeting of the Scientific Council during the intersessional period.

*4.3.2 Conference of Parties (COP)*

There was no Meeting of the Parties during the intersessional period.

*4.3.3 Agreement on Small Cetaceans of the Baltic and North Seas (ASCOBANS)[4]*

The report of the IWC observer at the 20th meeting of the Advisory Committee to ASCOBANS, held in Warsaw, Poland from 27-29 August 2013 is given as IWC/65/04(2014) E. The main discussions at the meeting are summarised below.

(1) progress with three harbour porpoise action plans, including new abundance for the 'gap' area and ongoing analyses of the SAMBAH project for the Baltic Sea;
(2) involvement in current developments concerning bycatch of small cetaceans;
(3) mitigation advice regarding underwater noise;
(4) chemical pollutions should accorded greater attention (ECS Workshop on Chemical Pollution and Marine Mammals) - it is possible that bottlenose dolphins and killer whales in parts of Europe are suffering from high levels of contamination;
(5) a series of recommendations from the Marine Debris Working Group including collecting data on the distribution of debris and necropsies (in the future, information on entanglement and debris could be added to the ASCOBANS national reports);
(6) ASCOBANS will ask Parties to provide details of those responsible for cetacean rescue and what laws require, allow and prohibit in each country.
(7) SCANS III is a high priority that aims to establish the current abundance of cetaceans in the European Atlantic, assess mortality arising from human activities and to compare methods to create a best practice guide for monitoring to inform European directives;
(8) the ASCOBANS/ACCOBAMS Population Structure Workshop included a definition for the term 'Management Unit (MU)'- MUs need to be established for all regularly occurring small cetacean species in the area of overlap of ACCOBAMS and ASCOBANS with priority to be given to those species for which there is not only evidence of sub-structuring but also which appear to be especially vulnerable to anthropogenic activities (include *inter alia* killer whale, bottlenose dolphin, Risso's dolphin, pilot whale and harbour porpoise); and
(9) the results of the joint ASCOBANS/ACCOBAMS workshop on 'The challenge of spatially managing cetaceans – a highly mobile animal group' were presented.

No Meeting of Parties to ASCOBANS occurred in the intersessional period.

The Committee **thanks** Scheidat for her report and **agrees** that she should represent the Committee as an observer at the next ASCOBANS Meeting of Parties and Advisory Committee meeting.

*4.3.4 Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)[5]*

Due to the attendance of Donovan at an IWC Workshop, Fortuna kindly attended the ninth meeting of the ACCOBAMS Scientific Committee held in Monaco from 14-18 April 2013. Her report is given as IWC/65/04(2014). The full report of the meeting can be found on the ACCOBAMS website.

The issues most relevant to the work of the IWC Scientific Committee included: (a) the ACCOBAMS-IWC joint effort on ship strikes; (b) the most recent involvement of IWC experts in research programmes (i.e. aerial surveys in the Tyrrhenian and Adriatic seas and a telemetry programme to investigate the movements and distribution of fin whales outside the summer season); (c) the IWC experience in drafting and helping the implementation of Conservation Plans (e.g. the case of recently adopted Conservation Management Plans).

ACCOBAMS and the IWC have recognised the problem of ship strikes and have been working together to develop a better understanding of the issue and to develop effective mitigation measures inter alia within the ACCOBAMS area for several years. A Working Group and according Steering Committee were established under the auspices of the ACCOBAMS Scientific Committee to ensure that the recommendations of the joint ACCOBAMS/IWC workshop and the resolutions from the Meeting of the Parties are acted upon. The Steering Committee and Working Group will work in close contact with the ACCOBAMS Secretariat, the IWC, the Pelagos Sanctuary and other relevant experts.

The IWC Secretariat and Italy have been co-operating on aerial surveys in the region to determine the extent and abundance of cetaceans as well as on a telemetry programme investigating the movements and distribution of fin whales

[1] *http://www.ccamlr.org/.*
[2] *http://www.cites.org.*
[3] *http://www.cms.int.*
[4] *http://www.ascobans.org.*
[5] *http://www.accobams.org.*

outside the summer season. Results of these studies will be useful in addressing and potentially mitigating the issue of ship strikes within the Mediterranean Sea as well as informing the drafting of Conservation Plans at regional and sub-regional level (e.g. the future Adriatic Cetacean Conservation Plan).

With respect to conservation plans, information on the IWC experience in developing Conservation Management Plans was presented, including relevant references and the information on the IWC's adopted process on how to handle the preparation of conservation plans including approved IWC guidelines were provided to the Scientific Committee.

The importance of continued cooperation between ACCOBAMS and the IWC was recognised.

The Committee **thanks** Fortuna for attending the meeting on its behalf and **agrees** that Donovan should represent the IWC at the next ACCOBAMS meeting.

### 4.4 Food and Agriculture Organisation of the United Nations (FAO)

No observer for the IWC attended the 2013 meeting of FAO.

### 4.5 Inter-American Tropical Tuna Commission (IATTC)

The reports of the IWC observer at the 85th and 86th meetings of the IATTC held in Veracruz, Mexico 10-14 June 2013 and 14-15 October 2013 respectively are given as IWC/65/04(2014)D. The Antigua Convention came into force on 27 August 2010 and under this the IATTC is expected to give greater consideration to non-target and associated species, including cetaceans, in taking management decisions. A summary was given of ongoing work describing what is known about the direct impact of the fisheries on other species in the ecosystem and the environment. This ongoing work will shape future directions of AIDCP (see Item 4.6) and IATTC measures aimed at managing fisheries and conserving dolphins.

The IATTC continues to focus much of its attention on conservation and management of target tunas and sharks and other non-target species. Discussions of tuna conservation measures have implications for dolphin conservation. Fishing effort on dolphins may increase if, for example, future measures focus on further restricting the sector of the fishery that takes the greatest number of juveniles (vessels that set on floating objects). This could provide an incentive to fish on dolphins in order to remain active during closure periods for the floating object fishery and/or to not exceed bigeye tuna catch limits.

The Committee **thanks** Rusin for attending on its behalf and **agrees** that he should represent the Committee as an observer at the next AITTC meeting.

### 4.6 Agreement on the International Dolphin Conservation Program (AIDCP)

The report of the IWC observer at the 27th and 28th Meetings of the Parties to the AIDCP held in Veracruz, Mexico on 4 June 2013 and in Del Mar, CA, USA 18 October 2013 respectively is given as IWC/65/04(2014)E. The AIDCP mandates 100% coverage by observers of fishing trips by purse seiners of carrying capacity greater than 363t in the agreement area and in 2013 all trips (750) by such vessels were sampled by independent observers.

The overall dolphin mortality limit (DML) for the international fleet in 2013 was 5,000 animals and the unreserved portion of 4,900 was allocated to 90 qualified vessels that requested DMLs. In 2013, no vessel exceeded its DML. The number of sets on dolphin associated schools of tuna made by vessels over 363t has been increasing in recent years, to 11,645 in 2010. However, since then, the number has been decreasing and was 8,025 in 2013. Reported dolphin deaths and mortality limits, presented by species and stock, can be found in IWC/65/04(2014)E.

While fewer dolphin sets were made since 2010, this remains a frequent practice and the predominant method for catching yellowfin tuna by purse-seine. There have been insufficient resources to conduct dolphin and ecosystem assessment surveys since 2006 so it is unclear when updated abundance estimates for cetaceans in the ETP will be available.

In 2013, the AIDCP focused significant discussion on consideration of reducing observer coverage and developing an 'Ecosystem Friendly' certification scheme for tuna caught in association with dolphins. Due to the increasing sentiment among some Parties that the dolphin problem has been solved and that dolphin-fishing methods are better economically and environmentally than dolphin-safe methods, in 2014 the AIDCP Parties are expected to continue consideration of these proposals and others that have the potential to increase fishing effort on dolphins and the magnitude of associated direct and indirect effects of this practice.

The Committee **thanks** Rusin for attending on its behalf and **agrees** that he should represent the Committee as an observer at the next AIDCP meeting.

### 4.7 International Committee on Marine Protected Areas (ICMMPA)

The report of the observer documenting the activities ICMMPA is given as IWC/65/04(2014)K. The International Committee for Marine Mammal Protected Areas was formed as an international committee of experts in 2006 to address common issues and challenges faced by scientists and managers using spatial management tools to manage and conserve important cetacean habitats or populations. In 2008, the IWC endorsed and supported a proposal by ICMMPA to host the first international conference on marine mammal protected areas in 2009. Since that time, the ICMMPA has undertaken several initiatives and has co-hosted, with France, a second conference in Martinique, in 2011[6]. Since that conference, the Committee has been working with the Australian Government and WDC Australia in order to hold the third International Conference on Marine Mammal Protected Areas (ICMMPA3) 9-11 November 2014 in Adelaide, Australia.

The IUCN Marine Mammal Protected Areas Task Force (IUCN-MMPA-TF) was officially announced at the third International Marine Protected Areas Congress in Marseille, France, 24 October 2013, at which time it began its first major initiative by holding a workshop to develop criteria for defining 'important marine mammal areas' (IMMAs). It was agreed that:

(1) the Task Force should start to apply existing suites of criteria specifically to IMMAs as a means to test their utility and to refine or add any additional sub-criteria as may be useful for marine mammals;
(2) IMMAs will be able to provide important data to support the identification of between Ecologically or Biologically Significant Areas EBSAs;
(3) the similarity in objectives between Important Bird Areas (IBAs) and IMMAs, which both focus on wide-ranging species, and the fact that IBAs are considered to be a

[6] *http://second.icmmpa.org.*

subset of Key Biodiversity Areas (KBAs), would suggest that IMMAs could fit adjacent to IBAs and other taxa-based sets of criteria, with KBAs as the global umbrella;
(4) EBSA descriptions draw on all available information including KBAs, IBAs, plus other data sets, and would take IMMAs into account, if such designations were available; and
(5) the Task Force will endeavour to work with partners including the CBD Secretariat and the IUCN to ensure IMMAs are included in the EBSA and KBA.

The Committee **thanks** Ridoux for his report and **agrees** that he should represent the Committee as an observer at the next ICMMPA meeting.

### 4.8 International Council for the Exploration of the Sea (ICES)[7]

The report of the IWC observer documenting the 2013 activities of ICES is given as IWC/65/04(2013)B. The ICES Working Group on Marine Mammal Ecology (WGMME) met 4-7 February 2013.

Requests for determining Good Environmental Status (GES) were reviewed and delineated for cetaceans. Boundaries were specified so that the management units can be populated with abundance and bycatch estimates. As previously agreed, these boundaries coincide with ICES Area/Division boundaries where possible. Further consideration was given to OSPAR's ICG-COBAM's common indicators for marine mammals.

There was discussion of monitoring efforts to determine the distribution and habitat use of marine mammals, in relation to environmental impact assessments e.g. for marine renewable energy developments. Too often, monitoring programmes in adjacent marine renewable energy developments occur independently without broader coordination. Regulators and seabed owners need to acknowledge the need for data pooling, require it as an integral part for marine renewable consenting and develop internationally standardised comparable data formats for easy access and analysis. The Joint Cetacean Protocol (JCP) may serve as such an example.

The ICES Working Group on Bycatch of Protected Species (WGBYC) met 4-9 February 2013. WGBYC reviewed EU Member States' reports to assess the status of information on recent bycatch estimates and evaluate the extent of the implementation of bycatch mitigation measures. It was noted that estimates are still very patchy and several member states have not fulfilled their monitoring obligations. Bycatch monitoring remains less than optimally directed in many cases.

WGBYC reviewed recent bycatch mitigation trials, including trials of gillnet modifications and experiments that attempt to quantify the effect of pingers on porpoise displacement. Implementation of bycatch mitigation measures was also found to be patchy, with few EU member states able to provide unequivocal confirmation that the obligations are being met. WGBYC continued to develop a streamlined and effective database for the collation, storage and analysis of European bycatch monitoring and fishing effort data for those fishing sectors where bycatch monitoring is mandated.

The 2013 ICES Annual Science Conference was held in Reykjavik, Iceland from 23-27 August 2013. Some sessions were designed with marine mammals included as an integral part. A number of sessions were of relevance to the Committee, including those describing:

(1) responses of living marine resources to climate change and variability;
(2) marine spatial planning: the multidisciplinary approach; and
(3) advances in studying spatial distribution.

The Committee **thanks** Haug for the report and **agrees** that he should represent the Committee as an observer at the next ICES meeting.

### 4.9 International Maritime Organisation (IMO)[8]

The report of the IWC observer to the IMO is given as IWC/65/04(2014)H. The IWC has contributed to IMO discussions on addressing ship strikes and the impacts of underwater noise from shipping. In April 2014 at the 66th meeting of its Marine Environment Protection Committee, the IMO adopted 'Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life' (MEPC.1/Circ.833). These non-mandatory, technical guidelines recognise that underwater-radiated noise from commercial ships may have both short and long-term negative consequences on marine life, especially marine mammals. The guidelines intend to provide general advice about reduction of underwater noise to designers, shipbuilders and ship operators.

The IMO also continued to develop a mandatory Polar Code. This is intended to augment existing measures to reduce the environmental impacts of shipping in polar waters, taking into account their greater environmental sensitivity. This work will continue through 2014. Chapter 12 of the draft Polar Code addresses voyage planning which will be considered in detail by the Maritime Safety Committee (MSC 93) in May 2014. This draft contains a broader mandatory requirement for ships to take into account important areas for cetaceans during voyage planning. Some concerns have been expressed about the availability of such information and this is an area where the IWC may be able to help.

In addition, the noise guidelines note that 'Speed reductions or routing decisions to avoid sensitive marine areas including well-known habitats or migratory pathways when in transit will help to reduce adverse impacts on marine life'. The IMO and shipping industry are therefore likely to welcome further information on cetacean distribution patterns.

The Committee thanked Leaper for his report and **agrees** that he or the Secretariat should represent the Committee at the next IMO meeting.

### 4.10 International Union for the Conservation of Nature (IUCN)[9]

Cooke, the IWC observer, reported on the considerable cooperation with IUCN that had occurred during the past year and this is given as IWC/65/04(2014)L.

*Red List updates*

The Yangtze finless porpoise (*Neophocaena asiaeorientalis asiaeorientalis*), the world's only freshwater porpoise, has been uplisted to Critically Endangered following an estimated decline of over 50% during 2006-12 (see also Annex L item 8.7).

The last comprehensive assessment of cetacean species for the Red List was completed in 2008, and most cetacean species are due for reassessment in 2014. Barbara Taylor,

[7] *http://www.ices.dk.*
[8] *http://www.imo.org.*
[9] *http://www.iucn.org.*

who has replaced Bill Perrin as the Red List Authority Coordinator for the Cetacean Specialist Group, will be coordinating the revision of the cetacean listings. All cetacean species and selected subpopulations will be updated and newly recognised species in the genera *Inia* and *Sousa* will be added.

*Western gray whales*
Two further meetings of the Noise Task Force of the IUCN Western Gray Whale Advisory Panel (WGWAP) have been held in the past year, to determine mitigation measures for seismic surveys near the Sakhalin gray whale feeding ground in summer 2015. A paper was recently published on best practices for mitigation of the effects of seismic surveys on cetaceans, based on the work of the Panel's Noise Task Force (Nowacek *et al.*, 2013).

*Cetacean Specialist Group*
A Marine Mammal Protected Area Task Force was established in October 2013 jointly by the IUCN Species Survival Commission (SSC) and the IUCN World Commission on Protected Areas (WCPA), to develop improved practices for the designation and implementation of different types of protected areas for marine mammals. More details of this and other activities of the IUCN Cetacean Specialist Group are provided on the its website *http://www.iucn-csg.org/* and also see Item 4.7.

The Committee **thanks** Cooke for his report and **agrees** that he should continue to act as observer to IUCN for the IWC.

### 4.11 North Atlantic Marine Mammal Commission (NAMMCO)[10]

*4.11.1 Scientific Committee*
The report of the IWC observer at the 20th meeting of the NAMMCO Scientific Committee (NAMMCO SC) held in Reykjavik, Iceland from 13-16 November 2013 is given as IWC/65/04(2014)I.

#### HUMPBACK WHALES
Following the completion of the major survey effort, T-NASS 2007, NAMMCO is to conduct a formal assessment of humpback whales. The assessment for West Greenlandic waters has been completed, but assessment in other areas not yet initiated.

#### NARWHALS AND WHITE WHALES
A symposium focusing on narwhals and white whales is planned for 2015.

#### BOTTLENOSE AND KILLER WHALES
Faroese bottlenose dolphin sightings data were analysed together with CODA and SCANS II data. The preliminary designed based estimate for the Faroese block of T-NASS 2007 was 16,284. A recent increase in catches of killer whales off Tasiilaq in East Greenland (8 on average per year from 2010 to 2012) was reported and there is a possibility of a high struck and lost rate in this hunt. Higher levels of annual catches of killer whales (19 on average per year from 2010 and 2012) and low levels of bottlenose catches (20 animals) were noted for West Greenland.

#### PILOT WHALES
The T-NASS surveys have indicated decreasing abundance of pilot whales subsequent to the 1989 survey. An index has been developed in order to determine trends in abundance. It uses only the three largest surveys and including the data from the CODA survey for enlarging the reference area. The reference area still comprises only a small portion of the summer range of the species and changes in distribution may have influenced the results.

Estimation of pilot whale group size has a strong influence on estimated abundance and varied significantly among the surveys. Although it seems unlikely that an annual harvest of around 1,000 whales could have caused the population to decline, the apparent reduction of pilot whale abundance in the reference areas, which include the hunting area around the Faroes, should be of concern. Tagging of pilot whales in the Faroes has recently been conducted. More tracking data should be obtained from offshore areas, with a focus on the period during sightings surveys (July-August).

#### HARBOUR PORPOISES
An aerial survey conducted in West Greenland in August-September 2007 gave an abundance estimate of 274,883. Another estimate from Danish waters resulted in a corrected estimate of 50,461. There were large increases in catches in the past 19 years in the settlements with the largest catches, which may be due to multiple factors, including technological improvements, increased harbour porpoise population, and the new reporting system. The catches were corrected based on a survey among hunters for missing data on harbour porpoise catches. A struck and lost rate of 8% was also revealed. The WG used age-structure data from the hunt and combining the two different availability corrections of the abundance estimate, with three different estimates of the historical catches, the model estimated the dynamics of harbour porpoises in West Greenland quite differently, from increase to rapid decline. Hence, to obtain a consistent assessment model that is useful for providing management advice, it is essential that the uncertainties associated with the abundance and catch history estimates are resolved. Nevertheless, the working group noted that the average annual catches since 1993 in West Greenland were 2,126 harbour porpoises and that a large abundance is needed to sustain such catches.

Bycatch by coastal monkfish and cod in Norwegian gillnet fisheries is estimated to be about 6,900 harbour porpoises per year. Although no abundance estimate is available for the coastal harbour porpoise population, the annual bycatch is likely not sustainable. Incidental sightings show that the species is commonly observed in near coastal waters, archipelagos and fjord systems along the entire Norwegian coast. Harbour porpoises have been observed in the southern Barents Sea, including the Pechora Sea, and a vessel-based survey gave uncorrected estimates of about 3,000 animals.

#### BOWHEAD WHALES
Aerial surveys were completed in West Greenland in 2012 and a comparison with a simultaneous genetic mark recapture study showed the genetics give higher abundance estimates. The reasons for the higher estimates are that the aerial surveys are snapshots of the situation, whereas the genetics represent a whole influx of bowhead whales.

#### SURVEY PLANNING
Acoustics are not included in the NAMMCO T-NASS 2015 proposal, but could be conducted during national survey activities. The specific objectives for the planned T-NASS 2015 are to obtain unbiased abundance estimates of:

(1) pilot whales around Faroe Islands - useful for assessing the sustainability of the hunt;
(2) common minke whales in West Greenland, around Iceland, Jan Mayen and Svalbard and the central Norwegian Sea; and

[10] *http://www.nammco.no/.*

(3) fin whales southwest of Iceland.

The Committee **thanks** Walløe for attending on its behalf and **agrees** that he should represent the Committee as an observer at the next NAMMCO Scientific Committee meeting.

*4.11.2 Council*

The report of the IWC observer at the 22nd Annual Council Meeting of NAMMCO held in Oslo, Norway from 25-27 February 2014 is given as IWC/65/04(2014)C.

A number of topics were discussed including T-NASS 2015, tagging efforts end the international observer scheme. A planning group is preparing for a meeting in 2015 focusing on marine mammals in the context of food security.

NAMMCO has completed two authoritative manuals; one dealing with large baleen whaling and the use of whaling cannon and the penthrite grenade and a second dealing specifically with the use of the spinal lance and hook in the pilot whale hunt. An English language version of each is accessible on the NAMMCO website, they will be available in native languages as required for the hunting communities in due course.

The Committee **thanks** Sakamoto for attending on its behalf and **agrees** that he should represent the Committee as an observer at the next NAMMCO Council meeting.

**4.12 North Pacific Marine Science Organisation (PICES)[11]**

The report of the IWC observer at the 22nd annual meeting of PICES held from 11-20 October 2013 in Nanaimo, Canada is given as IWC/65/04(2014)F. The Marine Birds and Mammals Advisory Group (AP-MBM) requested that a seabird observer be included in the IWC-POWER cruise, however the IWC observer noted that this was difficult due to the capacity of the sighting vessel. The AP-MBM proposed the following topics for projects starting in 2015:

(1) marine climate impacts on MBMs through food web;
(2) marine mammals and seabirds as indicators of temporal and spatial variations of pollutants;
(3) MBMs as a predictive indicator of forage fish; and
(4) MBMs as consumers.

The Committee **thanks** Tamura for attending on its behalf and **agrees** that he or Kato should represent the Committee as an observer at the next PICES meeting.

**4.13 Protocol on Specially Protected Areas and Wildlife of the Cartagena Convention for the Wider Caribbean (SPAW)[12]**

The report of the IWC observer to SPAW is given as IWC/65/04(2014)/M. At the 5th Meeting of the Scientific and Technical Advisory (STAC), 22 October 2012, Punta Cana, Dominican Republic, the SPAW recommended that:

(1) 'The Secretariat emphasises the activities in support of the Marine Mammal Action Plan, including follow-up to the work and recommendations emanated from implementation of the LifeWeb Project; and
(2) The Secretariat continues to collaborate and to identify synergies, to the extent possible with relevant partners and MEAs and strengthens collaboration with IWC through the possible conclusion of a Memorandum of Cooperation.'

Two training workshops have recently been held, focusing on the forensic detection of human impacts and the response to entangled large whales. These workshops assisted participants in developing improved and safer human impact capabilities and entanglement responses. A further Joint IWC and SPAW/UNEP Workshop to address collisions between marine mammals and ships, with a focus on the wider Caribbean will take place in June 2014 in Panama.

Implementation of the Spain-UNEP LifeWeb project 'Broad-scale Marine Spatial Planning of Mammal Corridors and Protected Areas in Wider Caribbean and Southeast & Northeast Pacific' has led to regional maps and factsheets have been produced for the following issues:

(1) distribution of the 25 marine mammals species that occur regularly in the WCR (24 cetaceans);
(2) species richness;
(3) threats and human impacts faced by marine mammals: pollutions, interactions with fisheries, maritime traffic, etc.; and
(4) existing policies, marine protected areas and governance for the conservation of marine mammals.

All the outputs are available from the SPAW website. Data from the project has led to identification of three priority areas of study for conflicts between marine mammal and human activities. A workshop on transboundary marine mammal management in the wider Caribbean was recently held in Puerto Rico. Proposed scenarios for the three priority areas identified were discussed along with possible mitigation measures and application of marine spatial planning for transboundary management of marine mammals. A similar workshop focusing on Northern South America was held last year.

The Committee **thanks** Carlson for attending on its behalf and **agrees** that she should represent the Committee as an observer at the next SPAW meeting.

**4.14 Other organisations**

*4.14.1 Pacific Regional Environment Programme (SPREP)*

Following the 2013 Annual Meeting, the IWC Secretariat was invited to give a presentation about areas of possible cooperation at the annual meeting of the Secretariat of the Pacific Regional Environment Programme (SPREP), in Noumea, New Caledonia, 17-19 September 2013. Since that meeting the two Secretariats have continued to communicate and are working together on two upcoming cooperative projects; (1) SPREP is actively involved in the preparation for the IWC's second Workshop on marine debris, which will be held August 5-7 2014, in Honolulu, Hawaii; and (2) IWC technical adviser Mattila, is working with SPREP to co-host an IWC entanglement response training in Tonga.

The Committee **thanks** Mattila for his report and **agrees** that he continue reporting on the activities of SPREP on its behalf.

*4.14.1 Regional Convention on Fisheries Cooperation among African States Bordering the Atlantic Ocean (ATLAFCO)*

The main objective of ATLAFCO is to foster effective and active cooperation between Member States for conservation and sustainable development of fisheries in the region. ATLAFCO encourages Member States to exchange their experiences in scientific research and promotes coordination between their institutions and the sharing of scientific data on fish stocks. ATLAFCO began cetacean sighting surveys in maritime waters of Member States in order to obtain

[11] *http://www.pices.int/.*
[12] *http://www.cep.unep.org/cartagena-convention.*

scientific information on cetaceans, which are top predators in the ecosystem. The first was conducted in Gabonese waters in 2011 and the second in the gulf of Guinea covering the EEZ of Côte d'Ivoire, Ghana, Togo and Benin in 2013. The results are presented as Diallo and Bamy (2013). ATLAFCO will continue cetacean sighting surveys in waters of Member States, where scientific information on cetaceans are relatively insufficient.

The Committee **thanks** Diallo for his report and **agrees** that he should continue reporting on the activities of ATLAFCO on its behalf.

## 5. REVISED MANAGEMENT PROCEDURE (RMP) – GENERAL ISSUES

The Committee **draws attention** to the fact that the RMP (and AWMP) approach, which was pioneered at the IWC and is now increasingly being used in fisheries management, is of broad relevance to the work of the Committee when examining status and the effects of human-related mortality. Irrespective of whether the *Catch Limit Algorithm* (or a *Strike Limit Algorithm*) itself is used, the modelling framework and approach to dealing with uncertainty are of wide application (Bunnefeld *et al.*, 2011; Dichmont *et al.*, 2013; Punt, 2006). Lessons learned during the RMP *Implementati*ons and *Implementation Reviews* are of value in assessments generally. The Committee **notes** that this approach is now being used for North Pacific gray whales (e.g. see SC/65b/Rep08).

### 5.1 Use of individual based energetics model

Last year, the Committee recommended that $MSYR_{1+}$=1% be adopted as a pragmatic and precautionary lower bound for use in trials, and that $MSYR_{mat}$=7% be changed to the roughly equivalent $MSYR_{1+}$=4%. However, it recognised that much remains to be learnt regarding MSYR for baleen whales and that the issue of the appropriate range for MSYR should continue to be reviewed as new information becomes available. A work plan was developed to consider the incorporation of the individual based energetics model (IBEM) into the RMP software framework.

SC/65b/RMP03 reported on progress with this work noting that there were no technical difficulties in linking to the existing FORTRAN master program. Results from one set of 100 trials for the MSYR ~ 4% development case showed that the software produced results broadly consistent with those using the standard population models.

The Committee **welcomes** this work which allows it to conduct trials of the RMP where the operating model is spatially- and individual-based. Prior to use of this model by the Committee, the code would need to be validated by the Secretariat.

### 5.2 Relationship between $MSYR_{mat}$ and $MSYR_{1+}$

SC/65b/RMP04 included results requested last year (IWC, 2014e) which had used the IBEM to examine the relationship between the $MSYR_{1+}$ and $MSYR_{mat}$. The results revealed that the relationships between the 1+ and mature MSY rates are quite different from those derived from the standard Baleen II model, and attributed the difference to the action of density dependence in the IBEM acting on a wide range of demographic parameters. The author of SC/65b/RMP04 concluded that the standard Baleen II model should not be used for inferring the relationship between $MSYR_{1+}$ and $MSYR_{mat}$.

The Committee noted that the energetics-based model is rather complex, with several functional relationships leading to different density-dependent processes. Several qualitative outcomes from the model runs were consistent with results from the stochastic model of Cooke (Cooke *et al.*, 2007) and were *a priori* plausible; at this stage it is not possible to reach conclusions on the quantitative nature of the results. The Committee considered it important to obtain a better understanding of the reasons underlying these emergent properties, including whether the conclusions regarding the relationship between $MSYR_{mat}$ and $MSYR_{1+}$ were robust to, *inter alia*, species life history.

As discussed fully under item 2.2 of Annex D, the Committee **agrees** that it is desirable to further explore the relationship between $MSYR_{mat}$ and $MSYR_{1+}$ arising out of the IBEM results, and developed a work plan to achieve that. The work is necessary before any conclusions or the need for additional RMP/*CLA*-related trials are considered. This work does not imply a need to change or delay the current *Implementations* of the RMP for North Atlantic minke and fin whales. The Committee established a Steering Group under de la Mare (see Annex D, items 2.2 and 5) to coordinate intersessional work.

Recognising that the IBEM is just one approach to this issue, the Committee also **encourages** the development/presentation at the 2015 Annual Meeting of alternative models which represent alternative plausible density-dependent processes.

### 5.3 Finalise the approach for evaluating proposed amendments to the *CLA*

The Committee agreed in 2006 that two steps needed to be completed before the evaluation of the Norwegian proposal to amend the *CLA* could be completed. The first was the review of MSY rates, completed in 2013, and the second was specification of additional trials for testing the *CLA* and amendments thereto and to the RMP. Last year, the Committee re-established a working group under Allison (see Annex D, Items 2.3 and 5) to formulate and run trials related to environmental degradation.

The trials agreed by the intersessional group in which the density-dependence function is modified so that the change in fecundity with density for stocks sizes above *K* are not as extreme as implied by the conventional Pella-Tomlinson model. The results (see Annex D, Appendix 3) suggest that the proposed solution does not lead to results which differ much from those when density-dependence is modelled using the standard Pella-Tomlinson approach.

The Committee thanked Punt and Allison for conducting this work but **agrees** that allowing natural mortality to be density-dependent would provide a more stringent test for the impacts of environmental change. It **recommends** that Allison and Punt include the model of density-dependence in natural mortality in Annex D, Appendix 3 into the common control rule program and provide results of such tests of the *CLA* to the 2015 Annual Meeting.

### 5.4 Evaluate the Norwegian proposal for amending the *CLA*

Walløe reminded the Committee that Norway had stated that it intended to develop and propose a change to the *CLA* of the RMP at the 2004 meeting (IWC, 2005). Norway proposed a new tuning mechanism for the *CLA* and that the MSYR should refer to the 1+ component of the population (with $MSYR_{1+}$= 1% as the minimum) instead of the mature component. The revised tuning mechanism and some simulation results were presented to the 2006 meeting, and were discussed extensively. The Committee established

Table 2
Overview of work on RMP general matters 2015-16.

| Topic | Intersessional (2014-15) | SC/66a (2015) | Intersessional (2015-16) | SC/66b (2016) |
|---|---|---|---|---|
| Evaluate energetics based model | For details see Annex D, item 2.2 | Review progress | Continue work | Review results |
| Evaluate *CLA* performance when density-dependence acts upon natural mortality | For details see Annex D, item 2.3 and 2.4 | Review results | If necessary | Complete, if not done at SC/66a |
| Other *CLA* related tasks | For details see Annex D, item 2.5 | | If necessary | As above |
| Diagnostic software to assist in evaluating design-based estimates | For details see Annex D, item 2.6 | Hold pre-meeting | If necessary | As above |
| Evaluate Norwegian *CLA* proposal | For details see Annex D, item 2.4 | Review results | If necessary | As above |
| Refine work plan | | In light of progress | | |

two working groups then, one of which led to the MSYR review completed in 2013, and the other to specify trials and diagnostic plots for testing amendments to the *CLA*. Revised results (Aldrin and Huseby, 2007) were presented to the Committee in 2007. However, the MSYR review had not been completed so no decision had been made at that time.

The MSYR review was completed last year and it concluded that the lower bound for MSYR in trials would be $MSYR_{1+}$=1%. However, as noted in Item 5.3, some work remains to be completed in regard to trials in which MSYR and *K* change over time.

The Committee **recommends** that Punt and Allison include the variants of the RMP considered by Aldrin and Huseby (2007) in their further analyses. This item has been outstanding for many years and the Committee **confirms** its intention that the evaluation of the Norwegian proposal would be completed at the 2015 Annual Meeting.

### 5.5 Other computing matters related to the *CLA*

Allison noted that a few minor issues related to how the code for the *CLA* was integrated into the control program remained outstanding. However, there had been insufficient time during the intersessional period to address these issues. They would be addressed during the current intersessional period, for report to the 2015 Annual Meeting.

### 5.6 Update 'Requirements and Guidelines for conducting surveys and *Implementations*'

SC/65b/RMP11 had been written in response to a request (and contract) from the Committee to update the Requirements and Guidelines for Conducting Surveys and Analysing Data within the Revised Management Scheme (IWC, 2012f) - hereafter 'the Guidelines'). The specific tasks were to summarise developments in design- and (spatial) model-based abundance estimation since 2004 when the Guidelines were last revised, and to provide suggested text for updates to the Guidelines. SC/65b/RMP11 reviewed the fundamentals of design-based abundance estimation; described new approaches to variance estimation for design-based analysis; considered how the Committee might decide whether the criteria for design-based assessment might be met; suggested some ways to evaluate the adequacy of design-based estimates when the strict criteria are not met; presented a paradigm for (spatial) model-based abundance estimation, and a checklist of decisions that need to be made when making a spatial abundance estimate; and proposed some updated text for the Guidelines. An important overall conclusion concerned the necessity, when the Committee reviews an abundance estimate for 'acceptability', for thorough descriptions of the design and analysis process, including the rationale for making particular choices.

The Committee **welcomes** this review, recognising the value of updated criteria for evaluating abundance estimates (both design- and model-based) to the full Committee rather than simply the sub-committee on the RMP, since abundance estimates are central to much of its work (see Annex D, Appendix 4). To progress the update of Guidelines (both in an RMP sense and in a wider context) to: (1) assist evaluation of design-based estimates of abundance; and (2) accommodate recent (and future) developments in abundance estimation, the Committee **recommends**:

(1) development of a simple-to-use diagnostic software that uses model-based analysis to assist in evaluating design-based estimates that can be applied when design-based criteria are not strictly met;
(2) refinement of the material in SC/65b/RMP11, both in the explanatory background text and in the proposed Guidelines, on specific issues (see Annex D); and
(3) hold a Workshop with two objectives:
    (a) to test the proposed new Guidelines against several test cases of model-based abundance estimates made specifically for and during the Workshop; and
    (b) to demonstrate and discuss the proposed diagnostic software with a wider Committee audience involved in basic line-transect abundance estimation.

Part (a), which would involve only a small number of analysts familiar with spatial modelling, could be held as a pre-meeting next year, and part (b) could follow on at the start of the Committee meeting. Updates to the Guidelines could then be considered during the full Committee meeting.

An appreciable amount of intersessional work would be required, particularly for item (1) and preparation for item (3). The Committee appointed at Steering Group under Bravington (see Annex D, items 2.6 and 5) to develop an agenda for the Workshop and facilitate preparations.

### 5.7 Imbalanced sex ratio in incidental catches

Last year, the Committee requested further consideration of the generic issue of how to deal with imbalanced sex ratios in incidental catches under the RMP. The Committee **agrees** that the current specifications for the RMP are sufficient but it **recommends** that annotation 26(a) to the RMP be adjusted to improved clarity as follows:

> 'Any subtraction of incidental catches from the catch limits output from the RMP as above would take place at the end of this process at the Small Area level, and separately at the Medium/Large Area level if Catch-capping was applied. However, as this is an RMS rather than an RMP feature, no wording to cover this is proposed here. Since imbalanced sex ratios in incidental catches have been taken into account in (iv) above, as this computation is with respect to the total catch, there is no need for further adjustment for this factor in this subtraction.'

### 5.8 Work plan

The Committee **notes** that the iterative nature of its work means that it is challenging to determine the exact nature of its work plan beyond a single year. Detailed work plans for

before and during the 2015 meeting, and before and during the 2016 meeting, are given in Annex D, item 2.8 although there is some uncertainty about the latter. Prioritised budget requests are detailed in Annex D, item 6. The Committee budget is discussed under Item 26. An overview of the work plan is given as Table 2.

## 6. RMP – *IMPLEMENTATION*-RELATED MATTERS

### 6.1 North Pacific common minke whales (additional work from completed *Implementation Review*)

*6.1.1 Review of intersessional work*

Last year, the *Implementation* for the North Pacific common minke whales identified six RMP variants which were 'acceptable without research' and four RMP variants which were candidates for being 'acceptable with research'. The latter are variants that lead to higher catches in some specific sub-areas in this instance. RMP variants which are 'acceptable with research' need to have a research programme that the Committee agrees has a good chance of determining within ten years whether trials on which performance was not 'acceptable' should have been assigned low plausibility. The Committee established an Advisory Group under Butterworth (see Annex D, items 3.1.1 and 5) to provide feedback to those developing research programmes during the intersessional period if requested. Pastene reported that Japan had not developed a research programme to date.

The Committee re-**establishes** the Advisory Group to provide advice to those developing research programmes if required.

*6.1.2 Survey plans*

SC/65b/RMP02 presented a research plan for a sighting survey for common minke whales in the Sea of Okhotsk, including the Russian EEZ, in summer 2014. It was revised from that presented last year owing to logistical and permit issues. The primary aim is now to obtain biopsy samples in one sub-area rather than obtaining abundance estimates for the whole of the Okhotsk Sea. A joint Russian-Japanese sighting survey in the Okhotsk Sea will occur in summer 2015 (see SC/65b/RMP02).

The Committee noted the revised research plan and **welcomes** the plan for a joint Russian-Japanese survey for common minke whales in Okhotsk Sea. It looks forward to seeing a detailed research plan for the latter survey at the 2015 Annual Meeting. The Committee appointed Miyashita to provide oversight on its behalf.

*6.1.3 Recommendations*

The Committee:

(a) again **strongly requests** that the Commission **urges** the Government of the Russian Federation to give permission for the survey to take place in its EEZ throughout sub-area 12, noting that there are often major difficulties making use of abundance estimates for only part of a sub-area; and
(b) **recommends** that future surveys be more synoptic, as this will better facilitate their use in the RMP.

### 6.2 North Atlantic fin whales (*Implementation Review*)

*6.2.1 Report of intersessional Workshop*

Donovan introduced SC/65b/Rep07, the report of the technical intersessional Workshop on the *Implementation Review* for North Atlantic fin whales, held in Copenhagen in January 2014. The Workshop was primarily technical, to finalise trial specifications and make progress towards conditioning the trials.

The Workshop reviewed the progress made since SC/65a (see Annex D, item 3.2.1) and made several additional changes to the code for the operating model. Given the complexity of the trials, it had not been possible to complete conditioning successfully by the end of the Workshop.

The Workshop developed a work plan with the objective of finishing the *Implementation Review* at the 2015 Annual Meeting, and established a Steering Group under Elvarsson (see Annex D, items 3.2.1 and 5) to assist with implementing the work plan.

The Committee **thanks** Donovan for chairing the Workshop and the participants for their work during the Workshop and subsequently, in particularly Elvarsson. In reviewing progress made since, it noted that further changes to the optimisation method had been implemented and the density-dependent dispersal model had been developed and included in the control program. Progress had been made assembling data and in updating the catch series to include incidental catches off Eastern Canada. In addition, Elvarsson had conditioned base-case trials for eight stock-structure hypotheses (Annex D, item 3.2.1).

*6.2.2 Consideration of available results*

Elvarsson provided an overview of progress on conditioning the set of trials identified during the Workshop. Many of the trials can now be conditioned successfully, but some problems remain (see Annex D, item 3.2.2).

The Committee received two papers that may be useful when assigning plausibility ranks to the *Implementation Simulation Trials* during the 2015 Annual Meeting. SC/65b/RMP06 presented cetacean sightings and effort during winter fishery (mainly capelin) surveys conducted during 1991-95, 2003 and 2009 around Iceland, while SC/65b/RMP08 investigated differences between the first and second or later fin whales taken per catching trip.

*6.2.3 Recommendations*

The Committee **recommends** that a Workshop takes place in early 2015 to ensure that it is in a position to complete the *Implementation Review* at the 2016 Annual Meeting, if not earlier. A Steering Group was appointed under Donovan (see Annex D, Items 3.2.2 and 5). Holding this meeting back to back with the Workshop proposed under Item 6.3 will reduce costs.

### 6.3 North Atlantic common minke whales (*Implementation Review*)

The *Implementation Review* for North Atlantic minke whales started with an AWMP/RMP Joint Workshop on stock structure in April 2014 (SC/65b/Rep04), and continued with a pre-meeting of a Working Group whose report is given as Annex D, Appendix 5.

The Working Group built upon the excellent progress made at the joint Workshop where a major review of data including comprehensive new genetic information led to an agreed set of stock structure hypotheses. The Working group built upon this to evaluate abundance estimates, biological and operational parameters, removals data, and trials structure.

The preliminary results from the sighting surveys suggest that the abundance in the E *Medium Area* has not changed from the last six-year period, but that there has been a decrease in abundance in the C *Medium Area.* It developed a work plan with the objective of completing the *Implementation Review* at the 2015 Annual Meeting (Annex D, Appendix 5, item 7).

Table 3
Overview of the work plan as it relates to *Implementations*.

| Species/area | Intersessional (2014-15) | SC/66a (2015) | Intersessional (2015-16) | SC/66b (2016) |
|---|---|---|---|---|
| Common minke whales (WNP) | Possible work by Advisory Group (if requested). | Review hybrid RMP variants and research proposals if submitted.<br>Agree abundance estimates for use in actual applications of the RMP. | | Review hybrid RMP variants and research proposals.<br>Agree abundance estimates for use in actual applications of the RMP. |
| Common minke whales (NA) | Assemble data.<br>Finalise trial specifications.<br>Validate code and condition.<br>Hold intersessional workshop. | Assign plausibility to trials.<br>Review trial results.<br>Complete *Implementation Review?* | Run trials and hold intersessional workshop (if needed) | Complete *Implementation Review* (if needed). |
| Fin whales (NA) | Assemble data.<br>Validate code.<br>Hold intersessional workshop. | Review trial results.<br>Assign plausibility.<br>Finish *Implementation Review?* | Run trials and hold intersessional workshop (if needed) | Complete *Implementation Review* (if needed). |
| Sei whales (NA) | Summarise data on stock structure and develop hypotheses. | Decide to initiate or not *pre-Implementation assessment*. | | *Pre-Implementation assessment* (if agreed at SC/66a). |
| Bryde's whale (WNP) | | Review new information. | | Review new information. |

*6.3.3 Recommendations*

The Committee **endorses** the report of the Working Group and **adopts** its work plan. It **thanks** Donovan for chairing the pre-meeting and the participants for their work. It established a Steering Group under Walløe (see Annex D, item 3.3) to guide the intersessional work that will include a technical intersessional Workshop.

### 6.4 North Atlantic sei whales

*6.4.1 Pre-Implementation assessment*

The North Atlantic sei whale Steering Group (IWC, 2014d), item 6.4) proposed that the feasibility of a pre-*Implementation* assessment be investigated further during the intersessional period by a Correspondence Group chaired by Víkingsson (see Annex D, item 3.4.1) and with Terms of Reference to finalise the compilation of the available data and develop a draft set of possible stock structure hypotheses for consideration during the 2015 Annual Meeting. It **notes** that initiation of an *Implementation* follows only from a decision by the Commission.

As for other North Atlantic balaenopterids, genetic analyses conducted so far for sei whales indicate low levels of population genetic structure. There is value in conducting further genetic analyses to aid in the formulation of plausible stock hypotheses for North Atlantic sei whales.

*6.4.2 Recommendations*

To maximise the amount of genetic data from the existing set of samples, the Committee **recommends** the generation and analysis of ddRAD-based SNP genotypes from the available tissue samples. In addition, it **agrees** that information on the distribution of sei whales from catch records be summarised by the intersessional group.

### 6.5 Western North Pacific Bryde's whales

*6.5.1 Prepare for 2016* Implementation Review

The *Implementation Review* for Western North Pacific Bryde's whales was originally scheduled for 2013. However, in 2012, the Committee postponed the *Review* until 2016 to allow additional sightings and genetics data to be available and analysed (IWC, 2013a). Miyashita, on behalf of Japan, requested that the *Implementation Review* be deferred to 2017 for reasons detailed in Annex D, item 3.5.1.

In discussion, it was noted that considerable new data are likely to be available by 2017. It was also noted that since no new abundance estimates had been adopted by the Committee, application of the RMP would lead to use of the 'phase out rule'.

*6.5.2 Recommendations*

The Committee **agrees** that the next *Implementation Review* be deferred to 2017, and that it be a 'full review' such as those currently being undertaken for North Atlantic minke and fin whales. Since the *Implementation Reviews* for North Atlantic minke and fin whales will not both be completed before the 2016 Annual Meeting – it is infeasible for the Committee to initiate another 'full' *Implementation Review* until these two reviews are completed.

### 6.6 Updated table of abundance

Allison advised that the 2001 estimate of abundance for sub-areas CG+CIP for the North Atlantic minke whales of 23,592 was an error and the correct estimate is 10,740. The estimate had been used in the applications of the RMP, which took place in 2010 (IWC, 2011a).

Annex D, Appendix 6 lists updated abundance estimates for North Atlantic minke and fin whales and North Pacific minke and Bryde's' whales. Allison advised that review of these estimates is continuing and Annex D, Appendix 6 will be updated with any new information.

### 6.7 Work plan

Detailed work plans, both for 2015 and 2016, are given in Annex D, item 3.7, and prioritised Budget Requests are detailed in Annex D, item 6 and Appendix 7. An overview of the work plan is given in Table 3.

## 7. NON-DELIBERATE HUMAN-INDUCED MORTALITY OF LARGE WHALES

The report of the Working Group on Non-deliberate Human-induced Mortality of Large Whales is given as Annex J. This work originally arose out of the need for information on such mortality for use in the RMP but has now broadened in scope, amongst other things providing advice to the Commission working groups on such matters.

### 7.1 Entanglement of large whales

*7.1.1 Estimation of rates of entanglement, risks of entanglement and mortality*

Online tools are now available to allow data entered into National Progress Reports to be queried. In reviewing the output from such queries it was noted that only a small proportion of countries submit bycatch data and it is important to distinguish no report from no data. The Committee **recommends** that member nations fill out the relevant fields appropriately and provide information on

efforts to estimate total bycatch of large whales. Some discrepancies in field codes were also noted with reports of ship strikes.

The Secretariat's technical adviser, Mattila, has provided entanglement response training for 156 individuals from 14 different countries in the past year. A result of this work is that detailed data on large whale entanglements are being brought to the Committee. The IWC's expert group on entanglement will discuss the development of a global database at its next meeting, currently planned for December 2014. The Commission has recommended that the expert group develop this database and that it is hosted by the IWC.

Entanglement injuries have been noted for decades during post-mortem examinations of harvested bowhead whales, raising concerns about potential interactions with pot fisheries for cod and blue king crab (Citta *et al.*, 2013). Young whales showed less scarring than older animals and this was attributed to a gradual accumulation in scars from entanglement as whales grow older. Although the spatial distribution of 21 satellite tagged bowhead whales partially overlapped fishery areas, there was no temporal overlap suggesting that lost gear was the most likely source of entanglement. The finding of a spatial but not temporal overlap suggested that this type of analysis might be helpful in the Committee's work on determining entanglement risk from debris versus actively fished gear.

A sperm whale calf and female pair were reported entangled in a mass of ropes, nets and plastic cans off Guadeloupe in November 2013 (SC/65b/HIM02). The material was suggestive of local artisanal Fish Aggregating Devices which would represent the first data on large whale entanglement in this type of fishing gear.

Of the 63 baleen whale entanglement records off Western Australia from 1982-2010, humpback whales accounted for 56. Almost half of entanglements occurred in rock lobster fishing gear. There is an upward trend in entanglements reported between 1990 and 2010 in this fishery despite a reduction in fishing effort (Groom and Coughran, 2012). The numbers of entanglements have increased significantly since the fishery went from seasonal to year-round. Fisheries and conservation agencies have responded by developing cooperative relationships and protocols to reduce entanglement risk. The Committee noted that other countries have been investigating and attempting to mitigate whale entanglements in similar pot fishery gear but currently the most certain way to avoid entanglement is to minimise the amount of entangling materials in the water column used by the whales. One solution for the Western Australian rock lobster fishery would be for the fishery to return to a seasonal one, avoiding gear in the water during whale migration. The Committee **recommends** that a careful monitoring scheme is enacted prior to any modifications of the fishery, so that the effectiveness of any changes can be determined. This might include a scar or wound monitoring programme. The Committee **recommends** that the relevant authorities in Australia contact Kristy Long (co-ordinator of the USA Take Reduction Teams) and Robbins, who is using monitoring of the annual accumulation of raw wounds on both humpback and right whales in the region affected by the USA lobster fishery.

The Committee **recommends** that Australia reports on any potential solutions that it tests as these could have beneficial global applications. In addition, recognising the global nature of the problem and the Commission's recommendation to prevent entanglement, the Committee **strongly encourages** members to bring forward papers on the effectiveness of various mitigation measures to future meetings, and that a dynamic matrix or table of various potential measures and their effectiveness be maintained.

*7.1.2 Collaboration with Commission's Whale Killing Methods and Associated Animal Welfare Issues Working Group including consideration of mitigation measures and future work*

The aim of the IWC Workshop on Euthanasia Protocols to Optimise Welfare Concerns for Stranded Cetaceans held in 2013 was to bring together international experts to inform guidelines on achieving the best welfare outcome when cetaceans strand (IWC, 2014c). The Workshop recommended that where chemical euthanasia methods were used additional studies or evaluations on the persistence and relay toxicity of chemicals used should be undertaken. In particular, at a minimum the injection site should be removed and disposed of, and when barbiturates are used, the whole carcass must be removed from predation possibilities. The Workshop recognised the effectiveness of penthrite grenades and encourages the development of a darting gun delivery device that may be suitable for use by trained personnel in specific large whale stranding situations. The addition of further fields into the national progress report would allow evaluation of techniques for euthanasia and disposal of live stranded whales. The Workshop recommended euthanasia of injured cetaceans at sea and the issues related to mass strandings should be considered for future Workshops. Finally, the Workshop recommended that IWC member nations refine existing or develop new incident response protocols based on the principles and guidelines in the Workshop report. The Committee **endorses** these recommendations, including those to refine the data requested in National Progress Reports.

### 7.2 Ship strikes

*7.2.1 Progress on the global database*

The ongoing development of the IWC ship strike database requires data gathering, communication with potential data providers and data management. The second year of work carried out by the data coordinators resulted in a variety of outreach actions, with a large number of contacts being established, and the drafting of a series of documents, including guidance documents for sailing and cruise ships. In May 2014, the database held a total of 1,221 incidents. A downloadable summary is available on the IWC website[13]. The Committee **recommends** that the important work of the data coordinators continue, both for its value to the Commission's mitigation efforts, contribution to a better understanding of the factors that relate to risk (such as ship type and speed), as well as estimates of ship strike mortalities.

*7.2.2 Estimating rates of ship strikes, risk of ship strikes and mortality*

Vessel strike risk for bowhead and gray whales in the Bering Strait region has been assessed using Automatic Identification System (AIS) data combined with data on habitat use and satellite telemetry data. The recent IWC Workshop on the Arctic discussed the possibility of seeking Particularly Sensitive Sea Area status for some high risk areas of bowhead distribution through the International Maritime Organisation (IMO). It was noted that the IMO was now considering known high density whale areas in relationship to voyage planning within the development of

[13] *http://www.iwc.int/ship-strikes.*

a Polar Code. Voyage planning in relation to high density areas will be further discussed at the ship strike Workshop in Panama, June 2014. Other examples of mapping the co-occurrence of whales and shipping to assess risk included data from satellite tagged humpback whales in the eastern South Atlantic, and from Arabian Sea humpback whales off the coast of Oman. Preliminary findings showed all three whale species off Oman passed through the main approach channels to major international shipping ports.

A simulation study was conducted to estimate the impact of ship strikes on the small Magellan Strait population of humpback whales (SC/65b/SH18). A single collision every three years randomly distributed among sexes and age classes would result in the median population growth shifting from stable to slightly decreasing. The concentrated shipping traffic through the area and the relatively small size of the population suggests potentially high vulnerability to ship strikes. Given the estimated size of the population (<100), the low estimated survival rate and the restricted nature of the Straits of Magellan, the Committee **expresses concern** over this situation and **agrees** that mitigation measures may be needed. While the Committee **agrees** that further studies of shipping and whale density are needed, the confined waters allow little scope for routing options and there may be a need to consider speed limits, if feasible.

AIS data have been used in cases of known ship strikes where a vessel has entered port with a carcass on the bow in an attempt to re-trace a ship's path to determine if any abrupt change in speed could indicate where the collision may have occurred. The Committee **recommends** that NOAA collaborate with the IWC to further test this application of AIS by attempting to retrace the routes and speeds of relevant ship strikes in the IWC ship strike database.

The probability of whale-vessel collisions in the Hawaiian breeding grounds for humpback whales was investigated by systematic transects recording surprise encounters and near misses as proxies for collisions with vessels. The rate of surprise encounters was found to increase with vessel speed. It was noted that there is not currently a standard definition of a 'near miss' which will depend on the size and manoeuvrability of the vessel involved. The Committee **encourages** work to develop definitions of a 'near miss' which could be considered at next year's meeting. Noting that the suggested speed of 15knots to reduce risk was greater than the 10-12knots in some other areas, the Committee **agrees** that the size and type of vessel associated with any speed recommendations needs to be explicit; otherwise speed recommendations might be used inappropriately.

Literature on ship strike records around Japan was reviewed to identify possible cases that could be included in the IWC database (SC/65b/HIM03). Twelve incidents between 1978 and 2012 were identified, all of which involved jetfoil vessels. In two thirds of the incidents reviewed, pieces of meat or blubber were found, suggesting potential for DNA analysis to identify species in future cases if samples are collected and appropriately preserved.

The Committee has previously noted an urgent need for long-term monitoring of the blue whale population in Sri Lankan waters and elsewhere in the northern Indian Ocean because of the potential for population impacts from ship strikes (IWC, 2014d). In 2012, two blue whales were struck and killed off Sri Lanka within a 12-day period (De Vos *et al.*, 2013) but it was noted that the observed mortality was an unknown fraction of actual mortality. Consequently, ship strikes could limit the recovery of this endangered subspecies, particularly given the projected doubling of large vessel traffic in the next 10-20 years (Southall, 2005). Surveys off the southern coast of Sri Lanka were conducted during February to April 2014 to investigate the distribution patterns of blue whales in relation to current shipping lanes and further offshore. The highest densities of blue whales were observed in the current shipping lanes, peaking at an average of 0.12 individuals $km^{-2}$ in the westbound shipping lane. These high densities of whales combined with one of the busiest shipping routes in the world suggest a severe risk of ship strikes. The results suggest that the blue whale distribution is related to bathymetry and that observed distribution patterns may be consistent over time. Hence moving the current Traffic Separation Scheme further offshore would likely substantially reduce risk of collisions with blue whales. The Committee **agrees** that further surveys of blue whale distribution in the area at different times of year would provide important data. Given that Sri Lanka is not a member of the IWC, but there has been a dialogue between IWC and the Government of Sri Lanka on the issue, the Committee **recommends** that the IWC should begin to discuss possible mitigation measures with the relevant authorities and stakeholders in the area. The Committee **requests** that the Secretariat send a letter to the Sri Lankan Government, with an update on the information from its discussion of this topic and ways in which the Committee or the IWC Ship Strikes Working Group may assist. In addition, it **recommends** that a representative from Sri Lanka be invited to relevant IWC meetings and Workshops.

Information was provided on an ongoing project between the University of California, Santa Cruz (De Vos *et al.*, 2013) and Southwest Fisheries Science Center (Redfern *et al.*, 2013) on reducing the risk of ship strikes to blue whales in Sri Lankan waters. The project will attempt to assess ship-strike risk to this population including: (1) developing habitat models that can be used to predict blue whale distributions off Sri Lanka and validating predictions using available data from the region; (2) re-examination of strandings records for baleen whales to confirm data and any evidence of ship strikes; (3) use available shipping data to characterise traffic patterns; (4) evaluate strategies to mitigate risk by overlaying predicted blue whale distributions with alternative shipping lanes (Redfern *et al.*, 2013); (5) expand the sightings data available for this region, especially in the context of the two monsoon periods; and (6) work with industry and economists to determine short-term economic costs of moving shipping lanes.

A dead male blue whale stranded in Puerto Montt, southern Chile in February 2014, with its right flipper and left mandible broken and the bone exposed (SC/65b/HIM08). This evidence strongly suggests that this whale was hit by a large vessel. The Committee **agrees** that the evidence was most consistent with the authors' conclusions that one of the two recently arrived cruise ships had likely brought the carcass into the harbour on its bow. The Chilean Navy does provide information about whales and collision risk to vessels in the area but an IWC guidance document for cruise ships would be very useful support to these outreach efforts. The Committee **endorses** the suggestion that the reporting system needs to be expanded to collect additional details on vessel strikes in Chile, especially in the inland passage region, and that mitigation measures may be needed. Similar to the Straits of Magellan, the confined waters allow little scope for routing options and there may be a need to consider speed limits.

The Hellenic Trench southwest of Greece is a known area of high sperm whale density which coincides with major

Table 4
Overview of the work plan as it relates to non-deliberate human-induced mortality.

| Species/area | SC/66a (2015) | SC/66b (2016) |
|---|---|---|
| Reviews of mitigation measures for ship strikes and entanglement | Review information collated intersessionally (see Annex J, item 9) and produce simple summary information and advice table. | Finalise if not completed at SC/66a. |
| Entanglement (annual reviews) | Continue to examine new information on rates, risks and mortality and provide advice. | Continue to examine new information. |
| Entanglement (support Commission initiatives) | Communication of key issues.<br>Advice in relation to specific CMPs.<br>Review recommendations from December 2014 workshop, including database.<br>Assist in work with other organisations. | Continue to support. |
| Ship strikes (annual reviews) | Continue to examine new information on rates, risks and mortality and provide advice. | Continue to examine new information. |
| Ship strikes (database) | Work with co-ordinators and Secretariat to update and improve database, including review process and criteria. | Continue. |
| Ship strikes (support Commission initiatives) | Communication of key issues.<br>Advice in relation to specific CMPs.<br>Review recommendations from June 2014 Workshop.<br>Assist in work with other organisations. | Continue to support. |

shipping routes. This area had been identified as potentially high risk during the IWC/ACCOBAMS Workshop in 2010 (IWC, 2011a). An analysis of twelve seasons of visual and acoustic observations of sperm whales identified high risk areas where whales were exposed to very high shipping densities. The potential for small changes in shipping routes to dramatically reduce risk in these high risk areas suggest considerable scope for effective mitigation. Given the evidence for a high incidence of ship strikes from stranded sperm whales the Committee **recommends** that a dialogue should be initiated with shipping regulators and interests in the area, perhaps in conjunction with ACCOBAMS. Leaper will work with the Secretariat to establish contacts. However, given the possibility of fin whales occurring further offshore of the current shipping routes, it was suggested that there should be further study of those deeper waters prior to recommending that shipping move offshore.

The efficacy of mandatory 10 knot speed restrictions in high risk areas for North Atlantic right whales has been evaluated by Laist *et al.* (2014). The results indicated a statistically significant reduction in right whale ship strikes in Seasonal Management Areas (SMAs) where speed limits were imposed, suggesting that these have been effective. Noting previous recommendations regarding reducing anthropogenic mortality to North Atlantic right whales (e.g. IWC, 2011a), the Committee **endorses** the recommendations in the paper for extension to the SMAs to cover a greater portion of vessel tracks across core migratory areas.

*7.2.3 Collaboration with the Commission's Ship Strikes Working Group including consideration of mitigation measures and future work*

Collisions between sailing vessels and cetaceans have been reported for a number of species, and this appears to be an increasing problem (Ritter, 2012). Many of these collisions have caused serious damage to the vessel or even vessel loss, as well as and serious or fatal injury to the whale. A draft guidance document was developed so as to provide information to sailors and offshore race organisers. A similar draft guidance document for reducing collisions with cruise ships was also reviewed. Both guidance documents contain information on relevant mitigation measures currently in place, as well as educational resources and existing reporting tools. It is foreseen that these documents will be discussed at the upcoming joint UNEP-CEP-SPAW-IWC Workshop on ship strikes in Panama in June and then be brought to the attention of the IMO. The Committee **recommends** that similar guidance be developed for other classes of vessels where there may be specific issues to that type of vessel not covered by the general IMO guidance on reducing ship strikes.

### 7.3 Marine debris

Aspects of this issue are discussed under Item 12.6.1.

### 7.4 Other issues including mortality from acoustic sources

Aspects of this issue are discussed under Item 12.4.

### 7.5 Work plan

The work plan includes a planned review of mitigation measures for both ship strikes and entanglements. This should lead to a simple summary table that would provide a useful communication tool. Such a table might be of particular value to the Secretariat in reaching out to other organisations.

The Committee **welcomes** a proposal for a Workshop on preventing the entanglement of large whales in fishing gear to be held in 2016, noting that advice for preventing entanglements would be relevant to many countries and that this would best be achieved by collaboration with fishers, managers, gear manufacturers and scientists.

The Committee's budget proposal is discussed under Item 26. The detailed work plan is given in Annex J, item 9. A simple overview is given as Table 4.

## 8. ABORIGINAL SUBSISTENCE WHALING MANAGEMENT PROCEDURE (AWMP)

This item continues to be discussed as a result of Resolution 1994-4 of the Commission (IWC, 1995a). 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. The primary issues at this year's meeting comprised: (1) developing *SLA*s (*Strike Limit Algorithms*) and providing management advice for Greenlandic hunts, with an initial focus on bowhead and humpback whales; and (2) providing management advice for the Greenland hunts and the humpback whale fishery of St. Vincent and The Grenadines (see Item 9). Considerable progress on item (1) was made as a result of an AWMP intersessional Workshop

(SC/65b/Rep06), a joint AWMP/RMP intersessional Workshop (SC/65b/Rep04) and the AWMP Developers' Fund.

The Committee **notes** that the approach used by the SWG (and the sub-committee on the RMP) is of broad relevance to the work of the Committee when examining status and the effects of human-related mortality. The modelling framework and approach to dealing with uncertainty is of wide application, for example when assessing the effects of bycatch in fishing gear or ship strikes. This approach is now being used for North Pacific gray whales (SC/65b/Rep08).

### 8.1 Progress on *SLA* development for the Greenland hunts

In Greenland, a multispecies hunt occurs and the expressed need for Greenland is for 670 tonnes of edible products from large whales for West Greenland; this involves catches of common minke, fin, humpback and bowhead whales. The flexibility among species is important to the hunters and satisfying subsistence need to the greatest extent possible is an important component of management. For a number of reasons, primarily related to stock structure issues, development of *SLA*s for some Greenland aboriginal hunts (especially for common minke and fin whales) is more complex than previous *Implementations* for stocks subject to aboriginal subsistence whaling. The Committee endorsed an interim safe approach to setting catch limits for the Greenland hunts in 2008 (IWC, 2009a), noting that this should be considered valid for two blocks i.e. the target will be for agreed and validated *SLA*s, at least by species, for the 2018 Annual Meeting at the latest.

The Committee has recognised that in a multi-species fishery, hunters would like to have some flexibility across species in terms of meeting the overall need expressed in terms of edible products. It has agreed that the inclusion of such flexibility across a series of interlinked *SLAs* is complex (e.g. IWC, 2011b). The Committee has therefore agreed that this aspect only be considered after single species *SLA*s have been developed and adopted.

In accordance with the work plan developed last year, the SWG on the AWMP made considerable intersessional progress, in particular through three intersessional Workshops, one of which was a dedicated AWMP Workshop with a focus on finalising the trial structure for the bowhead and humpback whale hunts off Greenland (SC/65b/Rep06); the second was a joint AWMP/RMP Workshop on the stock structure of common minke whales in the North Atlantic (SC/65b/Rep04) and the third was an RMP Workshop focussing on fin whales for which the operating model discussions were relevant (SC/65b/Rep07).

#### *8.1.1 Development of an* SLA *for the bowhead whale hunt off West Greenland*

##### 8.1.1.1 DATASETS, TRIAL STRUCTURE AND CONDITIONING

An important component of the intersessional Workshop was the finalisation of the datasets to be used in the trials. The question of stock structure had been extensively discussed last year (IWC, 2014d). Although the Committee's current working hypothesis is a single Baffin Bay-Davis Strait stock, pending the availability of some genetic analyses, the Committee had agreed that the possibility that there are two stocks present in the overall area, (with the second being the Foxe Basin-Hudson Strait stock) could not be ruled out (e.g. see IWC, 2009b). The Committee had therefore agreed to:

> 'proceed first on a conservative basis that assumed that the absolute abundance of bowhead whales on the West Greenland wintering area would be informed by abundance estimates from data for that region only (see below). Only if such an *SLA* proved unable to meet need would abundance estimate information and stock structure considerations from the wider area be taken into account.'

With respect to abundance estimates, two new abundance estimates for West Greenland were discussed (see item 3.1 of SC/65b/Rep06). The Committee **endorses** the agreement of the Workshop that:

(1) the mark-recapture abundance estimate of 1,274 (CV=0.12) constituted the best available estimate of abundance for the number of whales visiting West Greenland;
(2) given the present operating model, it was appropriate for this *Implementation* to continue to use (and project into the future), sighting survey estimates – determining an approach to use mark-recapture estimates should however be undertaken in the future (this is a major task); and
(3) conditioning would be based therefore on (a) the fully-corrected 2012 sighting survey abundance estimate of 744 (CV=0.34, 95% CI: 357-1,461); and (b) a comparable estimate for the 2006 survey of 1,103 (CV0.47). See Annex E of SC/65b/Rep06 to see how this comparable estimate was obtained.

With respect to removals, considerable work was undertaken to compile a complete list of direct and incidental catches and to discuss how Canadian catches should be incorporated into the trial structure (item 3.2 of SC/65b/Rep06). Greenland indicated that the need envelope that increased strikes to 15 over the 100-year period should be removed.

The Committee **endorses** the final trial structure given in Annex D of SC/65b/Rep06. This provides *inter alia* details on the population model, conditioning, trials, removals, need envelopes and abundance.

Factors considered within the trials are summarised in Table 5 and the *Evaluation Trials* are given in Table 6; the *Robustness Trials* can be found in SC/65b/Rep06 (Annex D, table 6). The conditioning of the operating models was conducted intersessionally. The SWG reviewed the conditioning by examining the diagnostic plots in the usual manner and agreed that conditioning had been achieved successfully except for one trial. The Committee **endorses** this view.

##### 8.1.1.2 CANDIDATE *SLA*S

In SC/65b/AWMP03, Brandão and Butterworth presented initial results for four potential *SLA*s.

(1) the 'Interim *SLA*' agreed by the Committee in 2008 (IWC, 2009b) which is based on the most recent estimate of abundance;
(2) a weighted-average 'Interim *SLA*' which uses all abundance estimates, but earlier abundance estimates are downweighted compared to more recent ones; and
(3) and (4) were variants of the weighted-average interim *SLA* that apply an adjustment to the multiplier of the abundance estimate in the interim *SLA* that depends on the trend of the abundance indices. This allows for additional reduction of the *Strike Limit* if abundance shows a reasonably precise downward trend. The two *SLA*s differ in the values for the control parameters. The *SLAs* can thus provide either a 'large' or 'lesser' change in depletion compared to the weighted-average *SLA* so that the resource is not reduced as much by strikes if MSYR is low.

The authors noted that although the weighted-average *SLA* performs well in terms of need satisfaction, it performs poorly for some 1% $MSYR_{1+}$ trials in terms of conservation; improvement in terms of relative increase in population size

Table 5
Summary of factors tested in the trials.

| | Levels (reference levels shown bold) | |
|---|---|---|
| Factors | Humpback whales | Bowhead whales |
| $MSYR_{1+}$ | 1%, 3%, **5%**, 7% | 1%, **2.5%**, 4% |
| $MSYL_{1+}$ | 0.6 | **0.6**, 0.8 |
| Time dependence in *K** | Constant, halve linearly over 100 years. | |
| Time dependence in natural mortality, *M** | Constant, double linearly over 100 years. | |
| Episodic events* | None; 3 events occur between years 1-75 (with at least 2 in years 1-50) in which 20% of the animals die; events occur every 5 years in which 5% of the animals die. | |
| Need envelope | A: 10, 15, 20; 20 thereafter.<br>B: 10, 15, 20; 20->40 over years 17-100.<br>C: 10, 15, 20; 20->60 over years 17-100.<br>D: 20, 25, 30; 30->50 over years 17-100. | A: 2, 3, 5; 5 thereafter.<br>B: 2, 3, 5; 5 -> 10 over years 17-100. |
| Future Canadian catches | N/A | A: 5_constant over 100 years.<br>B: 2-> 8 over 100 years.<br>D: 2 constant over 100 years. |
| Survey frequency | 5 years, **10 years**, 15 years | |
| Historic survey bias | 0.8, **1.0**, 1.2 | 0.5, **1.0** |
| First year of projection, τ | 1960 | 1940 |
| Alternative priors | $S_{1+} \sim U[0.9, 0.99]$; $f_{max} \sim U[0.4, 0.6]$; $a_m \sim U[5, 12]$ | N/A |
| Strategic surveys | Extra survey if a survey estimate is less than half of the previous survey estimate | |
| Asymmetric environmental stochasticity | $\tilde{\rho}_f$ **= 0.320** | |
| Depletion | Depletion = 0.3; depletion = 0.15/ 0.6 | |

*Effects of these factors begin in year 2013 (i.e. at start of management). The adult survival rate is adjusted so that if catches were zero, then the average population size during years 250-500 equals the carrying capacity. Note: for some biological parameters and levels of episodic events, it may not be possible to find an adult survival rate which satisfies this requirement.

Table 6
Bowhead whale *Evaluation Trials* (each conducted conditioning to the estimate of abundance for West Greenland, treating this as absolute abundance). Values given in bold type show differences from the base trial.

| Trial | Description | $MSYR_{1+}$ | Need scenario | Survey freq. | Canadian catches | Historic survey bias |
|---|---|---|---|---|---|---|
| 1A | $MSYR_{1+}$=2.5% | 2.5% | A, B | 10 | A | 1 |
| 1B | $MSYR_{1+}$=1% | 1% | A, B | 10 | A | 1 |
| 1C | $MSYR_{1+}$=4% (and $MSYL_{1+}$=0.8) | 4% | A, B | 10 | A | 1 |
| 2A | 5 year surveys | 2.5% | A, B | 5 | A | 1 |
| 2B | 5 year surveys; $MSYR_{1+}$=1% | 1% | A, B | 5 | A | 1 |
| 3A | 15 year surveys | 2.5% | A, B | 15 | A | 1 |
| 3B | 15 year surveys; $MSYR_{1+}$=1% | 1% | A, B | 15 | A | 1 |
| 4A | Survey bias=0.5 | 2.5% | A, B | 10 | A | 0.5 |
| 4B | Survey bias=0.5; $MSYR_{1+}$=1% | 1% | A, B | 10 | A | 0.5 |
| 5A | 3 episodic events | 2.5% | A, B | 10 | A | 1 |
| 5B | 3 episodic events; $MSYR_{1+}$=1% | 1% | A, B | 10 | A | 1 |
| 6A | Stochastic events every 5 years | 2.5% | A, B | 10 | A | 1 |
| 6B | Stochastic events every 5 years; $MSYR_{1+}$=1% | 1% | A, B | 10 | A | 1 |
| 7A | Alternative future Canadian catches | 2.5% | A, B | 10 | B | 1 |
| 7B | Alternative future Canadian catches; $MSYR_{1+}$=1% | 1% | A, B | 10 | B | 1 |
| 9A | Alternative future Canadian catches | 2.5% | A, B | 10 | D | 1 |
| 9B | Alternative future Canadian catches; $MSYR_{1+}$=1% | 1% | A, B | 10 | D | 1 |
| 10A | Asymmetric environmental stochasticity (depletion=0.3) | 2.5%* | A, B | 10 | A | 1 |
| 10B | Asymmetric environ. stochasticity; $MSYR_{1+}$=1% (depletion=0.3) | 1%* | A, B | 10 | A | 1 |

with the variants comes at the expense of need satisfaction. This trade-off also occurs for trials with a higher $MSYR_{1+}$.

In SC/65b/AWMP02, Witting outlined candidate *SLA*s based on adjustments to the 'Interim *SLA*'. The core calculation is an initial *Strike Limit* that is given as a percentage of a lower percentile of an abundance estimate. The percentage is determined by an *r* parameter, that is specified as a proportional take (e.g. *r*=0.03). The lower percentile is determined by a point estimate of abundance for the most recent survey estimate, a percentile parameter *p,* and the CV of the estimate (assuming a log normal distribution). The point estimate is given by a linear regression over the most recent four survey estimates, so that noise from random fluctuations between estimates is reduced, while a possible trend over time is maintained in the calculation. The CV is a time-weighted average of the CV's of the four estimates.

The initial *Strike Limit* is modified for increased need satisfaction and increased protection. Need satisfaction is increased by a 'snap to need' function, which sets the *Strike Limit* equal to need if the initial *Strike Limit* is greater or equal to 80% of need. If the point estimate of abundance is lower than a specified abundance, a protection function forces the *Strike Limit* to be very low. For the case of West Greenland bowhead whales, the yearly *Strike Limit* is set to 2 if the point estimate of abundance is 800, and it is then scaled linearly downwards to zero at a point estimate of 400.

After examining the influence of the variation in the CV on the performance of the *SLA*, *p*=2 was chosen for the candidate *SLA*s (equal to an approximate lower 5th percentile). The *SLA* was then tuned to *p*=2 to obtain the

Table 7

Proportion of times that each *SLA* achieves the conservation performance benchmark for various subsets of the 36 *Evaluation Trials* for bowhead whales off West Greenland, and the mean of the 5th percentile need satisfaction (N9 over 20 and 100 years) values within each such subset of trials. For all table entries, higher numbers indicate better performance.

| | Interim | *SLA*A | *SLA*B | *SLA*C | *SLA*D |
|---|---|---|---|---|---|
| **(a) Results by MSY rate** | | | | | |
| $MSYR_{1+}$=2.5% trials (18 trials) | | | | | |
| Conservation performance | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Need satisfaction 20 years | 0.92 | 0.73 | 0.74 | 0.97 | 0.98 |
| Need satisfaction 100 years | 0.96 | 0.81 | 0.82 | 0.88 | 0.97 |
| $MSYR_{1+}$ = 1% (18 trials) | | | | | |
| Conservation performance | 0.50 | 1.00 | 0.89 | 0.56 | 0.50 |
| Need satisfaction 20 years | 0.81 | 0.71 | 0.72 | 0.97 | 0.98 |
| Need satisfaction 100 years | 0.76 | 0.38 | 0.39 | 0.53 | 0.76 |
| **(b) Results by need envelope** | | | | | |
| Need Scenario A (18 trials) | | | | | |
| Conservation performance | 0.78 | 1.00 | 0.94 | 0.78 | 0.78 |
| Need satisfaction 20 years | 0.86 | 0.72 | 0.73 | 0.97 | 0.98 |
| Need satisfaction 100 years | 0.88 | 0.62 | 0.62 | 0.73 | 0.89 |
| Need Scenario B (18 trials) | | | | | |
| Conservation performance | 0.72 | 1.00 | 0.94 | 0.78 | 0.72 |
| Need satisfaction 20 years | 0.86 | 0.72 | 0.73 | 0.97 | 0.98 |
| Need satisfaction 100 years | 0.84 | 0.57 | 0.59 | 0.67 | 0.85 |
| **(c) Results by future Canadian catches** | | | | | |
| Canadian Scenario A (28 trials) | | | | | |
| Conservation performance | 0.75 | 1.00 | 0.93 | 0.79 | 0.75 |
| Need satisfaction 20 years | 0.87 | 0.72 | 0.73 | 0.97 | 0.97 |
| Need satisfaction 100 years | 0.86 | 0.60 | 0.61 | 0.71 | 0.86 |
| Canadian Scenario B (4 trials) | | | | | |
| Conservation performance | 0.50 | 1.00 | 1.00 | 0.50 | 0.50 |
| Need satisfaction 20 years | 0.84 | 0.72 | 0.72 | 1.00 | 1.00 |
| Need satisfaction 100 years | 0.81 | 0.53 | 0.53 | 0.66 | 0.84 |
| Canadian Scenario D (4 trials) | | | | | |
| Conservation performance | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Need satisfaction 20 years | 0.85 | 0.72 | 0.72 | 1.00 | 1.00 |
| Need satisfaction 100 years | 0.88 | 0.62 | 0.61 | 0.72 | 0.91 |

highest average need satisfaction. This was achieved under the conservation constraint that the lower 5th percentile of the ratio of the final 1+ population size at the end of the simulation period to that at the start was larger than 1 (for the *Evaluation Trials* with $MSYR_{1+}$=0.01). The result was a proposed 'best' candidate (denoted p2r0.9) with $r$=0.009.

#### 8.1.1.3 TRIAL RESULTS

The Committee has previously agreed the appropriate the statistics and plots to compare candidate *SLA*s (e.g. see IWC, 2014). Initial evaluation of the candidate *SLA*s focussed primarily on the following tables and plots (the full set is available from the Secretariat):

(1) a table with rows by trial for the 'Interim *SLA*' and each candidate *SLA*, along with scenarios in which all future catches are set to zero, in which there are only incidental catches into the future (no aboriginal catches), and in which the strike limit equals need. The tables include the lower 5th percentile and median for the following performance statistics (see Annex D of SC/65b/Rep6 for definitions): D1 (final depletion) for the 1+ component of the population; D1for the mature female component of the population; D8 (rescaled final depletion) based on incidental catches; D8 based on no future catches, D10 (relative increase), and N9 (need satisfaction) for 20 and 100 years;
(2) time-trajectories of the lower 5th percentiles and medians for 1+ population size in which the area which encompasses the results for zero future catches and future strikes equal to need is shaded, and lines are shown for the scenario in which there are only incidental catches into the future as well as for the 'Interim *SLA*' and the candidate *SLA*s (see example in Annex E, fig 2a); and
(3) 'Zeh' plots which show the same results as the table, except that the N12 (mean downstep) statistic is also reported (see example in Annex E, fig 2b).

The performance of four new *SLA*s was examined in detail, along with the 'Interim *SLA*' for comparison. These were:

(1) *SLA*A: *SLA* p2r0.9 of SC/65b/AWMP02;
(2) *SLA*B: *SLA* p2r1 of SC/65b/AWMP02.
(3) *SLA*C: (*SLA*3 of SC/65b/AWMP03);
(4) *SLA*D: (*SLA*4 of SC/65b/AWMP03);

The Committee noted that the time taken to determine and condition the trials meant that developers had had relatively little time to work on their *SLA*s.

Evaluation of the *SLAs* concentrated on: (a) the conservation performance, particularly for trials with $MSYR_{1+}$=1%, high need, and high future Canadian catches; and (b) their performance in relation to the current 'Interim *SLA'*. The four *SLA*s are tuned to somewhat different need-conservation trade-offs, which is reflected in the results of the trials.

In order to summarise inferences from the trials, attention was focussed on cases where either the lower 5th percentile of the D1 (1+) statistic exceeded 0.6 or the 5th percentile of D10 statistic was below 1 and in addition, examined the average of the lower 5th percentile of the N9 statistic.

Table 7 summarises various aspects of the trials in terms of conservation and need performance using these criteria. Overall, all of the *SLA*s performed adequately in terms of conservation performance if $MSYR_{1+}$=2.5% but as would be expected, performance was more variable for $MSYR_{1+}$=1% (Table 7a). From an examination of the tabular and graphical results, the Committee identified some general features:

(a) *SLA*s A and B generally had better conservation performance but poorer need satisfaction;
(b) *SLA*s C and D had better conservation and need satisfaction performance for the MSYR1+=2.5% trials;
(c) *SLA*s A and B exhibited higher levels of variability than *SLA*s C and D; and
(d) as expected, performance in terms of need satisfaction was better for the trials in which the Canadian catches were lower than for the basecase trials.

The Committee **agrees** that the performance of the 'Interim *SLA*' in these trials confirms the earlier recommendation of the Scientific Committee that at least for up to two quota block it was indeed a suitable *SLA*. However, the Committee also **agrees** that for the longer 100-year period, the results showed that better performance than the 'Interim *SLA*' could be obtained for bowhead whales off West Greenland.

Performance for the *Robustness Trials* is generally as expected given the results of the *Evaluation Trials*, as discussed under Annex E, item 2.5.

#### 8.1.1.4 CONCLUSIONS AND RECOMMENDATIONS

The Committee **agrees** that developing *SLA*s for bowhead whales off West Greenland that fully meet both conservation and need objectives is particularly difficult since:

(1) the *SLA* is only able to 'control' one source of mortality, i.e. strikes for the Greenland hunt, whereas mortality also occurs from catches by a non-member nation and from bycatches;

Table 8

The *Evaluation Trials* for humpback whales. Values given in bold type show differences from the base trial.

| Trial | Description | $MSYR_{1+}$ | Need scenarios | Survey frequency | Historic survey bias |
|---|---|---|---|---|---|
| 1A | $MSYR_{1+}$=5% | 5% | A, B, C, D | 10 | 1 |
| 1B | $MSYR_{1+}$=3% | 3% | A, B, C, D | 10 | 1 |
| 1C | $MSYR_{1+}$=7% | 7% | A, B, C, D | 10 | 1 |
| 2A | 5 year surveys | 5% | B, C, D | 5 | 1 |
| 2B | 5 year surveys; $MSYR_{1+}$=3% | 3% | B, C, D | 5 | 1 |
| 3A | 15 year surveys | 5% | B, C | 15 | 1 |
| 3B | 15 year surveys; $MSYR_{1+}$=3% | 3% | B, C | 15 | 1 |
| 4A | Survey bias = 0.8 | 5% | B, C, D | 10 | 0.8 |
| 4B | Survey bias = 0.8; $MSYR_{1+}$=3% | 3% | B, C, D | 10 | 0.8 |
| 5A | Survey bias = 1.2 | 5% | B, C, D | 10 | 1.2 |
| 5B | Survey bias = 1.2; $MSYR_{1+}$=3% | 3% | B, C, D | 10 | 1.2 |
| 6A | 3 episodic events | 5% | B, C, D | 10 | 1 |
| 6B | 3 episodic events; $MSYR_{1+}$=3% | 3% | B, C, D | 10 | 1 |
| 7A | Stochastic events every 5 years | 5% | B, C, D | 10 | 1 |
| 7B | Stochastic events every 5 years; $MSYR_{1+}$=3% | 3% | B, C, D | 10 | 1 |
| 8A | Asymmetric environmental stochasticity (depletion=0.3) | 5% | B, C, D | 10 | 1 |
| 8B | Asymmetric environmental stochasticity (depletion=0.3) | 3% | B, C, D | 10 | 1 |

Table 9

Number of times that the each *SLA* does *not* achieve the benchmark levels for *SLA* performance for the 18 *Evaluation Trials* for humpback whales off West Greenland. In this table, low numbers represent better performance.

| | Interim | *SLA*A | *SLA*B | *SLA*C | *SLA*D |
|---|---|---|---|---|---|
| **(a) Results by MSY rate** | | | | | |
| $MSYR_{1+}$=5% trials (24 trials) | | | | | |
| Conservation performance | 0 | 0 | 0 | 0 | 0 |
| Need satisfaction 20 years | 0 | 0 | 0 | 0 | 0 |
| Need satisfaction 100 years | 0 | 0 | 0 | 3 | 0 |
| $MSYR_{1+}$ = 3% (24 trials) | | | | | |
| Conservation performance | 0 | 0 | 0 | 0 | 0 |
| Need satisfaction 20 years | 9 | 0 | 0 | 3 | 3 |
| Need satisfaction 100 years | 0 | 0 | 0 | 7 | 0 |
| **(b) Results by need level** | | | | | |
| Need Level A (2 trials) | | | | | |
| Conservation performance | 0 | 0 | 0 | 0 | 0 |
| Need satisfaction 20 years | 1 | 0 | 0 | 0 | 0 |
| Need satisfaction 100 years | 0 | 0 | 0 | 0 | 0 |
| Need Level B (16 trials) | | | | | |
| Conservation performance | 0 | 0 | 0 | 0 | 0 |
| Need satisfaction 20 years | 1 | 0 | 0 | 0 | 0 |
| Need satisfaction 100 years | 0 | 0 | 0 | 2 | 0 |
| Need Level C (16 trials) | | | | | |
| Conservation performance | 0 | 0 | 0 | 0 | 0 |
| Need satisfaction 20 years | 1 | 0 | 0 | 0 | 0 |
| Need satisfaction 100 years | 0 | 0 | 0 | 3 | 0 |
| Need Level D (16 trials) | | | | | |
| Conservation performance | 0 | 0 | 0 | 0 | 0 |
| Need satisfaction 20 years | 6 | 0 | 0 | 3 | 3 |
| Need satisfaction 100 years | 0 | 0 | 0 | 5 | 0 |

(2) it is also not possible to assume that future Canadian abundance surveys will occur; and
(3) the remaining uncertainty over stock structure (and therefore abundance) means that the scenarios that must be considered may be overly conservative.

With respect to (3) the Committee **strongly encourages** scientists from Canada and Greenland to cooperate on issues related to stock structure and abundance that may allow revision of the trial structure at a future *Implementation Review.*

Given the difficulties presented by these circumstances, the Committee **agrees** that although improved performance over the *SLA*s considered this year was possible, it was unlikely that an *SLA* could be developed that fully met the conservation objectives (the highest priority) whilst also meeting need fully for the most difficult scenarios. Given this, the SWG **requested** Witting to consult within Greenland as to whether it wished to proceed with the 'high' need envelope.

The Committee **concludes** that further work should be undertaken by the developers during the coming year. It noted that now conditioning had been completed, progress on *SLA* development could take place at a faster rate, with progress being reported at the proposed intersessional Workshop discussed below. The objective would be for the Committee to be in a position to recommend an *SLA* to the Committee next year (see the work plan).

### *8.1.2 Development of an SLA for the humpback whale hunt off West Greenland*

#### 8.1.2.1 DATASETS, TRIAL STRUCTURE AND CONDITIONING

An important component of the intersessional Workshop was the finalisation of the datasets to be used in the trials. With respect to stock structure, the Committee has agreed that the appropriate 'unit-to-conserve' is the West Greenland feeding aggregation (e.g. see IWC, 2008a; 2012b).

The abundance estimates (including indices of abundance) for use in the trials have been discussed previously by the Committee and were agreed last year (IWC, 2014d); they are summarised in Annex E, table 7 and in SC/65b/Rep06 (Annex D).

Intersessional work (SC/65b/Rep06) focussed on developing removals series that took into account the incidental captures of 'Greenland' animals elsewhere in their range based *inter alia* on photographic matches from the College of the Atlantic (Simon and Boye, 2014) and movement information from telemetry data. The full review of information confirmed that approach previously adopted to incorporate bycatches outside Greenland. The final series can be seen in Annex F of SC/65b/Rep06.

The Committee **endorses** the final trial structure given in Annex D of SC/65b/Rep06. This provides *inter alia* details on the population model, conditioning, trials, removals, need envelopes and abundance.

The factors considered in the trials are given in Table 5. The *Evaluation Trials* are shown in Table 8. The conditioning of the operating models was conducted intersessionally. The SWG reviewed the conditioning by examining the diagnostic plots in the usual manner and agreed that conditioning had been achieved successfully. The Committee **endorses** this view.

#### 8.1.2.2 CANDIDATE *SLA*S

In SC/65b/AWMP01, Witting outlined candidate *SLA*s for humpback whales off West Greenland, that have the same structure, parameters and 'snap to need' function as those applied to bowhead whales (SC/65b/AWMP02; see Item 8.1.1.2 above). The selected 'protection level' within the *SLA* is slightly higher than that for bowhead whales. While this may seem counterintuitive given the higher growth rates of humpback whales, the developer's choices reflect that the bowhead whale is managed on what is known to be a sub-component of a stock, which allows for a somewhat lower protection level. 'Snap to need' occurs when the *Strike Limit* is 80% of need, and $p$ is set to 2. The value of $r$ was tuned which results in an *SLA* with $r$=0.04 that provides full need satisfaction for all of the *Evaluation Trials*, and also ensures that the 1+ population size at the end of the 100-year simulation period is higher than that at the start of this period for all of the *Evaluation Trials*.

The *SLA*s developed for humpback whales off West Greenland by Brandão (SC/65b/AWMP04) have the same structure as those developed for the bowhead whales (see Item 2.3). The control parameters of these *SLA*s were not 'tuned' for the humpback case; rather the same values were used as for the bowhead case, due to a lack of time.

#### 8.1.1.3 TRIAL RESULTS

The Committee explored the performance of four new *SLA*s in detail as well as the interim *SLA* for comparison. These were the same as for the bowhead whale:

(1) *SLA*A: *SLA* p2r4 of SC/65b/AWMP01;
(2) *SLA*B: *SLA* p2r3 of SC/65b/AWMP01;
(3) *SLA*C: *SLA*3 of SC/65b/AWMP03;
(4) *SLA*D: *SLA*4 of SC/65b/AWMP03;

The Committee noted that the time taken to determine and condition the trials meant that developers had had relatively little time to work on their *SLA*s. However, it also noted that the humpback case was relatively data rich compared to the bowhead case and that future catches from non-member nations was not an issue.

Consideration of the full set of graphical and tabular results (available from the Secretariat) followed the process agreed for the bowhead whale described under Item 8.1.1.3. There was relatively little impact of the need envelope in terms of need satisfaction performance of the *SLA*s (Table 9b). Performance in terms of conservation and need satisfaction was primarily evaluated using the same performance evaluation statistics (D1, D10 and N9) as for West Greenland bowhead whales (Table 9) as well as consideration of the graphical output. All of the *SLA*s except *SLA* C achieved satisfactory levels of performance when $MSYR_{1+}$=5%. However, only *SLA*s A and B achieved fully satisfactory performance when $MSYR_{1+}$=3%. Generally, *SLA*s A and B achieve notably better performance than the other *SLA*s, especially with respect to need satisfaction.

The Committee **agrees** that the performance of the 'Interim *SLA*' in these trials confirmed the earlier recommendation of the Scientific Committee that it was indeed a suitable *SLA,* at least for up to two block quotas. However, the Committee also **agrees** that for the longer 100-year period, the results showed that better performance than the 'Interim *SLA*' could be obtained for humpback whales off West Greenland.

In terms of *Robustness Trials*, performance was as expected for all *SLA*s.

#### 8.1.1.4 CONCLUSIONS AND RECOMMENDATIONS

Unlike the situation for the bowhead whales, the Committee **agrees** that the performance of two of the candidate *SLA*s (*SLA*s A and B) meets the Commission's objectives in terms of conservation and need. However, in terms of need satisfaction, *SLA*A performed slightly better than *SLA*B. For example, the lower 5$^{th}$ percentile of need satisfaction exceeded 0.99 for all except one trial for *SLA*A while *SLA*B achieved lower than 99% need satisfaction with 95% probability for 3 trials (20 year need satisfaction) and 8 trials (100-year need satisfaction). In accordance with its previous agreement (IWC, 2014d) that once an *SLA* had been developed that fully met the Commission's objectives, that time would not be spent trying to improve it even further, the Committee **recommends** that *SLA*A (hereafter the *Humpback SLA*) be used to provide long-term management advice to the Commission on the subsistence hunt of humpback whales off West Greenland, subject to final validation of the code by the Secretariat and archive running of the full set of statistics and graphical output.

The Committee was pleased to note that this component of its work plan had been completed and **thanks** the SWG on the AWMP for its hard work in this regard since focussing on this case in 2012. In particular, it wished to thank the developer of the *Humpback SLA,* Witting, and the other developers, Brandão and Butterworth, for their hard work in reaching this stage. Special thanks are also due to Brandão, Witting and Punt for their conscientious work in developing and finalising the operating model and conditioning. The Committee **stresses** that this work could not have been accomplished without assistance from the AWMP Developer's Fund established by the Commission, the funded intersessional Workshops and the hard work of the intersessional Steering Group. It **agrees** that this process (i.e. maintenance of the Developer's Fund, holding of intersessional Workshops and an active Steering Group) should be followed with respect to completing the development of the remaining *SLA*s for the Greenland hunts.

### *8.1.3 Development of an* SLA *for the common minke whale hunt off Greenland*

The Committee has previously noted connection between the development of an *SLA* for the Greenland hunts and the RMP *Implementation Review* for common minke whales in North Atlantic and the need for consistency in a number of aspects of operating model development and stock structure hypotheses (see IWC, 2013b). Given this, the joint AWMP/RMP intersessional Workshop was held in Copenhagen in April 2014; an important component of this successful Workshop was simulation work and co-operative genetic analyses supported by the IWC. A short Chair's summary of the results of the Workshop is given in Annex D, Appendix 5, item 2.1.

The Workshop had developed stock structure hypotheses based on a thorough review of the data from a suite of sources and began the work to develop the appropriate modelling framework. This work continued intersessionally and was reviewed at the pre-meeting of the RMP (Annex D, Appendix 5). The Committee **agrees** that framework developed for the RMP *Implementation Review* (Annex D, Appendix 5, Adjunct 5) is applicable to progress work on *SLA* development.

Much of the discussion within the SWG on the AWMP focussed on developing a work plan for *SLA* development with the objective of having a recommended *SLA* ready by the 2017 Annual Meeting. The Committee thanked Punt for working hard at this meeting to ensure that the initial conditioning of the basic operating model had begun. This will allow a preliminary version of the program to be available to developers shortly after the end of the SC

Table 10
Two-year work plan for AWMP (the second year is more tentative than the first and depends on progress).

| Topic | Intersessional (2014-15) | SC/66a (May-June 2015) | Intersessional (2015-16) | SC/66b (May-June 2016) |
|---|---|---|---|---|
| Validate *Humpback SLA* | Complete by July 2014. | Receive report formally. | No | No |
| Development of *SLA* for bowhead whales | Workshop (January). Developers' work. | Expect to finalise *SLA* recommendation. | Probable workshop (January). Developers' work. | Finalise *SLA* recommendation if not completed in 2015. |
| Development of *SLA* for common minke whales | Workshop. Developers' work. | Review progress. Developers' work. | Workshop. Developers' work. | Hope to finalise *SLA*. |
| Development of *SLA* for fin whales | Workshop. Developers' work. | Review progress. | Workshop. Developers work. | Review progress. Developers' work. |
| Annual review of catch limits | No | Complete. | No | Complete. |
| *Implementation Reviews* | No | None scheduled. | No | Prepare for gray whale *Implementation Review*. |

meeting. However, the full version of the control program will not be finalised until after the end of the proposed intersessional Workshop. In view of the new approach being used to model the sex-ratio, minor amendments to the operating model may be necessary following consideration of the conditioning results, particularly given the interaction between aboriginal and commercial catch patterns.

The need envelopes for West Greenland common minke whales will be confirmed later but will include a constant level of 200 whales for West Greenland and of 12 whales for East Greenland.

The Committee **welcomes** the information that Witting, Butterworth and Brandão expect to begin work intersessionally on the development of candidate *SLA*s for Greenlandic minke whales.

*8.1.4 Development of an* SLA *for the hunt of fin whales off West Greenland*

The Committee has previously noted connection between the development of an *SLA* for the Greenland hunts and the RMP *Implementation Review* for fin whales in North Atlantic and the need for consistency in a number of aspects of operating model development and stock structure hypotheses (see IWC, 2013a). A technical RMP Workshop was held in Copenhagen in January 2014 and this was followed up by work at the present meeting (see Annex D, item 3.2).

The Committee **confirms** that the general trial specifications developed for the *Implementation Review* for North Atlantic fin whales are suitable for testing *SLA*s in the West Greenland area. However, the operating model is complex and is not yet operational. The Committee is concerned that the complexity of the model may not allow development of an *SLA* for fin whales in time for the 2017 Scientific Committee meeting. It **agreed** that priority should be given to development of an *SLA* for minke whales, in view of the greater contribution of minke whales to the overall interspecies need satisfaction for Greenland. With respect to fin whales, the Committee **agrees** that an alternative approach to develop a single-stock operating model will be conservative (i.e. from a conservation perspective) in that it assumes that the animals found of West Greenland comprise a single stock, and should be investigated. The trials steering group (Witting, Givens, Brandão, Butterworth, Punt, Allison and Donovan) will consider this suggestion further and report back to the Intersessional Workshop.

### 8.2 Follow-up work on conversion factors for the Greenland hunt

This item relates to follow up work on conversion factors (i.e. related to converting edible whale products in to numbers of whales by species) that was undertaken by Donovan *et al.* (2010) at the request of the Commission. That report, endorsed by the Scientific Committee, provided a conversion factor for the common minke whale (for which data were abundant) and provisional factors for the other species (often by analogy with other areas as data are sparse for Greenland). They had recommended *inter alia* that data for those species be collected in Greenland such that the factors could be modified if necessary.

SC/65b/AWMP05 provided a full report on the work undertaken on conversion factors within Greenland, including explaining improved procedures for data collection and updating the new information obtained. All reliable weights obtained since 2009 are listed in table 2 of SC/65b/AWMP05 (bowhead whale $n$=6; humpback whales, $n$=8; fin whale, $n$=4). A detailed summary is given in Annex E, item 8. Greenlandic biologists will continue their close contact with hunters to improve the number of reported weights.

The Committee **thanks** the authors for this work which responded appropriately to its recommendations last year for a full report and **encourages** continuation of the study. It noted that the provisional conversion factors developed in 2009 (Donovan *et al.*, 2010) appear to overestimate the amount of edible products actually obtained (although sample sizes are small), but were generally within the confidence intervals. It also noted the low numbers of lost whales in the Greenlandic hunts.

The Committee **recognises** the difficulties inherent in obtaining the weight data, including: (1) persuading the hunters to modify their behaviour and obtain accurate weight measures; and (2) enabling researchers to be present to assist in the data collection. The latter is extremely difficult given the opportunist nature of the hunt and the variety of locations (both in distance and difficulties in access) where flensing is carried out.

Recognising: (1) the difficult field conditions; (2) the relatively low number of catches (and thus slow increase in sample size) of the species for which the conversion factors were deemed provisional; (3) the fact that the new data, albeit few, did not suggest that the provisional factors from the 2010 study required major modification; and (4) that the information was not required for *SLA* development, the Committee **agrees** that annual update reports are unnecessary for the work of the Scientific Committee. It **suggests** that data are submitted directly to the Commission when it meets and incorporated as necessary into need statements.

### 8.3 Aboriginal Whaling Management Scheme

In 2002, the Committee **strongly recommended** that the Commission adopt the Aboriginal Subsistence Whaling Scheme (IWC, 2003). This covers a number of practical issues such as survey intervals, carryover, and guidelines for surveys. The Committee has stated in the past that the AWS provisions constitute an important and necessary component of safe management under AWMP *SLA*s and it **reaffirms** this view as it has for the previous 12 years.

### 8.4 Work plan

The Committee noted that this year it was expected to put forward a draft work plan and budget for a two-year period. The two-year work plan for AWMP work summarised in Table 10 has to include a degree of expectation of progress that may not be realised.

## 9. ABORIGINAL SUBSISTENCE WHALING MANAGEMENT ADVICE

The Committee noted that the Commission had not reached agreement on strike limits for Greenland at the 2012 Annual Meeting (IWC, 2013a). The Committee has based its management advice this year on the same need requests considered last year. In providing this advice, the Committee noted that the Commission had endorsed the interim safe approach (based on the lower 5$^{th}$ percentile for the most recent estimate of abundance) for providing advice for the Greenland hunts developed by the Committee in 2008 (IWC, 2009b, p.16); it was agreed that that this should be considered valid for two blocks i.e. up to the 2018 Annual Meeting. The Committee **emphasises** that the results of the simulation exercise being undertaken as part of the development process for *SLA*s for the Greenland humpback and bowhead whales **reconfirms** the Committee's original advice with respect to the interim safe approach (see Items 8.1.2 and 8.1.3).

The Committee notes that when providing management advice on subsistence whale hunts it provides advice in a specific way i.e. it comments only on whether the need request or present limits can be safely met from the perspective of the Commission's conservation objectives. If it or they cannot be safely met then the Committee provides advice on what strike limit is acceptable from a conservation perspective.

### 9.1 Bowhead whales off West Greenland

*9.1.1 New information (incl. catch data and agreed abundance estimates)*

No bowhead whales were taken in West Greenland in 2013 while three bowhead whales were taken in North East Canada in 2012 and 2013; no struck and lost whales were reported. The catch corresponds with the quota set by the Canadian authorities. Samples were reported to have been collected from the Canadian hunt and the Committee **encourages** collaboration with Canada on genetic work (and see Item 2.6). The Committee **thanks** Canada for providing this information and **encourages** future reporting to the IWC Secretariat.

It was reported that 65 biopsy samples had been collected from West Greenland bowhead whales in 2013. The Committee **welcomes** this information and **encourages** continuation of the work and collaboration with Canadian scientists to resolve the outstanding stock structure issues.

The Committee **endorses** the following two new abundance estimates for 2012 (SC/65b/Rep06): (1) a fully-corrected sighting survey abundance estimate of 744 (CV=0.34, 95% CI: 357-1,461); and (2) a mark-recapture estimate of 1,274 (CV=0.12). It **agrees** that the mark-recapture estimate provides the best estimate of abundance for the number of whales visiting West Greenland.

*9.1.2 Management advice*

Based on the agreed best 2012 estimates of abundance for bowhead whales (1,274 CV=0.12), and using the agreed interim approach, the Committee **repeats** its advice that an annual strike limit of two whales will not harm the stock.

### 9.2 North Pacific gray whales

*9.2.1 The report of the rangewide Workshop and related future work*

A rangewide review of the population structure and status of North Pacific gray whales was carried out at an IWC Workshop in La Jolla, California, 8-11 April 2014 (SC/65b/Rep08).

The Workshop objectives, as agreed last year (IWC, 2014d), were to: (1) review available information (especially new telemetry, genetics and photo-ID data) and reappraise the population structure and movements of North Pacific gray whales with a focus on examining status; (2) develop a modelling framework to better assess the status of gray whales and the potential impact of human activities and possible changes in regime or climate; and (3) provide information for updating the IUCN/IWC Conservation Management Plan for western gray whales.

The Workshop put considerable effort into reviewing all of the sources of data that could provide insights in to the movements and stock structure of gray whale across the North Pacific, including identifying available data that remained to be analysed. Using the stock structure hypotheses for the western North Pacific put forward last year as a starting point the data review, the Workshop developed a series of plausible stock structure hypotheses to take forward into the modelling exercise. In order to make progress in developing operating models to further explore the potential implications of these hypotheses, the Workshop agreed that the initial focus should be on three of these hypotheses (and one sensitivity test). The full range of hypotheses are illustrated in Annex F of SC/65b/Rep08.

The Workshop then went on to review and compile the extensive data sources and information on parameters that would be needed for the modelling exercise, including removals data, abundance and trends, population parameters and other human activities that might affect status.

The Workshop recognised that the process would necessarily be an iterative process. The first step of developing an age- and sex-aggregated model which includes multiple stocks would be taken primarily to understand whether sufficient data are available to justify the various stock structure hypotheses and whether parameterisation of the model based on the associated hypotheses can provide reasonable fits to the data. The Workshop developed a work plan and made a number of recommendations for future research. These can be found in SC/65b/Rep08, items 9 and 10.

The Committee **welcomes** the Workshop report, **thanks** the participants and **endorses** its recommendations.

In response to part of the work plan of the Workshop, SC/65b/BRG01 provided the mathematical specifications for a sex- and age-aggregated population dynamics model which can represent the stock hypotheses developed during the Workshop. The model allows for multiple stocks, each of which can have sub-stocks, multiple feeding and wintering grounds, as well as migratory corridors.

Based on this paper and the recommendations from the gray whale Workshop, Committee **recommends** the detailed work plan provided in Annex G to take this work forward.

*9.2.2 Other new information*

**PACIFIC COAST FEEDING GROUP (PCFG) WHALES**

SC/65b/BRG19 presented research on gray whales in northwest Washington with the goals to: (1) increase our understanding of gray whale use of the study area; (2) document the annual and seasonal fluctuations in the numbers of whales utilising the area; and (3) to assess the

fidelity of whales to the study area within and between years. The study confirms that even though northwest Washington is an important feeding area, most PCFG gray whales do not have strong fidelity to this one region within the PCFG.

Mate described the satellite-tagging of 35 PCFG gray whales off the coasts of Oregon from September to mid-October (*n*=12) and northern California near Pt. St. George, CA (*n*=23) from late October to December during 2009, 2012 and 2013. The 33 telemetry tracks ranged from 3-383d (mean=118, SD=98.1d) with one of the 2013 tags still transmitting at 193d at the time of manuscript preparation. The area off Pt. St. George (Crescent City, CA) is a consistent late fall 'hot spot' that attracts large numbers of PCFG whales just prior to the southerly migration. One healthy mature adult male was tracked for 383d and did not migrate, the first such documentation for a gray whale. Six of 12 whales that migrated to Baja for the reproductive season and back into the PCFG area, spent from 1-5 days in the Makah U&A[14] area as they migrated north. Three of the same 12 whales (one in each year) migrated as far as Icy Bay, Alaska (60°N), considerably farther north than the conventional definition of the PCFG area, spending up to 55d there.

The Committee **welcomes** this new paper and **encourages** more telemetry effort in the PCFG area, noting its value with respect to better understanding of stock structure and movements in the context of the work of the Workshop and the modelling exercise discussed above.

*9.2.2 Review of recent catch information*

A total of 127 gray whales were struck off Chukotka, Russia in 2013 resulting in 125 landed. Of those, 39 were males and 86 were females. Two of the whales were inedible because of a strong medicinal smell (i.e. 'stinky whales'). The body length of whales ranged between 7.9 and 15.5m (mean=10.1m). Body weights ranged between 5.9 and 39.1 tons (average=11.9 tons).

*9.2.3 Management advice*

The Committee **agrees** that the *Gray Whale SLA* remains the appropriate tool to provide management advice for Eastern North Pacific gray whales. It also **agrees** the proposed Makah whaling management plan agreed by the Committee last year remains the appropriate tool to provide management advice for hunts in Washington State, USA, recognising that it must include that the ongoing research programme that monitors the relative probability of harvesting a PCFG whale in the Makah Usual and Accustomed Fishing Grounds.

### 9.3 Bering-Chukchi-Beaufort (B-C-B) Seas stock of bowhead whale

*9.3.1 New information*

The Committee received three papers providing information on this stock.

SC/65b/BRG05 described new laboratory methods for measuring D/L ratios of aspartic acid (AAR) in bowhead whale lens nuclei, and reported upon age estimates for 64 B-C-B bowhead whales, ten of which had been also aged using baleen carbon cycling and/or corpora counting methods. The results strengthened previous evidence suggesting that some animals may live to 200 years or beyond: the oldest estimated age found in this research was 187 years (95% CI (142, 258)) for a 17.7m male. The results also suggested that the AAR technique provided lower estimated ages than the corpora counting approach. One whale (estimated age 88, 95% CI 66-120 years) had a Yankee whaling projectile point patented in 1879 embedded in it, strengthening previous evidence that the age estimate was plausible. The Committee **welcomes** this study and **encourages** further work on aging studies.

SC/65b/BRG20 reported on the occasional inadvertent harvest of bowhead whale calves in autumn by Alaskan Eskimos and updates George and Suydam (2006) which had been requested by the Commission.

SC/65b/BRG10 summarised the results of onshore observations of bowhead whales in coastal waters of Chukotka in 2010-13, and compares them with earlier surveys dating to 1992. These observations provide spatial, temporal and relative abundance information for bowheads in coastal waters. Observations of the spring migration of bowhead whales were made in the northwest Bering Strait region. The Committee **welcomes** this information and **encourages** work in this region.

Citta *et al.* (2013) reported on the analysis of spatial/temporal overlap of satellite tagged bowhead whales and Bering Sea pot fisheries to evaluate which fisheries had the greatest risk of interaction with bowhead whales. This is also discussed under Item 7.1.

*9.3.2 New catch information*

Harvest data from the Alaskan hunt were presented in SC/65b/BRG08. In 2013, 57 bowhead whales were struck resulting in 46 animals landed. Total landed of the hunt for 2013 was higher than the past 10 years (2003-12: mean of landed=40.5; SD=8.7). Efficiency (no. landed/no. struck) in 2013 was 81%, which was slightly higher than the past 10 years (mean of efficiency=77%; SD=7.4%). Of the landed whales, 25 were females and 21 were males. Seven of the 25 females were assumed sexually mature (>13.4m in length). Four of these were pregnant.

SC/65b/BRG03 reports that in 2013, one bowhead whales was taken in Chukotka, Russia. It was a 41-tonne, 13m male. No whales were struck and lost.

*9.3.4 Management advice*

The Commission adopted catch limits for a six-year block in 2012, i.e. 2013-18. The total number of strikes shall not exceed 336 with a maximum of 67 in any one year (with a carryover provision). The Committee has agreed that the *Bowhead Whale SLA* is most appropriate tool to provide management advice for this stock. The Committee **agrees** that these limits will not harm the stock.

### 9.4 Common minke whales off West Greenland

*9.4.1 New information*

In the 2013 season, 166 common minke whales were landed in West Greenland and nine were struck and lost. Of the landed whales, there were 127 females, 37 males and two of unknown sex. Genetic samples were obtained from 106 of these minke whales in 2013. The Committee **welcomes** the additional data and **encourages** the continued collection of samples. It was also pleased to learn that samples from West Greenland were included in the genetic analyses that formed part of the Joint AWMP/RMP Workshop on stock structure (SC/65b/Rep04).

Over the years, the Committee has re-emphasised the importance of collecting genetic samples from these whales, and it **welcomes** the new genetic analysis on population structure of common minke whale in the North Atlantic (SC/65b/RMP09), where samples from the West Greenland hunt were compared with samples from the Icelandic and Norwegian hunts. Out of 66 samples from West Greenland

[14]Usual and Accustomed Fishing Grounds.

Table 11
Most recent estimates of abundance for common minke whales in the Central North Atlantic by RMP *Small Area*.

| *Small Area*(s) | Year(s) | Abundance and CV |
|---|---|---|
| CM | 2005 | 26,739 (CV=0.39) |
| CIC | 2007 | 10,680 (CV=0.29) |
| CG | 2007 | 1,048 (CV=0.60) |
| CIP | 2007 | 1,350 (CV=0.38) |

analysed for kin relationships, one parent offspring relation was found with a whale caught in the Central CIC sub-area. Witting advised that more samples are soon to be included in this analysis.

*9.4.2 Management advice*
In 2009, the Committee was able to provide management advice for this stock for the first time. This year, using the Commission's agreed interim approach (IWC, 2009c) and last year's revised estimate of abundance (16,100 CV=0.43), the Committee **advises** that an annual strike limit of 164 will not harm the stock.

### 9.5 Common minke whales off East Greenland

*9.5.1 New information (incl. catch data and agreed abundance estimates)*
Four common minke whales were landed in East Greenland in 2013 and two were struck and lost. Of the landed whales, there were three females and one male. The Committee is **pleased** to note that samples were collected from all four landed whales and that samples from the East Greenland hunt were included in the genetic analysis (SC/65b/RMP09). Out of 16 samples from East Greenland analysed for kin relationships, one parent offspring relation was found with a whale caught in the Central CIC sub-area (Annex D, Appendix 7). The Committee **welcomes** the new information and **encourages** the continued collection of samples.

*9.5.2 Management advice*
Catches of minke whales off East Greenland are believed to come from the large Central stock of minke whales. The most recent strike limit of 12 represents a very small proportion of the Central Stock which numbers around 40,000 – see Table 11. The Committee **repeats** its advice of last year that a strike limit of 12 will not harm the stock.

### 9.6 Fin whales off West Greenland

*9.6.1 New information (incl. catch data and agreed abundance estimates)*
A total of nine fin whales (five females, three males and one of unknown sex) were landed, and none were struck and lost, off West Greenland during 2013. The Committee is **pleased** to note that genetic samples were obtained from all landed fin whales, and that the genetic samples of fin whales off West Greenland are now being analysed together with the genetic samples from the hunt in Iceland. It **encourages** the continued collection of samples.

*9.6.2 Management advice*
Based on the agreed 2007 estimate of abundance for fin whales (4,500 95%CI 1,900-10,100), and using the agreed interim approach, the Committee **repeats** its advice that an annual strike limit of 19 whales will not harm the stock.

### 9.7 Humpback whales off West Greenland

*9.7.1 New information (incl. catch data and agreed abundance estimates)*
A total of seven (four males and three females) humpback whales were landed, and one was struck and lost, in West Greenland during 2013. The Committee is **pleased** to learn that genetic samples were obtained from five of these whales and that Greenland is contributing fluke photographs to the North Atlantic catalogue, both from captured whales and other field studies. The Committee again **emphasises** the importance of collecting genetic samples and photographs of the flukes from these whales.

The Committee also **welcomes** a report that 11 biopsy samples had been collected from West Greenland humpback whales in 2013 and **encourages** continuation of the work and collaborative studies across the North Atlantic.

*9.7.2 Management advice*
Based on last year's revised and agreed estimate of abundance for humpback whales (2,704 CV=0.34) and the agreed interim approach, the Committee **agrees** that an annual strike limit of 10 whales will not harm the stock.

Furthermore, the Committee **recommends** that the new *Humpback SLA* agreed above (see Item 8.1.2) should be used to provide management advice by the Committee in the future, following completion of the usual final validation/checking process. The Committee **notes** that the *Humpback SLA*, if used now, would provide the same management advice as the interim approach for within this period, i.e. that an annual strike limit of 10 whales will not harm the stock.

### 9.8 Humpback whales off St. Vincent and The Grenadines

*9.8.1 New information (incl. catch data)*
A total of four humpback whales were landed (three males and one female) in St. Vincent and The Grenadines in 2013 and individual data on these whales (including lengths and sexes) have been supplied to the Secretariat. No lost whales were reported. Skin and/or blubber samples were collected from all four whales. Preliminary information is that these data will be analysed in collaboration with the USA. The Committee **welcomes** this information from St. Vincent and The Grenadines and **strongly encourages** continued tissue sampling and collection of fluke photographs where possible. Data should be shared with the appropriate databases and catalogues for the North Atlantic.

*9.8.2 Management advice*
The Committee has agreed that the animals found off St. Vincent and the Grenadines are part of the large West Indies breeding population (abundance estimate 11,570 95%CI 10,290-13,390). The Commission adopted a total block catch limit of 24 for the period 2013-18 for the Bequians of St. Vincent and The Grenadines. The Committee **repeats** its advice that this block catch limit will not harm the stock.

## 10. WHALE STOCKS

### 10.1 Antarctic minke whales

The Committee is undertaking an In-Depth Assessment of the Antarctic minke whale, which is focused on whales within the Indo-Pacific waters. Details of the discussions summarised below can be found in Annex G. In addition, during February 2014 the JARPA II Special Permit program was reviewed (SC/65b/Rep02) where research recommendations were made, of which many were referred to in Annex G.

*10.1.1 New methods or information*
**10.1.1.1 BIOLOGICAL PARAMETERS**
SC/65b/IA01 described the yearly trend of age at sexual maturity in Antarctic minke whales collected during 1987/88-

2004/05 JARPA and 2005/06-2010/11 JARPA II surveys. It is a revised version of Bando *et al.* (2014) presented to the JARPA II Review Workshop taking into consideration some of their recommendations. The results confirmed that the age at sexual maturity of both stocks declined from around 10-12 years for the mid-1940s cohorts to around 7-8 years for the early 1970s cohorts.

The Committee identified two additional potential methodological issues in SC/65b/IA01 not addressed in SC/65b/Rep02 (the JARPA II Review) which could affect the reliability of the long-term trends and suggestions were made to investigate these issues (Annex G item 2.1.1). The Committee **endorses** the suggested work plan in SC/65b/IA01 to address the rest of the JARPA II Review Panel recommendations.

SC/65b/IA02 described the proportion of pregnant animals among mature females (PPF) in Antarctic minke whale catches for two biological stocks using samples collected during 1987/88-2004/05 JARPA and 2005/06-2010/11 JARPA II surveys. The conducted analysis was a revision of SC/F14/J09 which was presented to the JARPA II Review Workshop (SC/65b/Rep02). The PPF of both stocks appeared stable at around 0.9.

In discussion, the Committee first considered how the measured pregnancy rate might be related to the actual birth rate. In response, the authors stated that they will be reporting on results from a feasibility study to examine the possibility of documenting recent lactation by observation of histological samples of the mammary gland to develop a potentially more appropriate index of reproductive success.

The Committee further discussed the possibility that, if birthrate could be inferred, then it would be possible to compare trends and absolute levels of the *per capita* surviving calf production estimates from SCAA estimates of birth and initial calf survival proportions. The difference might be indicative of trends in post-birth juvenile survival. Butterworth and Bravington offered differing views on the utility of and inferences to be drawn from this particular pregnancy dataset in the context of the In-Depth Assessment (Annex G, Appendix 2).

#### 10.1.1.2 ABUNDANCE AND DISTRIBUTION

When estimating abundance of Antarctic minke whales in CPII and CPIII, it was presumed that some proportion of the population of Antarctic minke whales was distributed within the sea ice fields, away from where vessels were able to survey. Though the Committee has agreed upon abundance estimates for the 'ice-free' surveyed area, it is still not known what proportion of Antarctic minke whales are in sea ice.

SC/65b/IA15 described Australian supported aerial surveys and subsequent abundance estimates to quantify the proportion of Antarctic minke whales that may be in summer sea ice regions of East Antarctica. Using generalised additive models, model-based estimates of uncorrected abundances and densities (uncorrected for availability bias) were produced. Using 'prorated' abundances from IDCR/SOWER, leveraged on simple estimates of encounter rate from open water north of the aerial survey region, there is some evidence that between 10 and 50% of the minke population can be found within 93-113°E inside ice during the 2009/10 summer.

SC/65b/IA16 provided an overview of the Antarctic minke whale data obtained from five helicopter surveys conducted from *RV Polarstern* between 2002 and 2013 in the Weddell Sea and around the Antarctic Peninsula in regions of varying ice concentrations. The results show high variability in predicted minke whale numbers over space and time, with a strong relationship to the 15% ice edge and a longitudinal gradient, with more minke whales predicted in the west of the survey area than in the east, around the 0° meridian.

The Committee noted these two studies used different definitions of 'the ice edge'. The authors stated in the future they will use the 3% level which corresponds to the IDCR/SOWER 'ice edge'.

The Committee noted that without some idea of availability bias for Antarctic minke whales, across a range of different sea ice concentrations and types, the ability to judge the true numbers of animals in sea ice areas is limited. After discussion, the Committee strengthened its previous conclusions that there is no reliable basis for quantitatively extrapolating these results to other areas and to the past. Nevertheless, these studies open the possibility of looking at variability in proportions-in-ice as a function of changing ice-coverage.

The Committee noted that currently availability bias for Antarctic minke whales has not been evaluated. To do so the Committee **agrees** that two types of information needed are: (1) information on time-at-depth results across a range of ice conditions; and (2) information on the *visibility* of minke whales from the air as a function of depth and water clarity. The first data need may be met by using satellite-tag information like that in Friedlaender *et al.* (2014), discussed in Item 13. The second data need might be harder to resolve. At least in principle, though, it could be addressed as a gigantic Secchi disk experiment, using a whale-shaped target moored underwater at known depth and over-flights from a fixed-wing, helicopter, or drone aircraft, presumably somewhere close to an Antarctic land base. It might also be possible to derive an estimate of availability bias from forward sighting data. An Intersessional Correspondence group was established to explore these methods and data.

SC/65b/IA14 investigated possible responsive movement of whales to observer vessels by analysing tracks of humpback and Antarctic minke whales conducted from the *RV Polarstern* in the Antarctic.

In discussion, the Committee recalled that the possibility of responsive movement in Antarctic minke whales had been considered several times in the past. Overall, no clear effects had been found. Notwithstanding some of the interpretational difficulties with these data, the Committee **welcomes** the prospect of more data coming from an extension of this paper, accompanied by information on environmental conditions.

The Committee also discussed acoustic detections of Antarctic minke whales as another way that could potentially reveal distribution and possibly abundance information. Risch *et al.* (2014) documented the sound referred to as the 'bio-duck' sound is produced by the Antarctic minke whale. The Committee noted that, now that the bio-duck sound is unmasked, it may be possible to scrutinise past, present and future hydrophone and sonobuoy data for evidence of minke whale distribution and variability, since the frequency range of the calls appears to be detected and recorded with the listening devices.

#### 10.1.1.3 STOCK STRUCTURE

Two papers, SC/65b/SD01 and SC/65b/IA13, contain new genetic information on stock structure in the Antarctic minke whale, where the technical aspects were discussed under Item 11. SC/65b/IA13 presented an integrated approach, by using genetic and morphometric data, for estimating longitudinal segregation of two populations for Antarctic minke whale. The result indicates that the spatial distribution of the two populations has a soft boundary in Area IV-E and V-W, which depends on year and sex.

The Committee noted (as in previous years) that the results from the SC/65b/IA13 approach should be useful for the In-Depth Assessment, once the model has been embedded in a random-effects framework as the authors intend, assuming that a consistent signal between the two types of data can be shown, and diagnostics are considered. The Committee agreed that it would be reasonable to continue to use the two-stock hypothesis as a default for In-Depth Assessment, although further data might of course change the picture in future.

*10.1.2 Consideration of factors that may drive Antarctic minke whale distribution and abundance*

SC/65b/IA10 reported relative densities in a spatial context of the circumpolar distribution of baleen whales using the data from CPII and CPIII of IDCR/SOWER. Generalised additive models (GAMs) and available climatological data were used to estimate the relative density. These models suggest that the spatial extents of blue, fin, humpback and southern right whales expanded throughout the time from CPII to CPIII, while that of Antarctic minke whales shrank. The spatial distribution of sei whales was relatively constant between CPII and CPIII, but it was difficult to make any conclusion because of the small sample size.

The Committee **welcomes** this paper, particularly as it will eventually be a contribution to the SOWER Special Volume. In discussion it was noted the difficulty of trying to model relationships between environmental covariates and species distributions, specific issues to be considered were identified in Annex G.

The Committee considered that Additional Variance (AV) should be further explored when trying to explain the inter-survey differences of the Antarctic minke whale abundance based on the IDCR/SOWER CPII and CPIII surveys. Overall, the inter-survey differences are too large to be explained in terms of: (1) a single common trend in abundance across the whole Antarctic; and (2) the intrinsic CV of the estimates; this 'unexplained' variation is known as AV. The Committee considered that there are really only three plausible causes: (1) changes in longitudinal distribution from year to year; (2) changes in the proportion of Antarctic minke whales in the ice (and therefore unavailable to SOWER surveys), both in time and by Area; and (3) 'area-specific changes'. Ways to investigate the three possibilities are discussed in Annex G.

*10.1.3 Application of statistical catch-at-age (SCAA) models*

SC/65b/IA03 updated the Statistical Catch-at-Age Analysis (SCAA) for Antarctic minke whales in response to recommendations from the JARPA II review panel. Parameters of the model (annual deviations about the stock-recruitment relationship, changes over time in carrying capacity, density-dependence parameters (productivity and carrying capacity), and parameters which determine growth by stock, age-specific natural mortality by stock, and vulnerability by area and 'fleet') are estimated by fitting the model to data on catches, catch-at-length, conditional age-at-length, and estimates of absolute and relative abundance. This version of the SCAA provided analyses based on updated JARPA and JARPA II abundance indices, included results for three ways to model natural mortality-at-age, explored the sensitivity of time-trajectories of model outputs to assumptions regarding the age-averaged rate of natural mortality, explored the implications of not having the JARPA and JARPA II data, and provided results for a revised reference model which assumed that the updated JARPA and JARPA II indices are absolute rather than relative indices of abundance. The SCAA model is able to mimic all of the data sources adequately and indicates that Antarctic minke whales in the assessed area increased from 1930 until the mid-1970s and have declined thereafter, with the extent of the decline greater for minke whales in Antarctic Areas III-E to V-W than for those further east. The estimates of natural mortality (with asymptotic standard deviations) from the 'new reference case' assessment of SC/65b/IA03 for the I stock for ages ≤3, 10-20 and ≥40 are $0.077yr^{-1}$ ($0.016yr^{-1}$), $0.048yr^{-1}$ ($0.005yr^{-1}$), and 0.107 ($0.005yr^{-1}$) respectively while the corresponding values for the P stock are $0.074yr^{-1}$ ($0.016yr^{-1}$), $0.046yr^{-1}$ ($0.005yr^{-1}$), and $0.103\ yr^{-1}$ ($0.005yr^{-1}$) respectively. Given that carrying capacity for minke whales is estimated to have changed over time, measures such as population size relative to the (current) carrying capacity are not immediately straightforward to interpret. However, the results of SCAA can be interpreted in the context of trends in abundance. The new reference case model implies that the total 1+ population size increased annually by 1.9% (SE 0.50) (stock I) and 2.1% (SE 0.70) (stock P) per annum between 1945 and 1968. Numbers of 1+ animals were estimated to have declined by 54% (stock I) and 35% (stock P) from 1968 to 2001. SC/65b/IA03 confirms that the ability to estimate trends in abundance and natural mortality rely on the availability of age and length data from the period of both commercial and Scientific Permit catches.

In discussion, the insensitivity of the results of the SCAA to ignoring the JARPA and JARPA II index data was highlighted, noting that previous analyses based on Virtual Population Analysis had indicated that information on trends in abundance are required to distinguish between different values for natural mortality. Reasons for the lack of sensitivity include the fact that the JARPA indices are fairly imprecise, and, when age and length data are included, then the JARPA abundance indices do not convey much extra information about trends.

Some members, noting the estimates above for natural mortality, held the view that this allowed inferences to be drawn concerning minimum values for MSYR for this species, essentially on a similar basis to that used in the MSYR rate review. They added that the results from SC/65b/IA03 would be of particular importance in conditioning *Implementation Simulation Trial*s for these minke whale populations, as well as for further development of multi-species models.

Japanese scientists commented that the analyses of SC/65b/IA03 confirmed that age and length data collected during JARPA and JARPA II had allowed natural mortality for Antarctic minke whales to be estimated satisfactorily, as had been a key objective of JARPA.

Other members commented that, since the SCAA analysis concluded that the value of MSYR could not be estimated by the SCAA model due to lack of contrast (i.e. a wide range of MSYR values were consistent with the data under this model), it was not valid to attempt to exclude parts of the range of MSYR values from simple inspection of the model results. Therefore, it is not valid to use the SCAA results draw inferences about the level of MSYR or $r_{max}$.

*10.1.4 Future directions for the In-Depth Assessment*

After many years of working towards an In-Depth Assessment of Antarctic minke whales, which has focused on the Indo-Pacific region of the Southern Ocean, the Committee can now provide conclusions and determine what outstanding issues are feasible and/or worthwhile to address in the future. The Committee noted that there were still research

issues to complete, but that should not preclude the ability to provide conclusions on the assessment. Because the present In-Depth Assessment of the Indo-Pacific Antarctic minke whale has been so protracted, results are currently scattered across many different volumes of Committee reports. Thus, to complete the In-Depth Assessment of Antarctic minke whales in the Indo-Pacific region of the Antarctic next year, the Committee established an intersessional working group to summarise the state of knowledge.

The situation in the rest of the Antarctic is very different, as it has been decades since the Committee last attempted an assessment of the Antarctic minke whales in those regions. There is less data for other regions than the Indo-Pacific region, so feasibility needs to be considered before undertaking the In-Depth Assessment. It was noted that results from the Indo-Pacific might be helpful in assessing the other regions. An intersessional working group was established to summarise available data and knowledge for these other Antarctic regions.

## 10.2 Southern Hemisphere humpback whales

The report of the IWC Scientific Committee on the assessment of Southern Hemisphere humpback whales is given in Annex H. The Committee currently recognises seven humpback whale breeding stocks (BS) in the Southern Hemisphere (labelled A to G IWC, 2011e), which are connected to feeding grounds in the Antarctic (Fig. 1). An additional population that does not migrate to high latitudes is found in the Arabian Sea. Assessments of BSA (western South Atlantic), BSD (eastern Indian Ocean) and BSG (eastern South Pacific) were completed in 2006 (IWC, 2007). However, it was concluded at that time that BSD might need to be re-assessed with BSE and BSF in light of mixing on the feeding grounds. An assessment for BSC (western Indian Ocean) was completed in 2009 (IWC, 2010c) and for BSB in 2011 (IWC, 2012c).

### *10.2.1 Assessment of breeding stocks D, E and F*

In 2011, the Committee initiated the re-assessment of BSD in conjunction with assessments of BSE and BSF. As shown in Fig. 1, these correspond to the humpback whales wintering off Western Australia (BSD), Eastern Australia (BSE1) and the western Pacific Islands of Oceania, including New Caledonia (sub-stock BSE2), Tonga (sub-stock BSE3), the Cook Islands and French Polynesia (BSF2). For simplicity, the combination of BSE2, BSE3 and BSF will be referred to herein as Oceania (BSO). These are the last breeding stocks remaining in the Comprehensive Assessment of Southern Hemisphere humpback whales, and their assessments were to be completed as a matter of high priority this year.

#### 10.2.1.1 RESULTS OF MODELS DEVELOPED INTERSESSIONALLY

The Committee had previously recommended that work be carried out intersessionally to facilitate the completion of the assessment. This included: (1) obtaining a minimum bound on the absolute abundance of BSD (see IWC, 2014c); and (2) developing a suite of assessment models.

With respect to (1), the Committee used a preliminary estimate from Hedley. For reasons discussed in Annex H, item 3.1, the value was considered tentative and requiring future confirmation.

With respect to (2), assessment models developed intersessionally included: (1) a single stock model for BSD for a range of choices of the Antarctic feeding ground catches; (2) several two stock models; and (3) a three-stock model of BSD, BSE1 and Oceania (BSO). These models are summarised in detail in SC/65b/SH04rev and SC/65b/SH04add.

#### 10.2.1.2 SPECIFICATION AND EVALUATION OF ADDITIONAL MODEL RUNS

The assessment began with a pre-meeting on 10-11 May and continued. It was agreed that a three-stock model (Annex H, fig. 1) best captured the uncertainty in high latitude catch allocations across the three breeding stocks.

Key issues addressed in the pre-meeting included:

(1) while the $N_{min}$ constraint for BSO tended to be problematic intersessionally, the use of 'private' haplotypes (Jackson, 2011) resulted in markedly better model fits;
(2) differences were noted (particularly for Oceania) between the high latitude catch allocations that best fitted the three-stock model and the results of a mixed-stock analysis that allocated high latitude mtDNA samples to low latitude breeding grounds (Annex H, appendix 2). The assessment proceeded by not fitting the model to the genetic data, and future work to address this question was identified; and
(3) whilst the original three-stock model was biologically more plausible than a one or two-stock model, it required estimation of six mixing parameters. An alternate (simpler) three-stock model (Fig. 2) resulted in parameters that were relatively well estimated and so it was used as the base case in the final assessment of BSD, BSE1 and BSO.

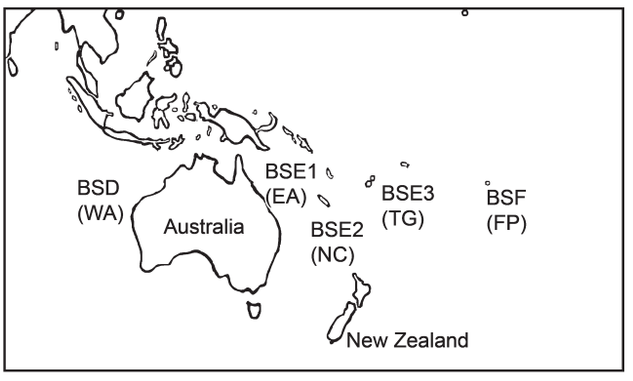


Fig. 1. Distribution of humpback whale breeding stocks BSD, BSE1 and BSO (BSE2, BSE3 and BSF2). Note the following abbreviations: WA=Western Australia, EA=Eastern Australia, NC=New Caledonia, TG=Tonga and FP=French Polynesia.

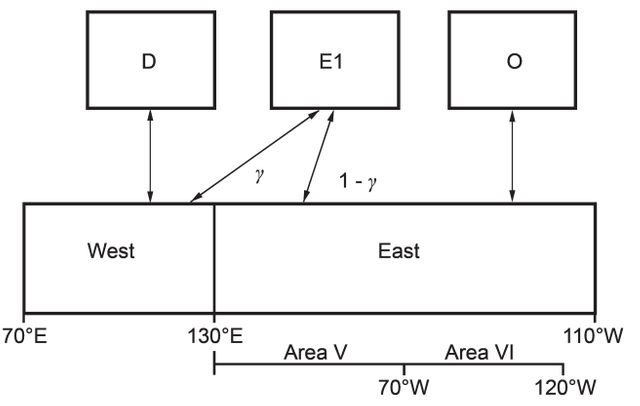


Fig. 2. Diagrammatic representation of the alternative three-stock model used as the base case in the final assessment of breeding stocks BSD, BSE1 and BSO. Antarctic Areas V and VI are shown for reference.

Table 12
Posterior median values of key model parameters for the base case model with 90% probability intervals in brackets.

| | BSD | | BSE1 | | BSO | |
|---|---|---|---|---|---|---|
| $r$ | 0.090 | [0.053, 0.104] | 0.105 | [0.103, 0.106] | 0.091 | [0.071, 0.101] |
| $K$ | 21,686 | [19016, 29383] | 26,133 | [21605, 29033] | 14,115 | [10198, 19651] |
| γ | | - | 0.068 | [0.007, 0.190] | | - |
| $N_{min}$ | 824 | [461, 3685] | 237 | [203,272] | 132 | [103, 250] |
| $N_{2012}$ | 19,264 | [17,553, 24012] | 16,366 | [14674, 18034] | 5,072 | [4456, 6040] |
| $N_{miN}/K$ | 0.039 | [0.023, 0.128] | 0.009 | [0.008, 0.011] | 0.010 | [0.007, 0.014] |
| $N_{2012}/K$ | 0.904 | [0.739, 0.984] | 0.634 | [0.561, 0.729] | 0.371 | [0.238, 0.535] |
| $N_{2020}/K$ | 0.984 | [0.883, 0.998] | 0.915 | [0.872, 0.950] | 0.648 | [0.409, 0.846] |
| $N_{2040}/K$ | 1.000 | [0.991, 1.000] | 1.000 | [0.999, 1.000] | 0.993 | [0.926, 0.999] |

With agreement reached on the base case model specifications (Annex H, table 1), sensitivity runs were carried out to evaluate the effects of: (1) shifting the Antarctic catch boundaries; (2) modifying the bounds of the BSD absolute abundance estimate; (3) alternative treatment of New Zealand catches and (4) augmenting the Noad *et al.* (2011) relative abundance data for BSE1 with Forestell *et al.* (2011) mark-recapture data in the model fit. The details of these sensitivities are presented in Annex H, item 3.1.2.3.

#### 10.2.1.3 FINAL ASSESSMENT MODEL RESULTS

Final assessment results and sensitivity runs are provided in Annex H, Appendix 3. The results for the base-case model are shown in Table 12. Plots of the median population trajectories for the base case three-stock model are given in Fig 3.

The Committee notes that the results of the model runs did not vary substantially under the different sensitivity scenarios, except if the minimum of the prior for the BSD absolute abundance in 2008 was increased appreciably. Further discussion is provided in Annex H, item 3.1.3.

#### 10.2.1.4 CONCLUSION AND RECOMMENDATIONS

The posterior median estimate of population status in 2012 relative to pre-exploitation abundance suggests that BSD is approaching pre-exploitation levels (90%, 90% probability interval (PI): 74-98%). However, the results are somewhat sensitive to the lower bound on BSD absolute abundance estimates for 2008, with greater abundance resulting in a slightly greater level of recovery. Given that the available lower bound estimate was preliminary, the Committee **recommends** future work to further refine that value.

A preliminary assessment of BSD was completed in 2006 and had concluded that there had been a substantial increase since protection (IWC, 2007). However, it was agreed at that time that the assessment modelling results should be re-evaluated in the future. It was anticipated then that this would require clarification of the stock structure of Oceania and the extent of mixing at high latitudes, as catch allocation would perhaps be influenced by mixing with BSE1. The three-stock models presented in the current assessment address the concerns expressed previously by allowing for mixing of neighbouring breeding stocks in the Antarctic feeding areas. Although direct comparisons between the two assessments should be viewed with caution due to differences in model inputs and assumptions, the results of the 2006 Fringe model for BSD are very similar to the current base case assessment (Annex H, Appendix 3, Table 2).

The base-case three-stock assessment results for BSE1 and Oceania were not sensitive to the assumption of BSD absolute abundance and suggested recovery towards pre-exploitation levels to be 63% (90% PI: 56-73%) and 37% (90% PI: 24-54%), respectively.

The Committee notes that the current assessment of BSO was valuable in terms of understanding the broader aspects of population status. However, complexities in Oceania require further investigation due to inadequate stock structure definition across the broad area, a lack of population trend data for most of the region, and a lack of resolution and understanding of connectivity in eastern Oceania.

As noted above, there was an inconsistency between the high latitude catch allocations that fit the model best and the mixing proportions of breeding stocks in the Antarctic as suggested from genetic data. Further work on this question would be valuable, although unlikely to alter the outcome of this assessment. For the future, the Committee **recommends** further examination of available genetic data, assumptions and analytical approaches, as described in detail in Annex H, item 3.1.4.

In conclusion, the Committee **agrees** that its assessment of breeding stocks BSD/BSE1/BSO had been completed. It acknowledges the efforts of all those who helped to bring the assessment to a conclusion. This also concludes the Comprehensive Assessment of Southern Hemisphere humpback whales. Noting that this circumpolar assessment took eight years to complete, the Committee **recommends** that assessment results for all Southern Hemisphere breeding stocks be compiled and synthesised for discussion next year.

### *10.2.2 Review new information on other breeding stocks*

#### 10.2.2.1 BREEDING STOCKS D, E, F

The Committee received four papers with new information on BSD, BSE and BSF, as described below. These papers, and their associated discussion, can be found below and in Annex H, Item 3.2.1. The Committee **welcomes** this new information noting that it remains consistent with the assumptions used in the assessment of breeding stocks BSD, BSE1 and BSO.

Polanowski *et al.* (2014) reported a new epigenetic technique for estimating humpback whale age from skin biopsy samples. The assay has an $R^2$ of 0.787 ($p$=3.04e-16) and predicted age with a standard deviation of 2.99 years. It correctly ordered parent-offspring pairs in more than 93% of cases. Age was estimated for 63 individuals off East Australia in 2009 and compared results to age profiles for the same population from 1952-62. Although several caveats were noted, the authors concluded that the high apparent proportion of young animals in 2009 was interesting and warrants further study.

SC/65b/SH07 described a genetic study of humpback whales from Cook Strait, New Zealand. Samples from New Zealand (167 individuals) were compared to Oceania (1,052 individuals) and east Australia (865 individuals). DNA registers revealed six matches (and the least genetic difference) to New Caledonia. Five matches were made to

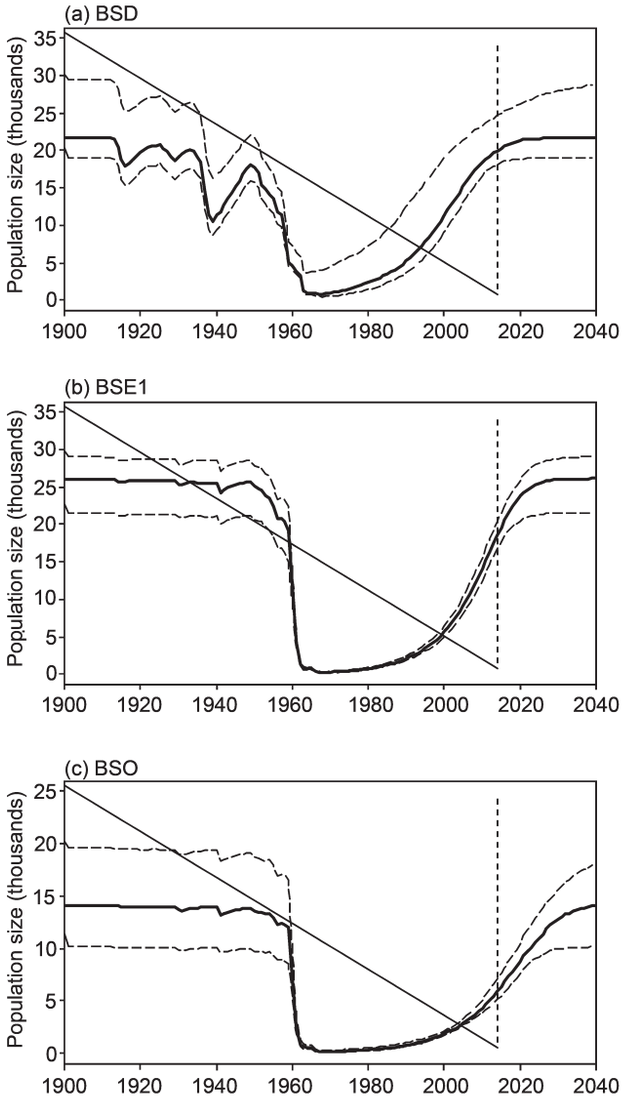


Fig 3. Median population trajectories for the base case three-stock model for breeding stocks BSD, BSE1 and BSO. 90% probability envelopes are indicated by the dashed lines.

east Australia, but none to any other part of Oceania. Further information is provided in Annex H and the Committee's discussion of the stock structure implications can be found in Annex I.

Orgeret *et al.* (In review) studied the population growth rate of humpback whales at New Caledonia. The results indicated a constant yearly growth rate of 1.15 (1.11; 1.20). This was higher than the maximum rate of increase for humpback whale populations (Zerbini *et al.*, 2010), but the authors hypothesised that it includes a contribution due to immigration from other areas. The Committee **welcomes** this paper and commented that analyses of this nature are important for understanding the effects of animal movement on estimates of population parameters.

SC/65b/SH10 introduced a new crowd-sourcing website, *Match My Whale*, which encourages citizen scientists to score and match humpback whale fluke photos in order to facilitate future cataloguing efforts for BSD and BSE1. The Committee notes the potential value of this project to harness increasing public interest in matching humpback whales online.

#### 10.2.2.2 BREEDING STOCK G

SC/65b/SH15 provided an update on humpback whale research in the Gulf of Chiriqui, western Panama. This is the northernmost breeding area of any Southern Hemisphere humpback whale population, and is also used by whales migrating from feeding areas off California-Oregon-Washington in the Eastern North Pacific. The authors describe the continuation of their long-term monitoring efforts in 2013, which involved greater encounter rates, larger group sizes, and more photo-identification data collected than in prior years. The authors highlighted the importance of continued monitoring to understand population trends and underlying factors.

The Committee **agrees** that genetic studies in this area would be of particular interest given the use of this breeding ground by Northern Hemisphere animals, as well as by individuals from different Southern Hemisphere feeding aggregations.

#### 10.2.2.3 BREEDING STOCK B

Rosenbaum *et al.* (2014) examined the movement of BSB humpback whales and their overlap with anthropogenic activities in the South Atlantic Ocean. This paper reported on the habitat use of three whale cohorts satellite tagged off Gabon and concluded that breeding areas in the eastern Atlantic were extensive and extended north of Gabon late in the breeding season. Also observed, for the first time, was direct migration between West Africa and sub-Antarctic feeding areas. Details can be found in Annex H, item 3.2.4.

#### 10.2.2.4 FEEDING GROUNDS

Two IWC-SORP papers received by the Committee provided data on humpback whales in Antarctic and sub-Antarctic waters. SC/65b/SH05 provided an update of the CETA project which was carried on the continental shelf off Adélie Land in Area V. SC/65b/SH16rev reported on data collected from visual and acoustic observations from the Argentinean vessel *Tango* SB-15 during February 2014. Details of those cruises are provided in Annex H, item 3.2.5.

SC/65b/IA10 described an analysis of the circumpolar spatial distribution of humpback whales based on IDCR/SOWER CPII and CPIII data. A generalised additive model (GAM) was used to examine changes in the abundance of humpback whales among areas, relative to other species and environmental data. Details are provided in Annex H, item 3.2.5.

SC/65b/SH18 reported estimates of abundance and trends of humpback whales in the Magellan Strait off southern Chile. The results suggested an abundance of 88 individuals (95% CI: 81-95) in 2012 with a median population growth rate of 3.2% year$^{-1}$ across the study, but close to zero in the past seven years. The authors concluded that this population is likely small and appears to be stable. The potential effect of ship strikes on this population was also examined. The Committee **welcomes** and **encourages** the continuation of this study. Further discussion is provided in Annexes E, H, and J.

### *10.2.3 Antarctic Humpback Whale Catalogue*

SC/65b/SH03 presented the interim report of the IWC Research Contract 16, the Antarctic Humpback Whale Catalogue (AHWC). During the contract period, the AHWC catalogued 761 photo-ID images representing 614 individual humpback whales submitted by 21 individuals and research organisations. Matches were made between BSG and the Antarctic Peninsula (18) and between BSG and the Chilean feeding area (3). Within-region re-sightings were identified in BSC3 (2), BSG (18) and the Antarctic Peninsula (7). Two

individuals with 28 year sighting histories, the longest in the database, were identified during the contact period, and sixty-eight individuals had re-sightings spanning ten years or more. The fluke photographic collection has approximately doubled in size in the past five years, and now consists of 9,007 photographs of 5,923 individual whales.

The Committee has supported the valuable work of the AHWC in the past and **strongly endorses** its continuation.

*10.2.4 Work plan*

With the completion of the assessment of humpback whale breeding stocks BSD/BSE1/BSO, the Committee **agrees** that the Southern Hemisphere humpback whale assessment has been concluded. However, given that this circumpolar assessment had taken eight years to complete, the Committee **recommends** a thorough synthesis of assessment results and unresolved questions for discussion in SC/66a.

It further **recommends** that focus on the planning of the future direction of the Sub-committee on Other Southern Hemisphere Whale Stocks is given next year. Topics would include the feasibility of conducting assessments of other Southern Hemisphere species and consideration of future assessments of humpback whales. As foundation, a literature review is **recommended** to identify all new information produced on Southern Hemisphere humpback whales since the Comprehensive Assessment began in 2006.

The Committee **recognises** the long-term value of photo-identification catalogues to support future assessments and **recommends** that work continue on the Antarctic Humpback Whale Catalogue. Consideration was also given to the importance of evaluating data needs to better inform future assessments. A modelling exercise is **recommended** as one means of informing this question.

Work is also **recommended** to address questions arising specifically from the assessment of BSD/BSE1/BSO. These included work to evaluate: (1) the available genetic data, assumptions and analytical approaches for establishing mixing proportions of breeding stocks in the Antarctic; and (2) the minimum abundance of BSD, which is only currently available as a preliminary value, but important to the interpretation of assessment results.

## 10.3 Southern Hemisphere blue whales

*10.3.1 Review new information*

**10.3.1.1 ANTARCTIC BLUE WHALES**

10.3.1.1.1 CRUISE REPORTS

SC/65b/SH01 reported on the South African National Antarctic Programme 2013/14 cruise to the 000°-020°E Antarctic coastal region. Based on the relatively high numbers of blue whales sighted, the authors concluded that this region of the Queen Maud Land coast is a hotspot for Antarctic blue whales. The Committee **congratulates** the authors. Discussion held on data sharing and further cruise details can be found in Annex H, item 3.2.5.

SC/65b/SH05 reported six sightings of Antarctic blue whales at the edge of the continental slope and in the Adélie depression. Three of the animals were individually photo-identified, one of which was re-sighted during the IWC-SORP Antarctic blue whale voyage in the Ross Sea region.

SC/65b/SH16 reported that a single blue whale was seen on one occasion on the Argentinean IWC-SORP Tango cruise in the Scotia Sea near Islas Orcadas del Sur (South Orkney Islands).

10.3.1.1.2 ANTARCTIC BLUE WHALE CATALOGUE

SC/65b/SH20 reported on catalogue comparisons of 52 individual Antarctic blue whales photographed between 2005/06 and 2012/13 during JARPA II from IWC Management Areas IIIE, IV and V. Three whales matched individuals in the Antarctic Blue Whale Catalogue with elapsed time intervals of two years (for one whale) and seven years (for two whales). This brings the total of photo-identified Antarctic blue whales to 354. This work provides data for capture-recapture estimates of abundance as well as information on the movement of individual blue whales within the Antarctic region.

The Committee **thanks** the authors and **recognises** the contribution of this on-going work. It also **recommends** that blue whale research be prioritised in upcoming Japanese Southern Ocean sighting cruises.

10.3.1.1.3 ACOUSTIC STUDIES

The IWC-SORP Antarctic Blue Whale Project (ABWP) reported a number of developments in the use of directional (DIFAR) sonobuoys to give bearing information to baleen whale calls. This has a number of uses including locating animals for further study, such as photo-ID, but also for applications related to estimates of abundance derived from acoustic data. DIFAR sonobuoys were used successfully during the 2013 Antarctic Blue Whale cruise to locate blue whales from distances of hundreds of kilometres and hence the steering committee of the ABWP has encouraged their use more widely within the project.

Papers were presented describing software tools to facilitate the use of DIFAR to obtain bearing information in real time (SC/65b/SH06), results of experiments to measure the accuracy and precision of a sonobuoy-based localisation system (SC/65b/SH08), and methods to estimate the drift of sonobuoys (SC/65b/SH09). Most DIFAR sonobuoys send data via VHF radio link back to an aircraft or nearby vessel. While there are some general purpose tools available for working with DIFAR signals, full analysis has required a limited number of bespoke systems, including a more user-friendly software system.

Measurements of the source levels of blue whale calls and propagation loss are important for determining the likely distances over which whale calls may be detected. SC/65b/SH11 presented preliminary estimates of source levels for the first (unit A) 25-29Hz component of Antarctic blue whale 'Z' calls. The authors concluded that with the source levels reported, and under assumed propagation conditions, these calls can be detected from thousands of kilometres away.

Miller *et al.* (2014) explored the Doppler effect as a potential explanation for the long-term linear decline in blue whale calls. Analysis suggested that this was unlikely to fully explain the observations of intra-annual pattern in the frequency of Antarctic blue whale song. Details of this study can be found in Annex H.

Taking these methodological papers as a whole, the Committee notes that the results had confirmed the potential to detect blue whales at over 1,000km in the Southern Ocean. It **recognises** the advancements that these methodologies have made towards improved abundance estimation of Antarctic blue whales and **encourages** the continuation of this important research.

Shabangu and Findlay (2014) described efforts to compile 7,500 sonobuoy acoustic data files from over 700 stations across IWC SOWER Antarctic cruises from 1996/97 to 2008/09 in Areas I-VI. Also included were data from three blue whale cruises off Australia, Madagascar and Chile. A total of 1,547.76 hours of recordings have been reviewed and blue whale vocalisations have been detected in 55% of the 7,501 recorded files.

Van Opzeeland *et al.* (2013) reported on the SOHN initiative of the IWC-SORP Acoustic Trends Project. This

is a long-term program to examine trends in blue whale and fin whale in the Southern Ocean through passive acoustic monitoring. The initiative proposes a circumpolar network of autonomous acoustic recording stations surrounding the Antarctic continent with at least one recording site in each IWC management area. Practical recommendations were also given to increase the efficiency of passive acoustic data collection in Antarctic waters.

#### 10.3.1.4 ABUNDANCE ESTIMATION

Part of the planning process for the IWC-SORP Antarctic Blue Whale Project has been to evaluate how much effort would be required under various survey methods to obtain a precise estimate of circumpolar abundance. The Committee received four papers on such methodological considerations of abundance estimation. The Committee notes that pre-survey analyses such as these are important and are **encouraged**.

SC/65b/SH13 explored the precision of a circumpolar abundance estimate that might be expected from a line-transect survey, and how it might be predicted for varying amounts of survey effort, given population increases. The precision for 6-year research programmes was too low to be considered useful, but the predicted precision of a 12 year program was 27%. The benefits and disadvantages of a line transect approach were discussed.

SC/65b/SH14 predicted the precision and bias of estimates from a hypothetical mark-recapture survey programme. It suggested a precision of the abundance, at the mid-point of the programme, of between 0.2 and 0.3 if passive acoustic tracking were utilised to increase the encounter rate. A 12 year study would be required, but surveys would not necessarily have to occur every year. The authors highlighted that care would be required to ensure that mark-recapture assumptions were met.

SC/65b/SH17 proposed that if parent-offspring pairs could be identified genetically from biopsy samples then these 'recaptures' could be accommodated in an extended mark-recapture model and improve greatly improve precision without any additional survey effort. The model could be made robust against bias arising from un-modelled heterogeneity, without inflating the CV. Precision could be improved further using epigenetic aging techniques (Polanowski *et al.*, 2014) to tell which animal is the parent and which the offspring.

The Committee discussed the relative priority of biopsy and photo-identification sampling to achieve mark-recapture goals, as well as the availability of mark-recapture models that combine genetic identity and photo-ID information. Details can be found in Annex H.

Peel *et al.* (2014) evaluated acoustics as a tool to increase the encounter rate in mark-recapture surveys. Encounter rates were predicted using a discrete-time individual-based simulation of whales and survey vessel. The results suggested that passive acoustics should provide a 1.7-3.0 fold increase in encounter rate of Antarctic blue whales over visual-only methods.

Olsen and Kinzey (In press) presents a mark-recapture analysis of Antarctic blue whale photographs taken on 15 IDCR/SOWER cruises from 1991/92 to 2008/09. Circumpolar abundance was estimated at 3,151 (95% CI: 530-24,113) from left side images and 4,286 (95% CI: 1,923-9,802) from right side images, both with large confidence intervals and based on five recaptures. For Area III, the corresponding estimates were 1,318 (95%CI: 514-3,716) from left side images and 939 (95%CI: 421-2,323) from right side images. The Committee **welcomes** this analysis, which provides the first abundance estimates of Antarctic blue whales since Branch (2007). It **agrees** that the authors be invited to the Scientific Committee in the future to discuss this work.

#### 10.3.1.5 PYGMY-TYPE BLUE WHALES

SC/65b/SH02 investigated evidence that blue whales have used the South Taranaki Bight in New Zealand as a foraging ground over the last 10 years. The authors concluded that photo-identification, biopsy sampling; environmental and prey data collection and behavioural observations in 2014 strongly supports this hypothesis, but that more research is needed.

The Committee recommends work to clarify the population identity of blue whales observed off New Zealand, noting that the relationship among pygmy blue whales in different areas of the Southern Hemisphere continues to be unclear and merits further investigation.

Double *et al.* (2014) reported on migratory movements of 11 pygmy blue whales between Australia and Indonesia as revealed by satellite telemetry. Individuals were tracked between 8 and 308 days and covered an average distance of 3,009±892km, at a rate of 21.94±0.74km per day. The Committee notes these results on migratory movements with interest and **recommends** the continuation of this work.

#### 10.3.1.6 CHILEAN BLUE WHALES

Galletti Vernazzani presented an update on efforts to obtain the first abundance estimates from blue whales off Chile based on photo-identification and mark-recapture techniques. The effects of different photograph quality approaches and the impact of a possible transience signal in this population are being investigated. The Committee **welcomes** this update and receiving final results next year.

### *10.3.2 Southern Hemisphere Blue Whale Catalogue*

The Southern Hemisphere Blue Whale Catalogue is an international collaborative effort to facilitate cross-regional comparison of blue whale photo-identification catalogues. It currently includes photo-identification catalogues of researchers from major areas off Antarctica, Australia, New Zealand, Eastern South Pacific and the Eastern Tropical Pacific. These are organised into three major regions, with a regional coordinator appointed for each: (1) Australia/New Zealand/Indonesia (Salgado Kent); (2) Southern Ocean (Olson); and (3) Gulf of California/Eastern South Pacific/ETP (Galletti Vernazzani). Photos are added to the catalogue by region and the regional coordinator appoints a photo-ID expert to perform the matching. Funding is distributed between regions according to the amount of work to be done. A total of 1,101 blue whales are currently catalogued (843 from the right side, 857 from left side and 23 from flukes). The SHBWC has also identified potential improvements in procedures and matching priorities, as described in Annex H, item 5.2.1.

The Committee notes the value of the SHBWC and **recommends** its continuation. Noting that the catalogue had grown in the last few years, discussion focussed on aspects of quality control and matching processes by both the contributing institutions and the SHBWC, as detailed in Annex H. The Committee notes the importance of continued development, reinforcement and communication of SHBWC contributor protocols and terms of reference.

### *10.3.3 Genetic analyses*

Torres-Florez *et al.* (2014) reported on genetic relationships between the whales from southeastern Pacific (SEP) areas of southern Chile, northern Chile and Eastern Tropical

Pacific (ETP) and Antarctic blue whale feeding grounds. Significant differences between Antarctica and the other three areas of the SEP were found, but not between the two areas in Chile, nor the ETP. Current analyses support the hypothesis that blue whales sampled in the SEP belong to a unique population, but more data are required. Analyses now underway include eastern North Pacific blue whale samples.

The Committee discussed that, as with many areas, the population identify and structuring of blue whales in the ETP is uncertain. The intermixing of blue whales from the North Pacific, southeastern Pacific and Antarctica provides challenges that may affect the degree of population structure that can be detected in samples from the ETP. The stock structure implications of this paper were also discussed in Annex I.

*10.3.4 Work plan*

The Committee **recommends** the continuation of the Southern Hemisphere Blue Whale Catalogue. It also **recommends** efforts to further develop and reinforce SHBWC protocols and to ensure clear communication of the terms of reference of the catalogue to current, pending and future contributors.

The Committee recognises that considerable new information has become available for pygmy blue whales in recent years. It **recommends** that relevant information be synthesised for SC/66a so that regions with adequate data can be identified for a potential future assessment. Further details are given in Annex H, item 7.2.

## 10.4 Distribution of baleen and toothed whales in the Antarctic relative to spatial and environmental covariates

SC/65b/IA10 reported circumpolar distribution of six different species of baleen whales using the data from CPII and CPIII of IDCR/SOWER. The main purpose was not to estimate absolute abundance in the survey areas but to show relative density in a spatial context. This paper was discussed in detail under Item 10.1.2 in only the context of the Antarctic minke whale, although the analytical discussion applies to all species.

## 10.5 In-Depth Assessment of North Pacific sei whales

*10.5.1 Preparations for In-Depth Assessment*

**10.5.1.1 ABUNDANCE AND DISTRIBUTION**

SC/65b/IA04 provided preliminary abundance estimates for North Pacific sei whales using sighting data collected during the 2010-12 IWC-POWER surveys. Abundance in the central and eastern North Pacific (north of 40°N, south of the Alaskan coast including both the US and Canadian EEZ between 170°E-135°W), from July to August was estimated as 34,150 (CV=0.27) for the base case scenario. In the sensitivity analysis, abundance estimates ranged from 26,926 (CV=0.205) to 32,843 (CV=0.272).

In discussion, the Committee provided some technical suggestions to improve the analysis, which are detailed in Annex G, item 4.1.1. The authors indicated they will update this analysis and also provide a spatial modelling analysis of these data when the data have been validated by the IWC Secretariat.

With the completion of the first trans-Pacific series of POWER surveys north of 40°N and south of the Aleutians, the Committee concluded that there was now a sufficient basis of new abundance data for proceeding with the In-Depth Assessment. The Committee **requests** that the POWER data continue to be validated by the Secretariat in the usual way.

**10.5.1.2 STOCK STRUCTURE**

SC/65b/IA08 reported on the uncertain stock origins of sei whales represented by 71 products purchased in Japanese market from 1997-2009. Of these products, 21 of them showed a phylogenetic affinity with available reference sequences from the Southern Hemisphere rather the expected affinity with available reference sequences from the North Pacific. Possible explanations were explored.

In discussion, (and see Item 11), the Committee **concludes** that the possibility that the market samples reflected additional, previously undetected, genetic diversity within the North Pacific could not be ruled out at this stage and, therefore, **recommends** a direct comparison between market and JARPN II samples to: (1) reconstruct phylogenetic relationships; (2) determine if there are significant difference between the market samples and the JARPN II samples; and (3) investigate the levels of genetic diversity and the factors explaining possible differences. Two independent proposals were presented to address these questions and are detailed in Annex G, Appendices 3 and 4. The proponents of the two studies agreed that, for the results to be presented next year, they would focus on mitochondrial DNA sequences, because this did not require inter-lab calibration. They recognised that this would not permit individual identifications. Analysis of microsatellites would also be performed, but not necessarily by next year.

The Committee noted that both studies depend on Data Availability requests being granted under Procedure B of the Data Availability guidelines. Because these results are needed by the Committee for the formulation of stock structure hypotheses under the In-Depth Assessment to commence next year, the Committee **endorses** both proposals and **requests** their favourable consideration by the Data Availability Group and the data holders.

The Committee noted that interpretation of the market samples would be aided by knowledge of the geographical and temporal distribution of purchases and thus **requests** that date and location of purchase be included in the data set to be provided for the above studies. Several members considered that more detailed information on the origin of market samples are necessary for a better interpretation of the genetic analysis. This information should include exact location of purchase, date of purchase, labelling and proof of purchase.

The Committee also identified a need for better elucidation of the world-wide genetic structure of sei whales. Pastene reported that a collaborative study is currently underway between the ICR and the University of Groningen, (Palsbøll) to do this using samples obtained from the North Atlantic, North Pacific and Southern Hemisphere. The Committee **welcomes** this study looks forward to receiving results from this study next year.

The Committee concluded that, pending the results of the above studies, it was not yet able to formulate stock structure hypotheses for North Pacific sei whales. This would be accomplished during the In-Depth Assessment.

**10.5.1.3 CATCH HISTORY**

Allison reported that she had now received the remaining Canadian catches, and that these data, together with the remaining revised Soviet catches, are being entered into the IWC Catch Database. This is expected to be complete within the next 2-3 months. The catch data for North Pacific sei whales is now considered complete.

**10.5.1.4 PHOTO-IDENTIFICATION**

During the POWER cruises in 2011 and 2012, photo-identification data were collected for all whales that the

ship approached for species confirmation and/or for biopsy sampling. Photographs were obtained with sufficient detail to catalogue 27 individual sei whales from the 2011 cruise, and 51 individuals from the 2012 cruise. There were no matches between these two years.

The Committee found these results promising but there was insufficient time to discuss them. The question of how to incorporate photo-ID data into sei whale assessments was deferred and submission of a paper encouraged.

*10.5.2 Work plan*

Given the abundance data from POWER and JARPN II, completed catch history, historical abundance data listed in (IWC, 2013c, p.211) and results expected from the genetic studies, the Committee **agrees** that it can proceed with the In-Depth Assessment for sei whales which was expected to last two years (see Annex G, item 4.2).

Since the Committee expected to specify assessment runs at the 2015 Annual Meeting, it **recommends** a proposal (Annex G, Appendix 5) be funded to develop the appropriate population dynamic models and report(s) documenting the models, their structure, the data used for analysis, results and interpretation of the results to be submitted to the 2016 Annual Meeting.

## 10.6 Gray whales in the western North Pacific

The discussion of the rangewide Workshop is given under Item 9.2.1. That Workshop incorporated information from all parts of the North Pacific, including some of the information provided below.

*10.6.1 New information*

SC/65b/BRG12 provided a summary of sightings of western gray whales near Japan. No gray whales were seen during several cetacean sighting surveys, including JARPN II, from spring to autumn 2013. There was a report of opportunistic sightings of gray whales in the Sea of Japan, just off the estuary of Ohkozu-Bunsuiro diversion channel, Teradomari town in Niigata prefecture in April 2014.

The Committee **welcomes** this information and **encourages** further analysis of the photographs to confirm that there were two whales and whether it was a mother-calf pair. The Committee **strongly recommends** that these photographs be compared with other photographs of gray whales from throughout the range.

SC/65b/BRG12 (also presented to the rangewide Workshop) osteologically compared five specimens stranded or entangled off the Pacific coast of Japan between 1990 and 2005 (one mature and four immature animals) with one whale from Ulsan, Korea and one from California, USA, which was reported by Andrews (1914). In 2013, Nakamura and Kato examined five additional California specimens (body length, 9.3-11.7m). The Committee reiterates the view of the Workshop, **welcoming** the results of the work and **encouraging** its continuation. However, it cautions against over-interpretation of any differences between the California, Ulsan, and Japanese specimens until the sample size is increased and factors such as differences with maturity stages are addressed.

The Committee **welcomes** the annual update of the results of the collaborative Russia-US research programme on gray whales summering off Sakhalin Island, Russia (SC/65b/BRG15). The results are discussed in Annex F, item 3.2.1. 2014 represents the 19th year of the study.

The Committee also **welcomes** the summary report of the annual study under the Joint Western Gray Whale Monitoring Programme off Sakhalin Island. This is also discussed under Annex F, item 3.2.1.

Although recognising some of the difficulties of sharing data, the Committee again **recommends** that the two programmes off Sakhalin should make every effort to collaborate, especially in sharing photographs and other data. Oil and gas activities are increasing near Sakhalin and the Committee **recommends** that other operators should be involved in studies and monitoring of western gray whales and follow the best mitigation practices (e.g. see Nowacek *et al.*, 2013) to ensure protection of these whales and their habitats off Sakhalin Island.

*10.6.2 Other issues*

There is substantial concern about interactions between gray whales and coastal fisheries in the western North Pacific. Between 2005 and 2007, four female gray whales in the western North Pacific were unintentionally entrapped and died in set nets (i.e. trap-nets) while migrating off the Pacific coast of Honshu, Japan (Kato *et al.*, 2013).

The Committee **expresses concern** about the possibility of the development of a salmon trap net fishery in the feeding areas of western gray whales off Sakhalin. Last year, the placement of these nets directly overlapped with a core portion of the feeding ground and within critical habitat for mothers with calves. An animal was seen trailing fishing gear that may have originated in this local fishery. Ilyashenko noted that his understanding is that the Russian Federation will prohibit fishing in the feeding areas of gray whales off Sakhalin Island in 2014. The Committee **recommends** that the Russian Federation and local Sakhalin authorities prohibit trap net fishing on the gray whale feeding grounds in the future.

The Committee also received information about *Exxon Neftegaz Limited's* proposed development of a temporary facility to be situated on the eastern shore of Sakhalin Island for the unloading of various modules for oil and gas activities. It **expresses serious concern** over this proposed development project and its possible immediate and cumulative impacts on gray whales, their feeding habitat and prey. The Committee **requests** additional information on the proposed project and **urges** the Government of the Russian Federation to take steps to ensure the maintenance of Piltun Lagoon.

*10.6.3 Conservation advice*

The Committee again **acknowledges** and **welcomes** the important work of the IUCN WGWAP (Western Gray Whale Advisory Panel) as reflected in the updated report provided to this meeting and **encourages** its continuation. As previously, the Committee again **recommends** that oil and gas development activities (including seismic surveys and on- or near-shore development) in areas adjacent to or used by gray whales be undertaken only after careful planning for mitigation and monitoring. This should include a credible environmental impact assessment process prior to final decision-making. The Committee also **welcomes** the efforts of Japan with respect to the conservation and research on gray whales and **encourages** those efforts to continue.

## 10.7 Southern Hemisphere right whales

*10.7.1 Review of new information*

**10.7.1.1 CIRCUMPOLAR**

SC/65b/IA10 reported circumpolar spatial distribution of southern right whales using the IDCR/SOWER CPII and CPIII data. A Generalised additive model (GAM) was used to estimate the probability of occurrence. Sightings were restricted in Area II and IV both in CPII and CPIII. The abundance estimate from CPIII data in Area IV was *ca.* 900.

#### 10.7.1.2 SOUTH ATLANTIC

SC/65b/BRG06 reported on the high mortality rates at Península Valdés, Argentina in 2003, the Southern Right Whale Health Monitoring Program was established by a consortium of NGOs to monitor the health status of this population by post-mortem examinations. A total of 672 dead whales have been recorded on the Península Valdés nursery ground and surrounding areas along the Argentine coast between 2003 and 2013. At least 116 whales died in 2012, which represents the highest number of southern right whale deaths ever recorded in one calving and nursing season. The number of dead whales was 67 in 2013. As in previous years, most of the dead whales were newborn calves (97% of strandings in 2012 and 94% in 2013).

The Committee discussed the increased prevalence of kelp gull attacks at length. The authors confirmed that attacks are most common on calves and, with very few exceptions, the calves are dead before they strand. Not all stranded animals can be examined; search flights occur every 14 to 20 days so some carcases are too decomposed before discovery. However, it is unlikely many calves are stranding outside the search area. The high variability in calf mortality between years has not been explained and is not clearly linked to environmental variation or simply variation is the number of calves born in the region. Notably 24% of the calves that died in 2012-13 had no gull-inflicted lesions possibly because they died so quickly after birth.

The Committee **expresses concern** over the high calf mortality reported in this population and recommends that the Southern Right Whale Health Monitoring Programme continue as a high priority under the Conservation Management Plan. It also **recommends** that information on the gull control programme is reported to the IWC Workshop to be held in Puerto Madryn, Chubut in August 2014.

SC/65b/BRG07 reported on the fifteen year aerial survey monitoring programme developed by the Marine Mammal Lab. (CENPAT-CONICET). The monitoring area covers waters around Península Valdés in a coastal strip of 620km. Two difference models were used to estimate the trend of the population and in both cases the trend was positive. Also the density is increasing and the range of the whales is expanding. The Committee **welcomes** this report and **urges** that these annual surveys should be continued.

The Committee **welcomes** this study which is valuable in monitoring the recovery of this population together with changes in distribution. Even with estimates of calf mortality there would be a considerable time lag between years of high calf mortality and associated changes in the rate of population growth. High rates of very early calf mortality could explain an increase in the frequency of two-year calving intervals. This would not be anticipated in a population approaching its natural carrying capacity.

#### 10.7.1.3 AUSTRALIA

Bannister outlined the results of a right whale aerial survey off the southern coast of Australia in late August 2013. Funded by the Australian Government through the Australian Marine Mammal Centre, Hobart, the survey, the 21st in an annual series since 1993, covered some 900 n.miles (*ca.* 1,700 km) close to the coastline between Cape Leeuwin, Western Australia and Ceduna, South Australia, to which the majority of Australian right whales (the 'western' subpopulation) resort in winter/spring. The 2013 cow/calf count (246 pairs) was the highest yet in the series; the calculated population growth rate, 1993-2013 was 7.39% (95% CI 4.55-10.29), and the estimated size of that part of the Australian population to be found in the survey area, based on the number of calving females recorded over the three-year period 2011-13, is 2,756. Given the likely very much smaller number in the 'eastern' Australian subpopulation, the 'Australian' right whale population probably numbers around 3,000.

The Committee **welcomes** the report and **urges** that such annual survey work should continue.

#### 10.7.1.4 SOUTH AFRICA

The Committee received a short report on the annual right whale surveys off South Africa and looks forward to a full report next year.

### *10.7.2 Conservation issues*

The Committee received a report on progress under the Conservation Management Plans of the Southwest Atlantic and Eastern South Pacific populations of Southern right whales. The Committee congratulated the teams that have contributed to the actions of the Conservation Management Plans. It stressed the importance and effectiveness of coordinated international action under these Plans given the small number of whales in the right whale population off Chile and Peru and the high calf mortality recorded off Argentina.

## 10.8 North Atlantic right whales

The Committee **welcomes** SC/65b/BRG14, produced in response to last year's request for an update on the status of the North Atlantic right whale population. A review of the photo-ID recapture database indicated some 455 individually recognised whales known to be alive during 2010. There appears to be a positive and slowly accelerating trend in population size of around 2.8%. From 2007 to 2011, the minimum rate of annual human-caused mortality and serious injury averaged 4.05 per year (annual incidental fishery entanglement, 3.25; ship strike records, 0.8). To reduce ship strikes, the 2008 US Administrative rule creating speed restriction zones was re-established in 2013 because there was evidence that the rule had been locally effective. To reduce fishery entanglements the National Marine Fisheries Service has implemented rules requiring pot gear to use sinking ground lines in areas seasonally used by right and humpbacks.

## 10.9 North Pacific right whales

SC/65b/BRG11 reported the sighting summary of North Pacific right whale collected by JARPN and JARPN II from 1994-2013. Right whales were mainly found north of 42°N in the research area (55 schools and 77 individuals; observed mean school size: 1.4); there were records of 10 mother and calf pairs.

The Committee **welcomes** this information provided in response to a request from last year. The Committee **recommends** that a photo-ID catalogue be established as soon as possible to compare with existing photographs from the Okhotsk Sea, eastern Bering Sea and other western North Pacific photos held by Japanese and Russian researchers. In addition, the Committee **recommends** that Japanese scientists prepare abundance estimates for right whales in the Okhotsk Sea and off the Kamchatka Peninsula.

## 10.10 North Atlantic bowhead whales

Shpak reported that in recent years, bowhead whales from the critically endangered Spitsbergen population have been regularly encountered in the waters of Franz-Josef Land (FJL) Archipelago during research vessel expeditions, helicopter surveys and land-based observations conducted by the National Park 'Russian Arctic' and Russian Geographic Society.

In April 2010, 20 bowhead whales were observed in the western part of FJL, in polynyas southwest of George Island (Gavrilo and Ershov, 2010). Gavrilo and Ershov (2010) summarised other past sightings of bowhead whales in the waters of the FJL.

Since 2010, there have been continued sightings of bowhead whales in the waters of FJL. In 2013, during the two visits in the first half of April, 3 groups of at least 9 whales in total were observed in polynya west off FJL (Gavrilo, 2013a). In August, during *Pristine Seas Franz-Josef Land Expedition, 2013*, *ca.* 40 whales in total were observed in FJL waters (Gavrilo, 2013b). In April 2014, 3 whales were encountered in polynyas (Gavrilo, 2014). Mapping of sightings from 2010-13 expeditions has allowed (Gavrilo, 2014) to document areas of regular bowhead encounters in the southern part of FJL.

Based on the summarised findings, Franz-Josef Land Archipelago should be considered an important habitat for Spitsbergen population of bowheads for late winter through summer.

The Committee **welcomes** this work, **encourages** its continuation and looks forward to further updates.

**10.11 Okhotsk Sea bowhead whales**

SC/65b/BRG17 presented new information collected in the Shantar region of the western Okhotsk Sea in 2013. Bowhead whales were encountered in Udskaya Bay in July and October; interviews with locals suggest whale presence in the bay throughout the summer. In Ulbansky Bay, in August, as many as 56 bowhead whales were counted during a single 360°-scan from the water with a limited to 2km visibility, suggesting that the size of the stock observed is much larger.

The Committee **welcomes** this work, **encourages** its continuation and looks forward to further updates.

SC/65b/BRG17 estimated the abundance of bowhead whales in Academii Bay in the Shantar region of the Okhotsk Sea as 328 (SE=125) whales using genetic mark-recapture population estimate methods. The endangered Okhotsk Sea population of bowhead whales face both natural and anthropogenic threats to recovery. Natural threats include killer whale predation which has been observed several times per season in the region. Anthropogenic threats include fishing activities such as salmon net entanglements (two reported cases within past two years) and industrial activities such as the planned construction of terminal for mining in Konstantina Bay (northwestern arm of Academii Bay) and oil and gas development in the northern Okhotsk Sea. The Committee thanked the author for this update on research of the small Okhotsk Sea bowhead population. The Committee **recommends** collaboration of genetic laboratories to allow analysis of all available genetic samples for a population estimate.

**10.12 Arabian Sea humpback whales**

*10.12.1 Review new information*

SC/65b/SH19 reported on preliminary results from satellite tracking studies of male Arabian Sea humpback whales (ASHW) at Oman. Three of five tags deployed provided locations for several weeks and the movement results were consistent with a prior spatial modelling study. Further analysis is planned after additional tags are deployed in April 2015 in the Gulf of Masirah. The spatial ecology of this sub-population continues to be poorly understood and the authors proposed that tagging be part of on-going research in the region. It was further reported that the involvement of participants from other ASHW range states in the tagging programme was important to the development of cetacean research programmes in other areas of the Arabian Sea. The Committee notes the value of this work and **strongly endorses** its continuation.

*10.12.2 Progress toward the development of a Conservation Management Plan and other conservation initiatives*

Willson reported on progress towards a Regional Conservation Initiative. The Committee had endorsed these plans in SC/65a and during the last year, a consortium of NGOs and active researchers in the region developed an agenda to facilitate that work, including a workshop funded by the US Marine Mammal Commission and WWF. This workshop will facilitate capacity building of research personnel and prioritisation of activities toward areas considered to be hotspots. Further assessment of escalating threats will also be evaluated. Priority tasks have been identified including: genetic analysis of existing biopsy samples, field survey training, and preliminary surveys in the Gulf of Kutch on the Pakistan-India border.

The Committee **welcomes** efforts to develop regional cooperation for research and capacity and **recommends** the priority tasks listed above.

The Committee **reiterates** its serious concern about the endangered status and threats facing this distinct population. A regionally coordinated conservation and research program is **strongly recommended** and the Committee urges the IWC and range states to consider the nomination of the Arabian Sea humpback whale for a CMP, given the benefits that a regional framework would provide. The Committee also suggests that the issue be reviewed by the Conservation Committee, with the continued support of the intersessional Arabian Sea working group.

*10.12.3 Work plan*

The Committee **recommends** a combination of exploratory surveys and molecular genetics for the Arabian Sea population, as well as the following planned work: (1) the continuation of satellite tagging of humpback whales off Oman; (2) an intersessional Workshop in 2014 to facilitate research capacity building, prioritisation of research in potential hotspots and further assessment of escalating threats; and (3) continuation of the Arabian Sea Working Group.

**10.13 International cruises**

*10.13.1 IWC-POWER cruises in the North Pacific*

The IWC-POWER programme has been through a thorough planning process by the Committee and it has developed short-, medium- and long-term goals over a number of years based upon a thorough review of data available throughout the North Pacific. The short-term part of the programme is to cover all of the poorly-covered areas of the North Pacific with sufficient coverage to allow the necessary information on distribution, density and abundance (as well as biopsy samples and photo-identification data) to enable the design of a robust medium- and long- term programme that meets the objectives of the IWC-POWER programme. Although the research programme is designed by the Committee, the Committee **acknowledges** the tremendous support of the Government of Japan who provide a vessel and crew for 60-days each year – this is tremendous in-kind support without which the programme could not take place.

This year, the Committee reviewed the results of the 2013 cruise (Item 10.13.2) and report from the Planning Meeting for the 2014 survey (Item 10.13.3) and discussed

plans for the 2015 and 2016 surveys (Item 10.13.4), mid- and long-term recommendations (Item 10.13.5), and the archived photographs (Item 10.13.6).

*10.13.2 Review of the 2013 IWC-POWER sighting survey*

The 4th annual IWC Pacific Ocean Whale and Ecosystem Research (IWC-POWER) was successfully conducted by the Japanese from 12 July to 9 September 2013 in the eastern North Pacific (north of 30°N, south of 40°N, between 160°W and 135°W). Researchers from Japan, Korea and Mexico participated. The cruise had five main objectives (see Annex G, item 5.1). Survey plans had been endorsed by the Committee (IWC, 2014k). The Committee **agrees** that it was duly conducted following the guidelines of the Committee (IWC, 2012f).

Further details of the cruise, including summaries of the sightings made, may be found in Annex G, item 5.1. The Committee thanks the Cruise Leader, researchers, Captain and crew, and the Steering Committee for completing this cruise. The Governments of the USA and Mexico granted permission for the vessel to survey in their respective waters, without which this survey would not have been possible. The Government of South Korea provided one scientist, and the Government of Japan generously provided the vessel and crew. Furthermore, the IWC Secretariat was thanked for providing support. The Committee recognises the value of these data, collected in accordance with survey methods agreed by the Committee, covering many regions not surveyed in recent decades, and addressing an important information gap for several large whale species.

The Committee **welcomes** news that the photographic data had been uploaded into the IWC Secretariat's Lightroom database and **encourages** continuation of this work. Finally, it was noted that for the short-term phase of POWER, surveys will be single-platform, but that double-platform configurations will be evaluated in 2015 and 2016 for possible incorporation into the long-term survey programme if $g(0)$ appears to be less than one for the target species. Other issues concerning this survey programme will be investigated further at the POWER Technical Advisory Group (TAG) Workshop scheduled for September or October 2014 (see also Annex G, Appendix 6).

*10.13.3 Planning for 2014 IWC-POWER cruise*

SC/65b/Rep01 presented the report of the detailed Planning meeting for the 2014 IWC-POWER cruise, the 5th cruise in the series. The programme is designed by the Scientific Committee and would be impossible without the generous support of the Government of Japan who provide a research vessel, crew and fuel for 60-days (worth some £1m in today's market), as well as the Governments of Japan, USA and Korea who have provided scientists over the period of the programme.

The Committee drew particular attention to the satisfactory resolution of a long-standing problem involving CITES permits. It **expresses** thanks for this satisfactory outcome to the US State Department and the US Embassy in Tokyo, to Brownell, and to Sakamoto (Japanese fisheries Agency), the latter in particular for their persistence in reaching this result.

*10.13.4 Recommendations for 2015 and 2016 IWC-POWER cruises*

SC/65b/IA11 outlined the line transect sighting survey cruise plan for the 2015 IWC-POWER cruises. It is proposed to be 60 days long mainly in July and August 2015 and conducted in the central north Pacific between 170°E and 160°W, from 20°N to 30°N. Photo-ID and biopsy experiments are also planned. It was agreed that a feasibility experiment will be implemented to determine whether $g(0)$ for Bryde's whales is likely appreciably less than one. Improvements of methods for distance and angle estimation experiment will be considered at the TAG meeting with the aim of trialling improved methods for this cruise. Information collected from the survey would contribute valuable information on blue whales, sperm whales and Bryde's whales in a poorly covered area. The data and report of this survey would be submitted to the Committee meeting soon after the cruise.

The plans for the 2016 IWC-POWER cruise are outlined in Annex G, Appendix 6. The Committee **agrees** that this survey be conducted either in a block surrounding the Hawaiian Islands or in the Bering Sea, depending on: (1) the level of coverage of previous surveys that are in the block surrounding the Hawaiian Islands; and (2) permitting issues for the Russian zone of the Bering Sea. The Bering Sea was suggested because the entire Bering Sea has been poorly covered and would also assist in discussions *inter alia* arising out of the Commission Workshop on Arctic impacts. Since the short term goal is to cover all poorly-covered areas of the North Pacific, if previous abundance surveys have already sufficiently covered the Hawaiian Island block, then it is not necessary for the IWC-POWER programme to once again conduct a survey in that area. Thus, if the Planning Meeting determines the previous coverage around Hawaii is sufficient, the Bering Sea will be proposed to be covered. The Committee during the 2015 Annual Meeting will finalise this decision.

The Committee noted in discussions there may be a possibility of including the collection of passive acoustics data, with equipment such as towed-arrays. The Committee **thanks** the Government of Japan yet again for its generous offer of providing a vessel for this survey. The Steering Group for the IWC North Pacific Planning meeting that was appointed last year was re-established and will be convened by Kato. Matsuoka was assigned responsibility for IWC oversight for both the 2015 and 2016 surveys.

*10.13.5 Mid- and long-term recommendations for the IWC-POWER cruises*

SC/65b/Rep09 presented the report of the TAG (Technical Advisory Group) to the IWC-POWER, who met in Tokyo prior to the 2013 Planning Meeting. The TAG focussed on beginning to review the information obtained thus far in order to begin to develop the medium-term programme. The TAG addressed six issues and a number of recommendations for further analyses, improvements to procedures and information requests were made.

The Committee was asked to establish intersessional correspondence groups to examine the following issues.

(1) Collaborative efforts should be made to develop an effective and efficient onboard electronic system for the medium-term programme in the light of existing systems and the shared interest in improving such systems in other national and international cetacean survey programmes (e.g. SCANS III, T-NASS etc.).
(2) Upgrade the old IWC-DESS system to a fully functional relational database to enable efficient storage of the several kinds of data collected and to facilitate analyses of the data (including a more effective mapping option). Data include that from IWC-POWER, IDCR/SOWER, and other national programmes. These should be linked to the extensive photographic database being developed by the IWC Secretariat.

Reports related to the onboard electronic system development and the potential for the use of passive acoustics on POWER cruises will be submitted before the TAG meeting in September/October 2014. In discussions it was noted that the distribution of sei whales may be driven by environmental factors, such as gyres, and that it might be possible to design surveys to inform on these relationships. The Committee **thanks** all the members of the POWER Steering Committee and TAG for reporting back from the respective meetings. The Committee **endorses** the TAG report, and **encourages** collaboration from other countries, recognising the contributions of Japan, Korea, Australia and the USA thus far.

*10.13.6 Archiving IWC-POWER photographs*

Donovan reported that data continue to be added to the Secretariat Lightroom database. All POWER photographs from 2010-12 have been added, geo-referenced and coded as previously described in last year's paper (Taylor and Donovan, 2013) and references to associated record sheet numbers added. All of the digitised SOWER records have been incorporated and the process of digitising the negatives from the earlier cruises is underway. A user's guide to the database is complete apart from final checking. Finally, a database of biopsy records from SOWER is almost complete and will be sent to Japan and SWFSC to ensure that the record numbers for samples can be cross-referenced. POWER records are being added. The Committee **welcomes** this news and **recommends** continuation of this work.

*10.13.7 Progress on IDCR/SOWER volume*

Last year, the Committee noted that preparation of the volume was underway. The contents will include an introduction to SOWER and the fieldwork; distribution and movement of species encountered; their taxonomy and population structure; acoustics; species abundance; conclusions and lessons for the future.

As convenor of the Editorial Board, Bannister reported that a deadline for texts of 31 December 2013 had been set, but that progress had been slow. Only six texts of a total of 26 (excluding the introduction and conclusions) had been received so far; a further five can be expected shortly. There is still some way to go, but the Board will continue its efforts to encourage authors to produce texts as soon as possible.

The Committee also **welcomes** the news that the Secretariat Lightroom database now incorporates all of the digital photographs from the more recent cruises and that efforts are now being made to digitise all of the negatives from the earlier cruises. It **recognises** the great value of this dataset and **recommends** continuation of this work.

The Committee thanked Bannister and the Editorial Board, and looked forward to an update next year.

*10.13.8 DESS database for IWC IDCR/SOWER data*

The Committee had been informed during the development of the abundance estimates for Antarctic minke whales that Bravington and Hedley had found some errors in the IDCR/SOWER data. The database should of course be as accurate as possible and Secretariat has agreed to correct any errors when they are passed on. To date the Secretariat has not received the necessary information and the Secretariat has encouraged provision of this as depending on its nature, this may also require alterations to the existing validation algorithms being used which is important for future datasets as well as past ones. The Committee **recognises** the difficulties of time constraints for the researchers involved but also the need to correct errors and improve validation algorithms. It has therefore formed an intersessional working group to assist in this process.

*10.13.9 IWC-SOWER sonobuoy data*

The South African Blue Whale Project applied for and received the acoustic recordings from sonobuoys deployed during several IWC Antarctic and low latitude cruises (Shabangu and Findlay, 2014). This resulted in some 7,500 acoustic files from over 700 stations across cruises from 1996/97 through to 2008/09 in Areas I-VI, and the three blue whale cruises off Australia, Madagascar and Chile. A total of 1,547.76 hours of recordings had been initially reviewed and blue whale vocalisations (either Z or D calls) have been detected on 4,155 (55%) of the 7,501 recorded files.

The Committee **welcomes** the processing of these valuable data. Now that the 'bio duck' sound has been positively identified as an Antarctic minke whale, the Committee **recommends** this database be interrogated to identify the bio duck sound to investigate the spatial temporal distribution of the Antarctic minke whale.

*10.13.10 Review of other cruises*

**10.13.10.1 REPORT OF JAPANESE CETACEAN SIGHTING SURVEYS IN THE NORTH PACIFIC IN 2013**

SC/65b/IA06 presented a systematic vessel-based sighting survey that was conducted in 2013 by Japan to examine the distribution and abundance of large whales in the western North Pacific. A total of 3,470.1 n.miles was searched, where eight species including seven baleen whales were sighted. Photo-ID photographs and biopsy skin samples were also successfully collected.

The Committee **welcomes** this report and looks forward to receiving abundance estimates arising from these data. The Committee thanked Matsuoka for overseeing this survey on behalf of IWC.

**10.13.10.2 PLANS FOR JAPANESE CETACEAN SIGHTING SURVEYS IN THE NORTH PACIFIC IN 2014**

SC/65b/IA07 presented a plan for a systematic vessel-based dedicated sighting survey in the North Pacific for 2014 by Japan as a part of the Japanese Whale Research Program under Special Permit in the western North Pacific (JARPN II). The main objective is to examine the distribution and estimate the abundance of Bryde's whale for management and conservation purposes. In addition to sighting survey data, biopsy samples and photo-identifications will be collected. A report will be submitted to the 2015 Committee meeting.

The Committee **endorses** the proposal and Matsuoka was appointed to provide IWC oversight.

**10.13.10.3 REPORT OF CETACEAN SIGHTING SURVEYS IN THE ANTARCTIC IN 2013/14**

SC/65b/IA09 indicated that a dedicated sighting survey for abundance estimations in the Antarctic in the 2013/14 austral summer season was unable to be conducted due to external violent interferences by an anti-whaling group. This situation has now continued over three seasons, starting from the 2011/12 survey.

The Committee **expresses** its regret that the actions of an anti-whaling NGO had prevented the sighting survey. Following the cessation of the IDCR/SOWER programme in 2009 (and notwithstanding smaller-scale national projects to collect sightings data in particular regions), surveys such as this provide the only dedicated cetacean sightings that are synoptic over a wide area, and as such are extremely valuable for the work of the Committee.

Table 13
Overview of the work plan as it relates to whale stocks.

| Species/area | SC/66a (2015) | SC/66b (2016) |
|---|---|---|
| Antarctic minke whales | Review information collated intersessionally (see Annex J, item 9) to try to finalise the in-depth assessment with a focus on the Indo-Pacific region. | Finalise if not completed at SC/66a and [consider how to] address the remainder of the Antarctic. |
| Southern Hemisphere humpback whales | Undertake thorough review (collated intersessionally) and synthesis of the completed 8-year circumpolar assessment. Begin to evaluate data requirements and process for future assessments. | Complete evaluation and determine future work plan. |
| Southern Hemisphere blue whales (including pygmy blue whales) | Review available existing and new information on stock structure abundance etc. and determine feasibility of conducting area-based assessments with an associated work plan. | Depends on work plan developed in 2015. |
| North Pacific sei whales | Begin in-depth assessment. | Complete in-depth assessment. |
| North Pacific gray whales | See detailed work plan provided in Annex F. | Continue and possibly complete. |
| Southern right whales | The most recent assessment was completed in 2012. The focus will thus be on reviewing new information, e.g. with respect to matters related to CMPs. | Continue to review new information and develop work plan with respect to future updated assessments. |
| North Atlantic right whales | The last assessment was completed in 2000 and since that time the Committee has reviewed new information on abundance, trends, anthropogenic mortality etc. Consideration of when to undertake a new assessment will be given and a work plan developed. | Depends on outcome of discussions in 2015. |
| North Pacific right whales | New information (and hopefully abundance estimates) is expected from the Sea of Japan/Kamchatka region. Consideration will be given to whether sufficient information is available to conduct an assessment and a work plan developed. | Depends on outcome of discussions in 2015. |
| North Atlantic bowhead whales | Continue to review new information. | Continue to review new information and develop a work plan towards and eventual assessment. |
| Okhotsk Sea bowhead whales | Review new information expected on abundance and stock structure. | Continue to review new information and develop a work plan towards and eventual assessment. |
| Arabian Sea humpback whales | Review new information expected from several research initiatives. Continue to assist in efforts to develop a CMP. | Depends on outcome of discussions in 2015. |
| Sperm whales | Review information and report from an intersessional group and develop a work plan. | Depends on outcome of discussions in 2015. |

#### 10.13.10.4 PLANS FOR CETACEAN SIGHTING SURVEYS IN THE ANTARCTIC IN 2014/15

SC/65b/IA12 presented a plan for a systematic cetacean sighting survey for abundance estimation for the 2014/15 austral summer season in the Antarctic to be operated by Japan. The research area comprises Areas IV, V and VIW between 70°E and 145°W, south of 60°S from December 2014 to March 2015, where up to four research vessels may be used using survey procedures used in the IWC/SOWER surveys. Photo-identification and biopsy studies will also be conducted. International researchers will be able to apply to participate in the cruise, but they will do so at their own cost. A cruise report will be submitted to the 2015 Committee.

The Committee **commends** the researchers for recording killer whale ecotypes as recommended in SC/65b/Rep02. The Committee **endorses** the proposal. Matsuoka was appointed to provide IWC oversight.

### 10.14 Sperm whales

Last year, an intersessional e-mail group was established to consider the feasibility of a future assessment of sperm whales. Its terms of reference were to evaluate data availability and work required on the following topics: (1) population structure within ocean basins; (2) population size within ocean basins and abundance in smaller areas; (3) catch history; and (4) consideration of the development of a new assessment model (IWC, 2014g). Brownell and Bannister met in Bled to consider four working papers on the above subjects and a number of published papers on sperm whales and had discussions with other members. For the purposes of those discussions sperm whales were divided into two broad groups: (1) North Pacific; and (2) Southern Hemisphere.

It is clear a lot of preparatory work is required before undertaking a sperm whale assessment in either the North Pacific or the Southern Hemisphere. However, based on recent and ongoing research (catch histories, population size, genetic sampling, population structure, acoustics) on sperm whales in the California Current, the available data could be used for the development of a new assessment model. At the present time in the Southern Hemisphere, highest priority could be given to conducting survey[s] with acoustics to resolve the current status of the sperm whales off southern Western Australia where a 2009 aerial survey found no evidence of increase since whaling ceased in 1978.

The high priority given to the assessment of humpback whale breeding stocks BSD/BSE1/BSO left inadequate time to consider this agenda item. However, Brownell and the intersessional e-mail correspondence group will continue to develop the ideas canvassed above, perhaps with others, for report to the 2015 Annual Meeting.

### 10.15 Overview of work plan

The Committee's work plan for items related to whale stocks is summarised in Table 13.

## 11. STOCK DEFINITION

This item has been handled since 2000 by a Working Group (hereafter the SDWG). The Terms of Reference for SDWG were changed in 2012 to reflect the evolving needs of the Committee. During the present meeting, the SDWG continued to develop guidelines for preparation and analysis of genetic data within the IWC context (see Item 11.1), provided the Committee with feedback and recommendations concerning stock structure related methods and analyses

presented to other sub-committees (see Item 11.2), and continued in their efforts to develop a reference glossary of stock related terms, to aid consistent definition of 'stocks' in a management context for the Committee (IWC, 2014h, pp.287-8). The Report of the SDWG is given as Annex I.

### 11.1 Guidelines for DNA data quality and genetic analyses

Two sets of reference guidelines have been developed and endorsed by the Committee (IWC, 2014f, pp.248-9) and form 'living documents' that can be updated as necessary[15]. The first set addresses DNA validation and systematic quality control in genetic studies. The second set provides guidelines for some of the more common types of statistical analyses of genetic data used in IWC contexts, and contains examples of management problems that are regularly faced by the Committee. One section of the data quality guidelines will be updated intersessionally. During the present meeting, appendix sections of the genetic analysis guidelines were added; this document will be completed intersessionally (see Item 11.5). Both guidelines will also be published in the peer-reviewed literature.

Several papers were discussed that present new methodologies of relevance for the DNA data quality and genetic data analysis guidelines. These included: (1) evaluation of data quality in studies using next generation sequencing technologies; (2) development of an epigenetic assay which uses known-age humpback whales to estimate age in humpback whales of unknown age; and (3) development of a suite of computational tools that allow the exploration and visualisation of spatial patterns in genetic diversity using data from individual-based, long-term cetacean studies.

The Committee welcomes the developments in epigenetic ageing methods. It noted that this approach can be applied to increase the power of the close-kin mark recapture by identifying the inter-generational relationships within parent-offspring pairs.

### 11.2 Statistical and genetic issues related to stock definition

A number of Committee stock related papers were discussed by the SDWG. These were submitted to the following sub-committees: Revised Management Procedure (Annex D), Bowhead, Right and Gray Whales (Annex F), In-Depth Assessments (Annex G), Other Southern Hemisphere Whale Stocks (Annex H), Small Cetaceans (Annex L) and Review of Special Permit Proposals (Annex O). Technical comments on these papers are given in Annex I.

The development of close-kin mark recapture methods for a number of species, including North Atlantic minke whales (Annex D, item 3.3.1) and Antarctic blue whales (Annex H, item 5.1.1.4) was also discussed (Annex I, item 3.1). This approach has broad utility for the work of the Committee as it can increase the stock structure-related information content available from existing sample collections. The Committee **encourages** the continuation of this developing methodology and further reporting to the 2015 Annual Meeting.

Another useful development was the concerted attempt to discover why different studies of common minke whales in the North Atlantic have led to different conclusions about stock structure. Some studies suggest substantial levels of differentiation between areas, and others identify little to no differentiation. Evaluating why these differences exist is complicated, as differences in sample size, areas sampled, years sampled, marker types, and potentially laboratory protocols exist between studies. To better understand these differences, locus-specific differentiation ($F_{ST}$') values were compared across five datasets, and revealed that the same markers varied substantially in $F_{ST}$' between studies (Annex D, Adjunct 3). It was noted that the loci in Annex D, Adjunct 4 were non-focal (i.e. heterologous; developed in one species but utilised in another species) which may contribute to the inconsistencies seen; though see Annex I, Appendix 2. Factors thought most likely to contribute to these differences were ranked (Annex D, item 3.3.3), and continued analysis to identify the cause of these differences continues intersessionally (Annex D, item 3.7). The Committee **expresses** strong appreciation for these efforts to combine allozyme and microsatellite datasets together for a locus-specific reanalysis. It is of importance to the ongoing North Atlantic common minke whale assessment to resolve what factors may be contributing to the lack of concordance among these studies as this will allow simplification of the number of hypotheses to be considered. In addition, determining the factors underscoring the different levels of differentiation between these datasets may have wider implications for other studies of interest to the Committee. In most cases, multiple datasets are not available for such direct comparisons of results, thus discordant signals such as those seen in this locus-specific $F_{ST}$' analysis (Annex D, Adjunct 3) could be present but unrecognised in other studies.

This year, there was extensive discussion of SC/65b/BRG02 (see author's summary in Item 3.1.2 and discussion summary in Annex I, Appendix 2). SC65b/BRG02 reports results of a meta-analysis of microsatellite diversity and standardised $F_{ST}$ across populations of whales, dolphins, porpoises and sharks. This analysis finds that whale and dolphin studies have been based on a significantly lower proportion of focal loci than porpoises or sharks. The authors also find significantly lower allelic diversity in whales and dolphins than in sharks and porpoises. This reduced allelic diversity is also associated with higher estimates of population differentiation (using standardised $F_{ST}$). The authors of SC/65b/BRG02 therefore strongly recommend that the use of non-focal microsatellites to estimate $F_{ST}$ should be avoided in future studies since this might lead to inflated estimates of $F_{ST}$ that are potentially statistically significant.

The potential implications of the main conclusions in SC/65b/BRG02 are far reaching, and resulted in extensive discussions (see Annex I, Appendix 2). This particularly focuses on the author's argument that the higher measures of $F_{ST}$ found for non-focal loci could lead to the over-diagnosing of stock structure. This inference has ramifications for the many studies based on non-focal loci in cetaceans and more widely in the field of molecular ecology. If the authors' assertion was correct, this would call into question the conclusions of those studies and the consequent recommendations agreed by several IWC sub-committees. In discussion, many argued that the conclusion from SC/65b/BRG02 about the over-diagnosing of structure was based on a methodological misconception. The essential reasoning is as follows (see Annex I, Appendix 2 for further details). $F_{ST}$ has two components: locus-specific effects, and population-specific effects. While highly diverse loci may

[15]DNA data quality guidelines are available from *http://www.iwc.int/sci_com/handbook.htm#*ten. Genetic data analysis guidelines are anticipated to become available before the 2015 Annual Meeting.

Table 14
Overview of the work plan as it relates to stock definition.

| Topic | SC/66a (2015) | SC/66b (2016) |
|---|---|---|
| Terminology review and unit-to-conserve | Continue to work on this issue with a focus on examining terms used for small cetaceans. Try to finalise an initial list for use by the Committee. | Finalise if not completed at SC/66a |
| Updates to genetic data analysis and DNA data quality guidelines (annual) | This is part of maintaining an online and evolving set of guidelines. | Review to see if updates are required |
| Statistical and genetic issues concerning stock definition | Continue to review technical issues regarding papers submitted to all sub-groups of the Committee. | Continue |
| Testing of Spatial Structure Models (TOSSM) | Examine the future application of TOSSM datasets to new cetacean examples of interest to the Committee; advance the use of TOSSM to provide general guidelines for setting subarea boundaries for assessment, including those for the RMP and AWMP. | Continue based on discussions at 2015 |

not reflect a sufficient proportion of the population-specific effects to detect real population structure, it is not conversely true that markers of low variation will detect non-existent structure. Indeed, if this was the case, commonly used low diversity markers such as allozymes and SNPs would routinely, artificially detect population structure, and this is demonstrably not the case. Regardless of the specific magnitude of $F_{ST}$, a statistical assessment determines significance with a controlled magnitude of type I error.

In summary, the Committee **requests** that the authors provide the data used in the meta-analysis be made available to the SDWG so that it can better understand the associations identified in SC/65b/BRG02. This will allow examination of alternative explanations for the results, which is needed before drawing conclusions for the Committee.

### 11.3 Testing of Spatial Structure Models (TOSSM)

The aim of the TOSSM project that was developed by the Committee is to facilitate comparative performance testing of population structure methods intended for use in conservation planning. From an IWC perspective, the TOSSM software package allows evaluation of methods for detection of genetic structure, in terms of how well the methods can be used to set spatial boundaries for management. It is available for all to use and simulated datasets exist for three of the five stock-structure Archetypes previously proposed by the Committee (see IWC, 2010b, p.51). There was no progress on Testing of Spatial Structure Models to report this year. Progress continues to be made on the work items suggested in IWC (2013b, p.239) for the Pacific Coast Feeding Group (PCFG) of gray whales and will be presented next year. The Committee **agrees** to form an intersessional email group to further advance the use of TOSSM, with the primary intent that TOSSM be used to provide general guidelines for setting sub-area boundaries for assessment processes, with particular reference to populations that pose management challenges to the Committee. It was noted that the use of particular examples, such as the ongoing work on the PCFG gray whales, was a great motivator for use of TOSSM and was helpful in making its relevance to the Committee clear.

### 11.4 Terminology and unit-to-conserve

Defining and standardising the terminology used to discuss 'stock issues' is still a long standing objective of the SDWG, in order to help the Committee report on these issues according to a common set of terms (see Appendix 5, IWC, 2014h, pp.287-8). This year, the SDWG decided further work was needed to: (1) agree the definition for 'mixtures of stocks'; as well as (2) align the terms used in SDWG with terminology already in use by the sub-committee on Small Cetaceans and make additions to the developing glossary where needed. An intersessional email group was formed to complete this task.

### 11.5 Work plan

The Committee **agrees** to the overall work plan given in Table 14; details are given in Annex I.

## 12. ENVIRONMENTAL CONCERNS

The Commission and the Scientific Committee have increasingly taken an interest in the environmental threats to cetaceans. In 1993, the Commission adopted resolutions on research on the environment and whale stocks and on the preservation of the marine environment (e.g., IWC, 1996a; 1997; 1998a; 1999a; 1999b; 2001). As a result the Committee formalised its work by establishing a Standing Working Group that has met every year since.

### 12.1 State of the Cetacean Environment Report (SOCER)

The SOCER provides an annual update, as requested by Commission Resolutions 1997-7 (IWC, 1998a) and 1998-5 (IWC, 1999a), on: (1) environmental matters that potentially affect cetaceans; and (2) developments in cetacean populations/species that reflect environmental issues. The 2014 SOCER (Annex K, Appendix 4) focused on the Atlantic Ocean, Caribbean and Gulf of Mexico. Details of this year's SOCER can be found in Annex K, item 6.

The Committee thanked the SOCER editors for compiling this year's report and **encourages** participation in the upcoming version. The focus of the SOCER at SC/66a will be on the Pacific Ocean region; at SC/66b, it will be focused on Arctic and Antarctic regions.

### 12.2 Pollution

*12.2.1 Update on Pollution 2020+ progress*

SC/65b/E13 reviewed microplastics in the marine environment and their potential impacts on cetaceans. Microplastics have a global distribution; do not biodegrade and are only partially removed by sewage treatment. The toxicological consequences for marine life range from mechanical hazards to leaching toxic chemicals. Analysis of cetacean faeces may provide information on the assimilation and excretion of microplastics. The Committee **thanks** the authors for this comprehensive report.

The IWC Pollution 2020 Steering Group Meeting report (SC/65b/Rep05) noted that the last 4 years have seen the completion of Phases II and III of the Pollution 2000+ initiative, which has included the finalisation of an individual-based model that can be used to investigate the effects of pollution (particularly polychlorinated biphenyl or PCB) exposure on cetacean populations (Hall *et al.*, 2013). The major points identified were that: (1) the model should include the ability to change the annual accumulation over time, as this would better reflect the gradual decrease in environmental PCBs; (2) the vital rates used to parameterise both the dolphin and the humpback model may need to be

updated; (3) a major source of uncertainty in the model relates to the parameters that control the offloading of PCBs from mothers to their calves; and (4) currently, there is no uncertainty incorporated into the model around the relationship between immune function and reduced survival probability. Work on prioritising current contaminants of concern for cetaceans remains important to the SWG and efforts to complete this task should be continued.

The Committee **commends** this work and recognises that the development of a practical modelling tool provides an important step in the Committee's ability to quantify the effects of chronic threats to cetaceans. The Committee **endorses** the steering committee advice and **recommends** the addition of leachate and adsorbed chemicals from microplastics to the questionnaire that will be circulated among experts for input on chemicals of concern. In addition, the Committee **recognises** that continued investigation into the effects of chemicals adsorbed to microplastics, on cetaceans, is needed.

*12.2.2 Oil spill impacts*

**12.2.2.1 UPDATE ON DEEPWATER HORIZON OIL SPILL**

An update on the 2010 Deepwater Horizon oil spill investigation on the injuries and impacts to cetaceans in the Gulf of Mexico was provided. Health assessments of bottlenose dolphins in Barataria Bay, Louisiana (an area that received heavy and prolonged oiling) and Sarasota Bay, Florida (control site) were conducted in 2011 (Schwacke *et al.*, 2014). Barataria Bay dolphins showed evidence of hypoadrenocorticism, consistent with adrenal toxicity and were five times more likely to have moderate to severe lung disease. Additional assessments and are planned for the region of concern.

An Unusual Mortality Event (UME) started in February 2010 in the northern Gulf of Mexico and was ongoing as of 14 May 2014. Most of the strandings (87%) were bottlenose dolphins. From results received to date, the cause of the UME is unlikely to have been due to *morbillivirus*, marine biotoxins, or *Brucella*. The Deepwater Horizon oil spill has not been ruled out as a possible contributing factor. Details of the discussion on these papers may be found in Annex K, item 7.2.1.

The Committee **commends** this work and **recommends** that these studies continue. It also **recommends:**

(1) that baseline data from populations at risk be collected and knowledge about exposure and impacts following spill events maximised;
(2) that analytical methods for oil spill-related compounds be standardised; and
(3) that pre-planning begin for an oil spill workshop to inform the Committee on the impacts of oil, dispersants, and spill response on cetaceans and the methodological tools for the assessment of impacts to cetaceans after a spill.

**12.2.2.2 OTHER OIL SPILL INFORMATION**

The report 'Responding to oil spills in the US Arctic Marine Environment'[16] was discussed. It noted that response actions will have to deal with the remoteness, limited infrastructure and capacity, and might have to deal with sea ice, low temperatures, and days with very little or no sun light. The report includes recommendations about all of these topics. Details can be found in Annex K, item 7.2.2.

The Committee again **stresses** the importance of baseline information on both marine mammals (and other wildlife) and their prey. It was noted that the injury assessment process is difficult to complete without this type of data available for comparisons. In addition, the Committee **recognises** the importance of subsistence species to local communities.

The 2013 *Community Oil Spill Response in Bering and Anadyr Straits* workshop report was briefly summarised (Wildlife Conservation Society, 2013). The workshop specifically focused on: (1) the role of communities in these policies and planning processes; (2) the location and role of emergency response equipment in the region; and (3) examples of how other communities in Alaska and elsewhere engage with prevention, planning, and response needs. Participants identified several key themes during this exercise including the need for oil spill response training, equipment, funding and effective local and cross-border communication plans (see Annex K; item 7.2.2).

Further to discussions about oil spills, the Committee **agrees** that absolute priority should be given to preventing oil spills in the highly vulnerable Arctic region. However, the Committee noted that even when preventative measures are taken, oil spills may still occur. Responding to an oil spill, especially a large one in a polar area, is hindered because of limited capacity particularly due to infrastructure. In addition to abundance and distribution, baseline data should include: health assessments; contaminant levels; biomarker measurements; and habitat/prey quality. It was noted that cetaceans in other countries are also under threat of both oil and gas development and increased shipping. The Committee **recommends** that Committee members: (1) enhance the collection of baseline data related to abundance, health assessments, prey, and habitat of cetaceans for an improved capacity for injury assessment and monitoring recovery in the event of a spill; and (2) build capacity for responding to an oil spill in polar regions or other vulnerable or at risk areas. The Committee also **recommends** that the Commission seeks observer status at the Arctic Council for improved communication and coordination of Arctic issues related to cetaceans, including issues related to shipping oil and gas activities (and see Item 10.2.1 and Item 7.2.2).

*12.2.3 Other pollution information*

An update on the 2011 Fukushima Nuclear Accident was provided. Monitoring efforts to determine levels of radionuclides in environmental samples have increased since the disaster. Radioactive isotopes of iodine and caesium were detected in air, water, milk and food samples collected across the entire northern hemisphere and also southern hemisphere, including New Guinea and Fiji but radiation levels were very low and did not pose a risk to the public. A report has been published on the potential impacts and monitoring efforts being conducted[17].

The Committee noted that the Government of Japan has measured Fukushima-associated radionuclides in more than 45,000 seafood samples collected from various coastal waters of Japan[18]. Modelling efforts have projected the input of Fukushima-associated radionuclides into marine waters of eastern North Pacific and the levels in some areas could approach those reported in the 1950-60s, i.e. a period during nuclear testing and activity in the region. The Committee **expresses concern** about this new information; the impact that radionuclides released as a result of the Fukushima accident might have on wildlife and humans remains unclear.

[16]*http://www.nationalacademies.org.*

[17]See: *http://marinedebris.noaa.gov/sites/default/files/Japan_Tsunami_Marine_Debris_Report.pdf.*

[18]See *http://www.jfa.maff.go.jp/e/inspection/index.html.*

**12.3 Cetacean emerging and resurging diseases (CERD) and mortality events**

*12.3.1 Update from the CERD intersessional group*

The Cetacean Emerging and Resurging Disease (CERD) Group was created in 2008 in recognition of the increased need to address disease issues in cetaceans at an international level, including information on emerging diseases and the fact that for most cetacean species there is insufficient information on diseases, particularly those with potential anthropogenic drivers, to evaluate the risks to populations (IWC, 2008c).

*12.3.2 CERD website and database*

In 2012, the CERD working group proposed to develop a website that provides information on infectious and non-infectious diseases, as well as nutritional disorders and biotoxins (IWC, 2013a). The CERD will advertise internships to assist with data validation and input into the CERD web framework. In recent years, standardisation of the data that will be used for the CERD website has begun and the proposed format was presented to the Committee.

*12.3.3 Strandings and mortality events*

SC/65b/E03 provided information on an Unusual Mortality Event (UME), with increased numbers of bottlenose dolphin strandings documented from New York to Virginia beginning in July and August (>1,200 dolphins stranded). This was determined to be a *morbillivirus* outbreak. Other stranded cetacean species testing positive by PCR (polymerase chain reaction) for cetacean *morbillivirus* included humpback, fin and pygmy sperm whales and striped dolphins. The impacts of dolphin *morbillivirus* on these species remains unknown (see Annex K, Item 8.3 for details). The Committee **encourages** continuation of the investigation of the *morbillivirus* outbreak, further international collaboration and looks forward to additional information as it becomes available.

SC/65b/SM03 reported the first mass stranding of seven Longman's beaked whales in New Caledonia on 16-17 November 2013. Samples were collected from five animals. Low concentrations of elements associated with mining activity in New Caledonia were found in the tissues, suggesting that industrial extracting activities do not represent a significant source of contaminants for this species. Cetacean *morbillivirus* was identified in one of the individuals via PCR analysis. Details can be found in Annex K, item 8.3.

On 1 April 2014, an atypical mass stranding of 6-10 Cuvier's beaked whales occurred along the coasts of south and southwest Crete, Greece, Mediterranean Sea, inside the 'area of special concern for beaked whales', discussed in Item 12.4.4. The mass stranding comprised several stranding events in three different locations/areas. At the time of the Crete atypical mass stranding event, the 'Noble Dina' naval exercise, involving Greek, US and Israeli navies, was taking place in Greek offshore waters.

In discussion, it was noted that atypical mass stranding events such as this have previously been associated with anthropogenic sound from military sonar. The Committee recommends that this event be investigated by marine mammal veterinarians and the findings reported next year.

*12.3.4 Other health-related activities*

SC/65b/E04 evaluated marine *Brucella* infections in cetaceans in the United States (see Annex K, item 8.4 for details). Manifestations of infection in cetaceans include late-term abortions and lesions in lungs, reproductive organs, bones and the brain. Collaborative work in the US over the last four years has identified more than 120 cetaceans testing positive for marine *Brucella*, many with clinical signs of brucellosis. Brucellosis due to marine *Brucella* has been found in four human cases worldwide and the wide presence of the marine *Brucella MLST 27* in cetacean cases has raised the most concern for public health, as this was the type implicated these *Brucella* infections. Based on concerns for both cetacean populations and human health, the Committee **recommends** that the development of a reliable serological assay for the detection of marine *Brucella* antibodies be given high priority. It also **recommends** further research into virulence mechanisms, transmission pathways, pathogenesis and co-morbidity factors in cetaceans. The Committee **recognises** and **encourages** the work on *Brucella* in the Southern Hemisphere and welcomes initiatives that would allow cetacean *Brucella* types to be identified and compared. In addition the Committee **recognises** the concern about the potential risk that the marine types may pose to humans, including stranding response workers, subsistence consumers and fishermen, and **recommends** that particular attention be given to elucidating the frequency and routes of transmission of the marine *Brucellas* to humans.

SC/65b/E05 described information on a pilot project called Marine Mammal Health Map for tracking heath data obtained from marine mammal strandings, mortality events, and health assessments during live capture release programs. The ultimate goal of the Marine Mammal Health Map is to share marine mammal health and disease information on a national and international scale and evaluate potential impacts on populations. The Committee **expresses** interest in the health mapping technology and **encourages** updates on this work, as well as further development and potential application to CERD.

SC/65b/E06 summarised information on skin lesions in southern right whales from the Península Valdés area. Over the past ten years, there has been an increase of skin lesions in whales in this population. As a result of analysis of samples obtained during 2012 and 2013, the presence of poxvirus in skin lesions of southern right whales was confirmed, and several bacteria (e.g. *Erysiphelotrix spp., Staphylococcus epidermidis*, and *Streptococcus spp*.) were isolated from wounds caused by kelp gulls.

The Committee **commends** Argentina for conducting skin lesion research on Southern right whales, especially the recent investigations of pathogens that may be expressed in the lesions and **recommends** that they continue the work on skin lesions given the prevalence and continued problems with kelp gulls. Further information on this work was discussed in Annex F, item 4.1.

Information on pathological findings of subsistence-harvested bowhead whales by Alaskan Eskimos during 2013 was presented to the Committee (see SC/65b/BRG08).

Di Guardo and Mazzariol (2013a) described some of the host and viral factors driving dolphin *morbillivirus* infection with particular emphasis on striped dolphins in the Mediterranean. An expansion of the host range has recently been observed in the Mediterranean with infection in fin whales and a captive harbour seal.

Di Guardo and Mazzariol (2014) presented a commentary on two papers recently published regarding cetacean *morbillivirus* in the Southern Hemisphere. The authors noted that data are needed on the genetic composition of the new strains and emphasis should be placed on the host and agent-related factors that drive the complex *morbillivirus* cetacean interaction dynamics.

Of note was the number of new cases of *morbillivirus* globally which may be a cause for concern. Princeton University is hosting a workshop on marine *morbilliviruses* in August 2014 and the Committee looks forward to a report at SC/66a.

Di Guardo and Mazzariol (2013b), reported that striped dolphins stranded in 2007 and 2008 showed evidence for *T. gondii* in association with brain lesions. They suggested that an 'open sea' life cycle involving this and other pelagic cetaceans should not be ruled out.

**12.4 Effects of anthropogenic sound on cetaceans and approaches to mitigate these effects**

*12.4.1 IWC/IQOE Workshop report*

A two-day Workshop was sponsored by the Commission, the International Quiet Ocean Experiment (IQOE) and others, to discuss regional and ocean-basin scale underwater sound field mapping techniques to provide support for decision makers seeking to characterise, monitor, and manage the potential impacts of chronic or cumulative anthropogenic noise on marine animals. Many different soundscape monitoring and modelling programs have been developed (see Annex K, item 9.1). However, while these programmes are an excellent start, they are not standardised in their measurement or modelling parameters, making it extremely difficult to compare products across regions. In addition, they are largely focused on US and European waters, while management concerns for marine organisms are far wider ranging. The Workshop recommended identifying acoustic measurement and modelling protocols that if implemented world-wide would greatly add to the value of local and regional studies by allowing data to be combined and integrated at larger scales.

To support further development of sound modelling tools, it was proposed that the Committee should consider its management needs and designate high priority areas for the next steps in this work. Possible areas that were highlighted during Workshop discussions for further evaluation by the Committee included the Arctic, Southern Ocean Sanctuary, South Atlantic, Mediterranean, North Sea and Gulf of Mexico-Caribbean waters.

The Committee **commends** the IWC/IQOE Workshop participants for their efforts, and **recommends** continuation of this effort and further work to implement the recommendations contained in the Workshop report. The Committee **endorses** the recommendations from the Workshop report. In order to advance this work, the Committee **recommends** conducting the two predictive sound field mapping studies in high priority areas as described in Annex K, Appendix 2. In addition, the Committee **recommends** the collection of empirical data (e.g. acoustic recordings) to assess baseline acoustic conditions in these high priority regions (particularly where rapid industrial or environmental change is occurring), and the expansion of efforts where data collection is currently limited. The Committee **recommends** continued international collaboration on the issue of underwater anthropogenic sound, and planning of additional Workshops or projects with various regional management agencies, industry, and organisations.

*12.4.2 New information on the effects of anthropogenic sound*

Simmonds *et al.* (2014) gives a history of marine noise pollution and explains how it came to emerge as a 'significant mainstream issue,' taking note of the role that the IWC has played in this effort and concluding that over the last two decades or so, significant progress has been made acknowledging this issue, especially in the USA. The authors call for enhanced international cooperation and the expeditious sharing of information from marine renewable energy devices (which has emerged as a new issue) and stress that temporal and spatial separation should be the primary mitigation approach.

*12.4.3 Update on new tools, approaches or efficacy of mitigation of effects of anthropogenic sound on cetaceans*

SC/65b/E11 describes a simulation framework to evaluate the efficiency of using Marine Mammal Observers (MMOs) for mitigation of sound-related injury. Without an adequate quantified assessment of the risk reduction, mitigation measures may often be applied inappropriately or result in regulators granting approval for activities on the basis of measures that do little to reduce risk. The Committee **thanks** the author and encouraged publication of his findings.

SC/65b/E09 discussed the real-time mitigation measures based on the detection of animals close to airguns and other sources and, in particular, the role that MMOs play. SC/65b/E09 raised questions about the work of MMOs covering issues including: increasing distances of monitoring from sound sources required, complex multispecies requirements, the authority and independence of MMOs, their training and assessment, numbers of observer required to be effective and data availability.

The Committee noted that addressing such issues was important in ensuring that MMOs were effective and noted that an independent assessment of MMO practices does not exist. Hence, the Committee **agrees** that this issue would be a suitable focus for its consideration at a future Committee session in which MMOs and their associations would be represented.

SC/65b/E08 provided a brief overview of the various options available to reduce anthropogenic ocean noise. The overarching recommendations are: (1) governments around the world should phase in increasingly strict noise level standards for all noise-producing activities; and (2) governments, industry and NGOs should seek ways to address and reduce the underlying demand for noise producing activities. For more specific recommendations see Annex K, item 9.3.

In SC/65b/E07, Environmental Impact Statements or Reports were examined to determine whether the focus on reducing Level A 'takes' under the US Marine Mammal Protection Act (i.e. a predicted level of sound that could result in physical injury or death) is sufficiently protective and effective by comparing the numbers of Level A with Level B takes (i.e. a level of sound that results in behavioural disturbance). Spatio-temporal mitigation (time-area closures) and quieting alternative technologies, such as marine vibroseis (which exposes only 1-15% of animals to higher noise levels compared with airguns), in contrast to safety zones and ramp-up, can dramatically lower both Level A and B takes. For discussion details see Annex K, item 9.3. In summary, it was considered that more animals are affected by noise, and as such the impacts to cetaceans are greater, than currently estimated.

The Committee **thanks** the author for presenting these findings, **recommends** that further consideration should be given to examining behavioural effects and possible population level effects. It looks forward to receiving additional information from studies such as this.

A German study about the development of noise mitigation measures in offshore wind farm construction was presented to the Committee[19]. The aim of this study was to

[19] *http://www.bfn.de/0314_meeresnaturschutz-berichte.html.*

describe technical noise mitigation measures that can be applied during pile driving of offshore wind turbines, as well as alternative low-noise foundation concepts and to analyse their applicability. Additionally, it was noted that, in Germany, an 'underwater noise concept' for the North Sea has been in place since September 2013, which is applied to protect harbour porpoises from underwater noise from pile driving activities.

The Committee welcomed the study and **stresses** the importance of sound mitigation measures. With respect to the Baltic Sea, the Committee **strongly encourages** the relevant governments in the area to apply appropriate measures to protect the highly endangered harbour porpoise subpopulation of the Baltic proper from negative effects of underwater noise through pile driving and other anthropogenic activities.

In recognising the pervasive nature of underwater sound in the marine environment and the inherent difficulties in assessing the behavioural impacts that such inputs may cause, the Committee **agrees** that increased efforts should be made to avoid, minimise and mitigate the adverse effects of anthropogenic noise on cetaceans. In particular the Committee **recommends** that Governments should promote and facilitate the adoption of noise-reducing technologies by industry including shipping noise, exploration for fossil fuels and pile-driving. The Committee also **encourages** the completion of appropriate assessments for marine activities to help ensure harm is not caused to cetaceans, including giving consideration to the development of noise exposure limits as, for example, used in Germany with respect to pile driving. The Committee **encourages** industry (and other noise producers such as the military) to release data about its noise generating activities (both completed and where possible, planned), including but not limited to activity, location, source characteristics, duration, in order that the cumulative implications for cetaceans of all activities can be assessed.

The Committee also **stresses** the importance of utilising temporal and spatial management of noise generating activities and encouraged the identification of sensitive areas in which noise would be strictly managed.

Nowacek *et al.* (2013) dealt with a responsible approach to minimising disturbance to cetaceans from seismic surveys. The authors identified a number of principles and steps that would have common application even though the final mitigation and monitoring programmes would differ (see Annex K, item 9.3) This is a feedback process with a primary objective that the monitoring and mitigation plans improve over time and the monitoring component is integral part of any programme not merely an optional extra.

The Committee thanked Donovan for presenting this paper on behalf of the authors and **recommends** the process described in this paper. It also **endorses** the approaches described in the other papers presented in this section.

*12.4.4 Other anthropogenic sound issues*

The Committee received a brief summary of the findings of the 2008 mass stranding of melon-headed whales in northwestern Madagascar undertaken under the auspices of the IWC and others. The full report and supplementary information can be found on the IWC website.[20] While seismic surveys and other factors were systematically excluded or deemed unlikely it was found that the use of a12-kHz Multi-Beam Echosounder System to be 'the most plausible and likely behavioural trigger for animals initially entering the lagoon system.'

[20]*http://iwc.int/2008-mass-stranding-in-madagascar.*

The Committee noted that the investigative process described in this report could serve as a model for investigating the causes of mass stranding in other areas.

The Committee drew attention to the fact that this is a new sound source to be associated with cetacean mass strandings and **recommends** that high intensity multi-beam echosounder systems be considered in addition to military sonars as possible threats to cetacean populations. The Committee **thanks** the Government of Madagascar, the US government as well as the IWC for their support in the investigation of this mass stranding event.

Di Sciara presented the work of the Scientific Committee of the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS), on the location of critical habitats of Cuvier's beaked whales in the Mediterranean in order to support appropriate mitigation measures. The ACCOBAMS Committee developed a map of 'areas of special concern for beaked whales' – based on a combination of modelled beaked whale habitat and locations of all known mass stranding events, surrounded by a 50 nautical mile buffer zone – showing areas that naval exercises involving sonar use should avoid.

The Committee **commends** the ACCOBAMS Scientific Committee for addressing the conservation of Cuvier's beaked whales in the Mediterranean through the identification of the species' critical habitat, and **recommends** that efforts to map Cuvier's beaked whales' habitat in the Mediterranean should be continued and improved.

**12.5 Impacts of climate change on cetaceans**

*12.5.1 Progress on climate change*

An overview of IWC work on climate change and a summary of recent relevant publications were provided in SC/65b/E12. It noted Doney *et al.* (2012) which discussed impacts of climate change on marine ecosystems structure and dynamics, and how species might adapt; Lambert *et al.* (2014) recognised limitations of current scientific understanding of cetaceans, when attempting to model future distribution under climate change scenarios; and Poloczanska *et al.* (2013) compiled a database of 1,735 marine biological climate-related changes from the literature.

In addition, the recent Intergovernmental Panel on Climate Change (IPCC) summary for policy makers (IPCC, 2013) predicted continued ocean warming, higher rates of sea level rise, greater sea ice loss and ocean acidification.

During discussion, it was noted that approximately half of the members of the SWG on Environmental Concerns are currently engaged in or indirectly working on issues related to climate change. In addition, the Committee indicated that other bodies have been considering the issue of climate change and conservation (e.g. ACCOBAMS, CMS). The Committee **agrees** that an intersessional steering group should meet to develop a plan for climate change work by the Committee over the next few years.

*12.5.2 Other climate change information*

Information on a recently published review of the distribution of endemic cetaceans in relation to hydrocarbon development and commercial shipping in the Arctic (Reeves *et al.*, 2014) was presented to the Committee. The results showed extensive overlap between areas inhabited by the whales and areas of increasing interest for shipping and hydrocarbon exploration and development. For details of the paper, see Annex K, item 10.2.

*12.5.3 Arctic impacts Workshop*

A summary of the 'Workshop on Impacts of Increased Marine Activities on Cetaceans in the Arctic' (Anchorage, Alaska on 6-7 March 2014) was presented to the SWG. It focused on shipping and oil and gas activities and involved a wide range of stakeholders who discussed number of relevant aspects of the issue, including: current and past research conducted; implementation of management measures; knowledge gaps and concerns; and information the IWC can provide to assist managers in preparing for these impacts (see Annex K, item 10.2.1 for further details and recommendations).

The Committee **commends** the Workshop participants for their work and looks forward to the final report. The Committee **reiterates** that two of its recommendations are independently in accord with those arising out of the Arctic Workshop: (1) that the Commission pursue stronger links with other important international organisations (e.g. the Arctic Council, IMO), range states, local authorities and industry; and (2) that IWC member nations enhance the collection of baseline data related to health assessments, prey, and habitat of cetaceans for an improved capacity to detect impacts from or recovery after oil spills or to detect changes due to other human activities.

## 12.6 Habitat-related issues

*12.6.1 Cetaceans and marine debris*

**12.6.1.1. UPDATE ON PLANNING FOR THE 2ND MARINE DEBRIS WORKSHOP**

The first IWC Workshop on marine debris sought to define and understand the adverse impacts of marine debris on cetaceans (IWC, 2014b, pp.521-39). A second marine debris Workshop under the auspices of the Conservation Committee will be held in Hawaii in the first week of August 2014 and a report will be forthcoming in 2014 (see Annex K, item 11.1.1).

**12.6.1.2 NEW INFORMATION ON MARINE DEBRIS IMPACTS ON CETACEANS**

Information collated on rates of marine debris ingestion and associated mortality rates, as well as recommendations regarding reporting debris interactions to the IWC was presented in SC/65b/E02. Debris ingestion has been documented in 48 cetacean species, with rates of ingestion in necropsied stranded carcasses as high as 74% in some areas. A key recommendation of the first IWC Workshop on marine debris was that information on rates of debris interactions should be reported annually by country to the IWC. SC/65b/E02 made recommendations for information that should be included in such reporting.

The Committee **thanks** the authors of SC/65b/E02 for providing the information and **notes** that there was a need to develop monitoring tools to quantify the relevance of marine debris ingestion to the incidence of strandings and mortality, with the ultimate aim of extrapolation to cetacean mortality rates. The Committee **agrees** that information on marine debris ingestion should be included in national Progress Reports submitted to the IWC. For details on fields see Annex K, item 11.1.2.

The Committee **recommends** discussions with the *ad hoc* Progress Report group and Secretariat with the aim of adding agreed fields for inclusion of such records in the online submissions portal.

A plan for the analyses of the quantity and distribution of marine debris in German waters, collected via aerial surveys, as well as an assessment of marine debris impacts on marine mammals was described in SC/65b/E10.

Summaries of SC/65b/SP02-SP05 and Isoda *et al.* (2014) were presented to the Committee (see Annex K, item 3 for statement on these papers). During the 2013 JARPN II offshore survey, debris was detected in stomachs of 33 of 100 sei whales sampled and two of 28 Bryde's whales. Plastic was the most abundant type of (<15cm). No obvious signs of illness that may have been caused by debris ingestion were detected. Marine debris on the sea surface was recorded during the sighting surveys (1987/88-2010/11; (Isoda *et al.*, 2014)). A total of 70 pieces of marine debris and objects other than prey were found in the stomachs of Antarctic minke whales ($n$=10,041), including feathers, stone, wood, plastic and others. The authors noted that given the low indices, the effect of marine debris on whales in the Antarctic is expected to be limited at the present time.

## 12.7 Other habitat-related issues

Rosenbaum *et al.* (2014) provided information on the movement of Southern Hemisphere humpback whales from Breeding Stock B and the overlap with anthropogenic activities in the South Atlantic Ocean. The extent of overlap with anthropogenic activities makes it difficult to implement effective mitigation measures over their entire range.

Rosenbaum presented information on the assessment of vessel strike risk for large cetaceans in the Bering Strait region. The conclusions were that significant overlap between whales and vessels does occur, and these interactions are likely to increase and this is an area of key concern.

SC/65b/SH19 presented preliminary information that indicated 3 satellite-tracked Arabian Sea humpback whales exhibited spatial and temporal overlap with shipping traffic, oil and gas activity and planned fast ferry routes along the coast of Oman, and all three whales passed through the main approach channels to major ports.

The Committee **thanks** the authors of the papers for presenting their findings and **encourages** the continuation of similar work.

## 12.8 Conservation Management Plans

This is considered under Item 21 as well as in Annex K (item 12).

## 12.9 Work plan

The two-year overview of the Committee's work plan for matters related to environmental concerns is given as Table 15. The work plan itself is discussed in detail under Annex K, item 13.

# 13. ECOSYSTEM MODELLING

The report of the Working Group on Ecosystem Modelling is given as Annex K1. The Ecosystem Modelling Working Group was first convened in 2007 (IWC, 2008b). It is tasked with informing the Committee on relevant aspects of the nature and extent of the ecological relationships between whales and the ecosystems in which they live.

Each year, the Working Group reviews new work on a variety of issues falling under three areas:

(1) reviewing ecosystem modelling efforts undertaken outside the IWC;
(2) exploring how ecosystem models can contribute to developing scenarios for simulation testing of the RMP; and
(3) reviewing other issues relevant to ecosystem modelling within the Committee.

Table 15
Overview of the work plan as it relates to environmental concerns.

| Topic | SC/66a (2015) | SC/66b (2016) |
|---|---|---|
| POLLUTION 2020 | Refine population modelling approach; finalise priority contaminants list for future studies. | Continue to refine modelling approach; in utero transfer analyses and modelling. |
| Oil spills | Review new information. | Plan for an oil spill workshop. |
| Contaminant threat information | Focus sessions on regional trends and POPs in cetaceans. | Data integration and mapping. |
| CERD | Pre-meeting to develop work plan. Data input and website management. | Improved communications on disease issues. |
| Strandings and mortality events | Plan intersessional workshop and finalise agenda; review new information. | Receive the report of the intersessional Workshop; review new information. |
| Anthropogenic sound | Continue work on soundscape mapping including next steps and priorities; plan for 'masking' focus at SC/65b. Review new information. | Continue work on soundscape mapping; focussed sessions on 'masking'; plan for 'stress and sound' workshop; focus session on effectiveness of marine mammal observers in mitigation. |
| Climate change | Receive report from intersessional meeting and agree work plan. | Depends on progress at SC/66a. |

This year the Working Group focused on a review of competition among predator species and the work of CCAMLR on krill and its dependent predators.

### 13.1 Review of ecosystem modelling efforts undertaken outside the IWC

*13.1.1 Competition among baleen whales: how can we measure and model it?*

Friedlaender gave a presentation reviewing published and unpublished data related to baleen whale foraging ecology, energetics and competition, including Friedlaender *et al.* (2013). This issue was first addressed by Clapham and Brownell (1996), who discussed criteria necessary to demonstrate if, in fact, direct competition[21] among cetaceans exists. Although the potential for some direct competition may exist, the influence of any such interaction on depleted and recovering whale populations in the Antarctic is difficult to assess, given the paucity of appropriate data for analysis (Clapham and Brownell, 1996). Nonetheless, Clapham and Brownell (1996) postulate that competition is unlikely between Antarctic baleen whale species due in part to probable resource partitioning mediated by food preferences and, potentially, the biomechanics of body size.

Until recently, logistical constraints limited our ability to test many of the ecological criteria to determine direct competition between cetaceans. Work off the western Antarctic Peninsula by Friedlaender and collaborators shows that sympatric humpback and minke whales appear to partition resources vertically at broad spatial scales. Humpback whales also appear to be distributed primarily in relation to their prey, while minke whales are more strongly associated with sea ice and secondarily to prey, which may indicate lower likelihood of competition via evolved means to partition resources. Tagging studies also show that minke and humpback whales feed at very different rates, in direct relationship to the anatomical scaling of their feeding apparatuses as predicted by recent biomechanical models for rorquals. Integrated with prey data, these models can also be used to predict minimum prey density thresholds, feeding rates and energetic intake across species.

In discussion, it was noted that data obtained by these tagging studies only provided the number of lunges as a measure of feeding success, and that the amount of food consumed by the animals could not be estimated based only on data obtained by the tags. However, it was also noted that when tagging data is accompanied by simultaneous measurements of prey density, such estimates of food consumption are possible.

The Committee agrees that there is a critical need for species-specific, fine-scale data on cetacean feeding and prey to provide parameters for individual-based models of competition between baleen whales. There is also an urgent need to develop the analytical and modelling tools to scale from individual-based whale foraging scales to broad spatial scales across species and ecosystems, using information about baleen whale energetics and feeding functional forms, as well as existing satellite tag, spatial and temporal data. The development of competition models should be conducted in parallel with data collection because the models can inform data collection and experimental design, and vice versa. In light of this, the Committee recommends that further work be carried out to collect the data identified above to inform the further development of ecosystem models.

*13.1.2 Update from CCAMLR's Ecosystem Monitoring and Management Programme (WG-EMM) on krill and its dependent predators*

The Committee held a joint Workshop with CCAMLR in 2008 (IWC and CCAMLR, 2010). Since then, the Committee has identified significant knowledge gaps in aspects such as spatial variability and trends in prey species, on the relationships between predators and prey, and on the effects of environmental variability on predators. Seeking closer collaboration between IWC/SC/EM and SC-CCAMLR's WG-EMM, in 2013 the Committee established communication with SC-CCAMLR and obtained a formal invitation for an IWC Scientific Committee observer to attend the annual meeting of the SC-CCAMLR WG-EMM. At this year's meeting, the Committee nominated Watters to take on this role and asked him to bring IWC Scientific Committee priorities to CCAMLR for future joint discussion. The Committee **views** the appointment of Watters as important for the development of a continuous and long-term relationship between IWC SC/EM and SC-CCAMLR WG-EMM. In addition, the Committee noted that Currey is now SC-CCAMLR observer to IWC SC and recommended his appointment to the obverse role of IWC SC observer to SC-CCAMLR in place of Kock. The Committee **agrees** to make this collaboration its primary emphasis for 2015 and 2016, and formed an intersessional correspondence group under Currey to facilitate communications that the Committee **expects** will lead to a joint IWC-CCAMLR intersessional Workshop in 2016.

[21]Direct completion occurs when two predators are present in the same area as a prey species, and may interfere with each other's access to the prey. When the two predators occur in different parts of the area of prey distribution, indirect competition may occur because the prey's production is limited so that consumption by the one predator limits the production available for the other, and *vice versa*.

Watters also gave a presentation to the Committee on the development of minimally realistic ecosystem models to evaluate management strategies for the Antarctic krill fishery, based on work by Plaganyi and Butterworth (2012) and Watters *et al.* (2013). These models are relevant to the consideration of (both direct and indirect) competition among baleen whale species, but he noted that the specific effects of competition are conditional on the various structural assumptions (e.g. the spatio-temporal overlaps of predators and prey) and parameters that are estimated or fixed (e.g. the shapes of functional responses). Watters also noted that although time series of krill biomass and predator abundance are necessary to 'condition' the models, these time series might not be sufficient to discriminate among competition hypotheses. Thus, he concluded that it seems most robust to use multiple models for making inference about the effects of competition.

The Committee **agrees** that in order to successfully model indirect competition between baleen whales there is a need to collect data on the energetic demands and foraging behaviour of individual species across a range of scales from large regional or global scale, through defined management units, to spatially confined, fine-scale situations. Moreover, an important requirement of a competition model is for it to be able to inform strategic management advice, and this requires the ability to:

(a) Change state variables to address particular management concerns; and
(b) Maintain open communication and feedback between modellers and management bodies to ensure reciprocal familiarity, understanding and acceptance of the priorities, scientific process and proffered advice.

**13.2 Explore how ecosystem models contribute to developing scenarios for simulation testing of the RMP**

At last year's meeting, de La Mare (2013) presented a modelling framework that uses spatially resolved individual based energetics models (IBEMs) to determine reproductive success and mortality in an environment where food has a patchy spatial distribution. These models can be used to generate population dynamic scenarios for evaluation in the RMP context (IWC, 2014i, Annex K1, p.333). Among the issues that could usefully be explored using these IBEMs, the Committee accorded highest priority to the characterisation of yield curves for populations in stochastic environments, and to exploring the relationships between $MSYR_{1+}$ and $MSYR_{mat}$ and between *K* and MSYR.

SC/65b/RMP03 and SC/65b/RMP04 reported progress on using the IBEM to explore the relationships between $MSYR_{1+}$ and $MSYR_{mat}$ and to incorporate it into the RMP testing software framework. The Appendix of SC/65b/RMP03 provides the details of the model, including energetics and prey dynamics. The Committee noted that it was not immediately clear what were the main drivers of the results and that an emulator could be usefully developed to better understand the model's properties, although this would require considerable work. Further discussion of these papers is given under Items 5.1 and 5.2.

**13.3 Review of other issues relevant to ecosystem modelling within the Committee**

*13.3.1 Update on Antarctic minke whale body condition analyses*

For the last four years the Committee has discussed suggested declining trends in blubber thickness and body condition in Antarctic minke whales (Konishi *et al.*, 2008) over the 18 years (1987/88-2004/05) of the JARPA special permit programme (IWC, 2011c; 2012d; 2013d; 2014i). This item is relevant to ecosystem modelling because the findings have implications for energetics, reproductive fitness, foraging success, and the prey base itself, all of which are important as input in models. A number of concerns have been raised and addressed on the statistical methods that were used to derive these trends.

At last year's meeting (IWC, 2014i), the Committee recommended the use of mixed-effects linear models with different interaction terms as possible random effects and the inclusion of a new binary variable (near or far from the ice edge). The Review Panel at the JARPA II Review Meeting raised additional issues regarding the treatment of the time trend in body condition, the correlation among covariates, the procedure for model selection from the full model, and the diagnostics for the best model (SC/65b/Rep02). The Review Panel also recommended consideration of additional interaction terms, as well as additional variables that could potentially be included as random effects (SC/65b/Rep02).

SC/65b/EM02 presented analyses that included the recommended interaction terms for 'Date and longitude', 'Year and Latitude' and 'Year and Ice' (although these adjustments did not result in any change in model selection in terms of BIC in the cases investigated). The procedure for model selection was done with the recommended stepwise selection, and the requested correlation matrices and diagnostic plots for the best model were also included. In discussion, the Committee indicated that further clarity was required about what the full and reduced models were, including the explicit identification of a 'maximal biologically plausible model'. A small group was formed to address this issue and the complete results are presented in Appendix 2 of Annex K1.

Konishi *et al.* (2014) reported a decreasing time trend in the weight of stomach contents from Antarctic minke whales taken during the JARPA and JARPA II programmes, and SC/65b/EM03 provided a revision of this paper following the JARPA II Review Panel recommendations (SC/65b/Rep02), but restricted to data from the JARPA period. The authors applied similar regression analyses as in SC/65b/EM02 for body condition and obtained similar results, including an indication that it was not necessary to consider year as a categorical variable. In discussion, the Committee identified similar problems to those of SC/65b/EM02, and asked that the small group tasked with addressing those issues also include SC/65b/EM03. The Committee further noted that a model with a constant time trend and with a random effect for the variation around this trend could potentially be better suited. In addition, in light of the highly skewed distribution of the residuals, they were asked to revisit model's distributional assumptions.

The results of the work of the small group are included in Annex K1, Appendix 2. In discussion of these further analyses, the Committee **agrees** that the analyses which it had requested last year, and those requested by the Review Panel, had been satisfactorily completed. Given the results, the conclusion followed that a decline in blubber thickness and in fat weight that was statistically significant at the 5% level had occurred during the JARPA period. The Committee **agrees** that the implications of these results, together with indications of no further decline after the JARPA period, should be discussed further at next year's meeting. In particular, this will address whether a change of biological importance had occurred or not in the Southern

Table 16
Overview of the work plan as it relates to ecosystem modelling.

| Topic | SC/66a (2015) | SC/66b (2016) |
|---|---|---|
| Co-operation on ecosystem model development | Discuss how best to further the long-term scientific exchange between IWC SC/EM and SC-CCAMLR WG-EMM (and receive report from observer at 2014 WG-EMM meeting). | Receive results of Joint CCAMLR-IWC Workshop and continue. |
| Processes in ecosystem model development | Receive results of IWC funded project to use tagging data to incorporate into models (especially with respect to competition, resource partitioning and total prey consumption). | Review progress and continue. |
| Ecological change in the Southern Ocean | Review new analyses of the minke whale body condition and stomach content data to further examine temporal trends. | Continue if necessary. |
| Effects of long-term environmental change | Review work of intersessional group to determine suitable long time datasets and determine work plan. | Depends on discussions at SC/66a. |
| Modelling species distribution | Build upon previous and intersessional work to develop guidelines and recommendations for modelling steps. | Depends on discussions at SC/66a. |

Ocean ecosystem during the JARPA period. The Committee also **agrees** that the model presented in Annex K1, Appendix 2 would benefit from extension to determine whether the trends identified showed any indication of change over time. It was noted that, even if not statistically significant at the 5% level, estimates of changes in trends would ultimately be important to take into account in fitting multi-species models.

Finally, the Review Panel at the JARPA II Review Meeting also recommended that a paper be presented at this meeting with details of a work plan to incorporate uncertainty in the estimates of prey consumption rate by Antarctic minke whales based on JARPA and JARPA II data (SC/65b/Rep02). SC/65b/EM01 was written as a response to these recommendations, indicating that over the next 1-2-year period the authors will implement Monte Carlo simulations for the estimation of uncertainty in the following parameters: *r* (the ratio of low/high feeding intake), the length of the feeding season and the extent of night feeding. The Committee had no further comments on this paper.

*13.3.2 Case studies of the effects of long-term environmental variability on whale populations*

The Committee briefly considered the types of information that should be compiled for analysing the effects of environmental change on cetaceans, for a fuller discussion next year. These analyses require decadal-length time series of cetacean demographic parameters and/or abundance together with relevant environmental variables for the same time periods and regions. An initial list of potential data sets was identified, and an intersessional correspondence group was appointed under Cooke to continue advancing this objective.

*13.3.3 Other, if new information is available*

Palacios *et al.* (2013) presented an evaluation of current statistical modelling efforts applied to predict marine mammal species distributions, commonly referred to as habitat models or species distribution models. These efforts have primarily relied on correlative approaches, and the authors argued that their limited explanatory power is due fundamentally to the omission of critical environmental and behavioural processes that directly affect marine mammal distributions. Palacios *et al.* (2013) outlined field studies targeted at that the elucidation of such processes, and the subsequent incorporation of this information into habitat models, as a way forward to significantly improve our ability to predict species' distributions. Finally, the authors note a convergence between probabilistic (stochastic) and deterministic approaches as a potential solution to the incorporation of the processes of interest into species distribution models.

The Committee **welcomes** this summary and noted the paper provides a timely contribution to discussions within the Committee on methods in species distribution modelling. Given the complexity and rapid development of this field, the Committee appointed an intersessional correspondence group under Murase to develop guidance and best practices to further applications of species distribution and habitat modelling within the Committee. Annex K1, Appendix 3 was compiled as a basis for this work.

### 13.4 Work plan and budget requests

The detailed work plan and budget requests are detailed in Annex K1. The overall two-year work plan is summarised in Table 16.

## 14. SMALL CETACEANS

### 14.1 Review of status of small cetaceans in the eastern Mediterranean and Red Seas

This year, the priority topic given the location of the meeting, was to review the current status of small cetaceans in the eastern Mediterranean and Red Seas (Annex L, fig. 1). The Committee noted the importance of co-operation with ACCOBAMS in this region.

Relatively little information was received on the eastern Mediterranean Sea and several areas in the region remain poorly known with respect to the status of small cetaceans. The available information was primarily for the Adriatic and Aegean seas, Libyan waters and the Levantine Basin.

*14.1.1 Adriatic Sea*

SC/65b/SM20 provided a general review of cetacean species in the Adriatic Sea. The common bottlenose dolphin is the only species that occurs throughout the basin and it appears to have a continuous distribution over the continental shelf area. The striped dolphins are more abundant but limited to the southern Adriatic Sea which also seems important for Cuvier's beaked whales and Risso's dolphins. The common dolphin, once abundant, is now extremely rare (Bearzi and Notarbartolo di Sciara, 1995; Genov *et al.*, 2012; Rako *et al.*, 2009). Two recent aerial surveys have covered the entire Adriatic basin and provide important new information on summer distribution and abundance[22]. Surveys confirmed the general distribution of cetaceans and generated preliminary abundance estimates uncorrected for availability and perception bias (Fortuna *et al.*, unpublished data). Details on available information on genetic structure of populations, interaction with fisheries and other existing threats can be found in Annex L.

[22]Carried out by the Italian National Institute for Environmental Protection and Research (ISPRA) and Blue World Institute (Croatia) within the framework of two projects (Italian monitoring of bycatch under EU regulations and EU IPA Adriatic NETCET project).

The Committee **thanks** Holcer and colleagues for providing this valuable summary.

The Swiss NGO OceanCare provided an inventory[23] of the seismic offshore explorations for oil and gas in the Mediterranean since 2006, many in the Adriatic Sea. There is a concerning geographical overlap with areas thought important for cetaceans. The Committee **welcomes** this information and reiterates previous Committee concern over the difficulty of obtaining information of where and when seismic surveys are taking place (Nowacek *et al.*, 2013). Additional discussion on beaked whales and anthropogenic noise was carried out in the joint session with the SWG on Environmental Concerns (see Annex K, items 8.3 and 9.4).

The Committee also **thanks** Genov for providing information on the bottlenose dolphins that occur year round off Slovenia and in the Gulf of Trieste (northern Adriatic Sea), that have been monitored since 2002 (Genov *et al.*, 2008). All details are provided in Annex L.

In conclusion, the Committee **recommends** that monitoring programmes in the Adriatic Sea should be coordinated among the neighbouring countries to enable regular basin-wide surveys of populations and monitoring of threats especially within the mandatory activities needed under the EU Marine Strategy Framework Directive (*Directive* 2008/56/EC). The Committee also **recommends** that ongoing studies in the region, particularly in offshore areas of the southern Adriatic, be continued (e.g. to improve the knowledge on beaked whale).

*14.1.2 Aegean Sea*

Frantzis (2009) summarised the present status of knowledge on small cetaceans in Greek waters, and more recent publications (Bearzi *et al.*, 2011; Bonizzoni *et al.*, 2014) complement that information. Five species of small cetaceans are present year-round in Greek waters: striped; common bottlenose; short-beaked common; Risso's dolphins and Cuvier's beaked whales. The harbour porpoise has been recorded in the northern Aegean Sea (they are not genetically isolated from those in the Black Sea (Rosel *et al.*, 2003; Tonay *et al.*, 2012; Viaud-Martínez *et al.*, 2007) and there have been opportunistic sightings of harbour porpoises in the straits between the Aegean and Black Seas. The rough-toothed dolphin has been recorded in the central Ionian Sea. False killer whales are occasionally recorded. The common bottlenose and striped dolphins are the most common species. Cuvier's beaked whale is present along the Hellenic Trench from Corfu to Rodos Island, and over steep depressions of the Aegean plateau. Abundance estimates are very scarce and apply to limited areas (Bearzi *et al.*, 2008a; 2008b; 2011; Bonizzoni *et al.*, 2014). Details on threats in this area can be in Annex L.

Explosives are still used illegally to fish and the Committee **expresses concern** and **requests** the Greek authorities to stop the illegal use of explosives.

SC/65b/SM15rev provided a review of current knowledge on small cetaceans in the Mediterranean waters of Turkey, including the Aegean Sea. Information for this large area, particularly on abundance and population structure, is limited by funding and research capacity. Nine species of small cetaceans have been recorded from the area. The short-beaked common dolphin, common bottlenose dolphin, striped dolphin, Risso's dolphin and Cuvier's beaked whale are considered common based on sighting and stranding data whereas the long-finned pilot whale, the false killer whale and beaked whales are considered rare. All cetacean species are protected by national legislation. Additional information can be found in the paper.

The Committee **thanks** Öztürk and colleagues for preparing this useful overview.

SC/65b/SM04 summarised information from the summer 2013 *Song of the Whale* survey of the Aegean and Levantine Seas (Ryan *et al.*, 2014). Harbour porpoises were encountered for the first time in over 20 years north of Thasos Island and west of Alexandropoulos (Greece) and in Saros Bay (Turkey). Common bottlenose dolphins were most common in the Aegean Sea and striped dolphins in the Levantine Sea. Common dolphin sightings were limited to the northern Aegean Sea, primarily the Thracian Sea. Rough-toothed dolphins were observed twice in the Levantine Sea, south of Cyprus. Seven acoustic detections (no sightings) of beaked whales were recorded, one in the Ikaria Basin, an area thought to be important for deep-diving species, and the rest along the Anaximander Seamount, south of Turkey.

The Committee **endorses** the recommendation from local scientists that Turkey develops a Conservation Action plan for small cetacean species in its waters which incorporates public awareness as well as research elements.

*14.1.3 Libyan waters*

SC/65b/SM16 provided a brief summary of the status of small cetaceans in Libyan waters, which occupy 40% of the southern Mediterranean coast. The cetacean fauna of Libya is little known, with seven species expected to occur. A long-term photo-identification study in Cyrenaica suggests the presence of a resident bottlenose dolphin population distributed between two areas. There is growing concern over both habitat degradation and unregulated fisheries, including the use of explosives. There are some reports of bycatch, consisting mostly of striped dolphins and common bottlenose dolphins in seasonal trammel net fisheries in the west of the country.

The Committee **encourages** relevant authorities in Libya to more strictly regulate fisheries and stop the illegal use of explosives.

*14.1.4 Levantine Basin*

SC/65b/SM09 presented a review of the present knowledge on small cetaceans in Mediterranean Israeli waters. Very few surveys have been conducted, but densities of all species (common bottlenose, stripes, common, Risso's and rough-toothed dolphins and Cuvier's beaked whales) appear to be relatively low. Strandings data collected between 2000 and 2010 indicate almost 30% of dead bottlenose dolphins were trapped in the safety line of bottom trawls. Entanglement in gillnets is apparently rarer (6%). The presence of large groups of short-beaked common dolphins (up to 100 individuals) off southern Israel is noteworthy. SC/65b/SM09 also contains some information on observed and potential threats, including gas and oil explorations. More details are given under Annex L, item 6.1.4.

Discussion focused on the status of rough-toothed dolphins in the eastern Levantine basin, an area of apparent importance for the species. The species appears absent from the western Mediterranean and the Red Sea. Genetic information suggests the Levantine animals are a relict population of Atlantic origin with little if any recent exchange with other populations. Differences in behaviour and diet are suggested compared to other areas. Kerem encouraged analyses of an as yet unanalysed dataset from surveys conducted by IFAW in 2013.

[23]Still not exhaustive as the information about these surveys is not readily accessible.

The Committee **thanks** Kerem and his colleagues for information on a poorly known region and **encourages** publication as soon as practicable. It also **recommends** that: (1) that a preliminary analysis to define the amount of effort needed to obtain robust abundance and distribution data in Israeli waters be conducted; and (2) that Israel develop Conservation Action plans for small cetacean species incorporating scientific elements and public awareness.

*14.1.5 General recommendations for the eastern Mediterranean*

Noting the various threats identified for small cetaceans in the eastern Mediterranean region, the Committee **recommends** that further research be conducted to investigate their effects on the long-term viability of populations. Specifically the Committee **reiterates its previous recommendations** that:

The large-scale survey known as the 'ACCOBAMS Survey Initiative' be carried out as soon as possible in order to obtain information on cetacean distribution and abundance for the whole Mediterranean, including the eastern sub-region.

It also **recommends** that:

(1) systematic sub-regional surveys be implemented;
(2) research be undertaken to define management units, at least for the most common species (e.g. the common bottlenose dolphin and the striped dolphin), through multidisciplinary approaches (including genetics, isotopes, biomarkers and photo-identification) to evaluate the effects of anthropogenic mortality (e.g. bycatch) at population level;
(3) the nature and extent of cetacean-fisheries interactions (including bycatch, depredation and competition/overfishing) be investigated. This could include enlarging the scope of existing fishery monitoring programmes (e.g. by collecting data on cetaceans bycatch and other interactions on a regular basis), including those for IUU (illegal, unreported and unregulated) fisheries;
(4) research be conducted on the extent and effects of oil- and gas-related activities;
(5) cooperative research with oil and gas industries be developed for sharing information on cetacean distribution and to develop models to identify areas of high density or high importance to small cetaceans;
(6) conduct research on the effects of boat traffic on small cetacean local populations, especially in harbours and other areas of high activity and potential overlap;
(7) a research project be developed in the eastern Mediterranean Sea to gather data on rough-toothed dolphins in order to assess their degree of isolation and their conservation status under IUCN criteria. This assessment should make use of existing acoustic and genetic data.
(8) regional cooperation on science and policy for conserving/managing shared populations/species (e.g. common research/monitoring programmes, common mitigation actions) should be implemented (e.g. in the Adriatic Sea under the Marine Strategy Framework Directive); and
(9) capacity building actions should be implemented (university, local authorities) throughout the region.

**14.2 Review of status of small cetaceans in the Red Sea**

SC/65b/SM13 summarised existing knowledge on cetaceans in the Red Sea based on a literature review and the authors' direct observations. Eleven species of small cetaceans are thought to occur in the Red Sea of which eight (*D. c. tropicalis*, *G. griseus*, *P. crassidens*, *S. plumbea*, *S. attenuata*, *S. longirostris*, *T. aduncus* and *T. truncatus*) are thought to occur regularly.

SC/65b/SM23 summarised the results of a dedicated survey to estimate abundance of delphinids in a portion of the southern Egyptian Red Sea (10,651km$^2$). Abundance estimates are provided in Annex L, item 6.2. *Stenella* species were encountered throughout the study area. Bottlenose dolphins were present at low densities, with an apparent concentration of *T. truncatus* in offshore areas and *T. aduncus* in southern coastal areas. Within the study area *G. griseus* occurred mainly south of 23°N. Offshore reefs in the southern part of the study area appear to be used as resting areas by at least three species; this is also an area where fishing and tourist activities are concentrated. The authors stressed the need to gather more information about these zones, since similar resting areas are known to be heavily affected by tourist and fishing activities in the northern part of the study area. They also urged that there be more research effort in the southern coastal areas frequented by two coastal species (*T. aduncus* and *S. plumbea*), where unregulated fishing is conducted regularly from the main village (Shalatin) and where there are two large active Egyptian naval bases.

Despite low human densities along the region's desert coasts, observed increases in tourism and coastal development, fishing, shipping, and hydrocarbon exploration and extraction (particularly in the northern portion of the region) suggest the need for increased cetacean research efforts. Dedicated research projects and surveys should include investigations of ecology, potential threats and conservation status. Such actions could be facilitated by PERSGA, the Regional Organisation for the Conservation of the Red Sea and Gulf of Aden.

The Committee **agrees** on the importance of gathering additional detailed information on the distribution and abundance of cetaceans, particularly in the least known portions of the region (e.g. Gulf of Suez, waters of Saudi Arabia, Sudan, Eritrea and Yemen), and promoting regulation of dolphin watching in Egypt.

The Committee **encourages** the authors to publish their review in a peer-reviewed journal as soon as practicable.

**14.3 Report on the Voluntary Fund for Small Cetacean Conservation Research**

Fortuna presented a summary of projects funded by the Voluntary Fund for Small Cetaceans. Approximately £350,000 has been disbursed since 2010 and 16 projects have been funded (Annex L, Appendix 2). Projects were awarded through two calls for proposals (2011 and 2013). Proposals are selected through a rigorous review process by the Small Cetacean Conservation Research Fund Review Group[24]. All details of funded projects were available through the Secretariat and final results will be made available on the IWC website.

The Committee **recognises** the importance of this fund and the work being accomplished and **welcomes** the most recent voluntary contributions received after the last Commission meeting in Panama (June 2012) by Italy (£12,300), the Netherlands (£19,324), the United Kingdom (£30,000), the USA (£6,320), Italian National Institute for Environmental Protection and Research (£12,132), Oceancare (£998), World Society for Protection of Animals (£3,000) and World Wildlife Fund (£1,295).

[24]*http://iwc.int/sm_fund.*

*14.3.1 Update on 2011 awarded projects*

SC/65b/SM21 reported progress on the 'Ecology, Status, Fisheries Interactions and Conservation of Coastal Indo-Pacific Humpback and Bottlenose Dolphins on the West Coast of Madagascar'. Interview surveys with fishers in the northwest indicated that directed hunting on coastal dolphins is not as prevalent as in the southwest, but bycatch, particularly of *T. aduncus,* is prevalent and there is some evidence for 'directed bycatch' that may indicate a progression towards hunting. In the southwest where hunting has been documented, a model of community-based conservation has been successfully implemented; local associations for the protection of marine mammals have been established, education and outreach commenced, local traditional laws (Dina) are being developed and ratified, and alternative livelihood options (ecotourism) are being tested. Additional details on this project can be found in Annex L, item 7.1.

In discussion, it was noted that in the southwest the overt presence of meat in markets had decreased since the project's inception (1999) and that fishers were benefiting from alternate sources of cash generated through seasonal whale watching ecotourism activities (developed in 2004). The number of local operators and clients was increasing in the Anakao area and the spatial extent of conservation work was expanding in the wider southwest region (Anakao to Andavadoaka). Continued effort was planned but requires additional funding.

The Committee **emphasises** that this project represented another good example of the important contribution made by the Small Cetaceans Conservation Research Fund.

*14.3.2 Update on 2013 awarded projects*

SC/65b/SM26 provided a progress review of the project entitled 'Defining the units of conservation and historic population dynamics for two small cetacean species affected by directed and incidental catches in the North Pacific' (Principal Investigator: Chen). Ten animals confiscated in PingDong Taiwan from an illegal take (from unknown locations) were investigated to confirm species identity. They had been identified as Fraser's dolphins by the Taiwanese authorities. Genetic analysis suggested that the confiscated samples were not Fraser's dolphin but more likely of a species in the genus *Stenella*, possibly *S. longirostris*. Further analyses and sequencing is planned to resolve this question. These results were presented at regional meetings in Taiwan and Japan and a report on the status of these species for Taiwanese authorities in in preparation. A final report will be submitted to the IWC in June 2014.

In discussion it was noted that although the results were preliminary, they served to emphasise the lack of reference sequences for many genes. The Committee **commends** the work by Chen and Hoelzel and **emphasises** the efficient use of a relatively modest grant.

Porter provided an update on an ongoing project entitled 'A Pilot Study to Identify the Extent of Small Cetacean Bycatch in Indonesia using Fisher Interview and Stranding Data as Proxies'. Recent activities include a Workshop (November 2013) where participants were trained to identify evidence of bycatch in strandings events. Interviews of fishers (50 per site) were completed at two sites: Paloh and Adonara. The Paloh area fisheries focus on coastal areas using gillnets as the main fishing gear and interviews suggest that the species most effected are the finless porpoise and the Indo-Pacific humpback dolphin (*Sousa chinensis*). The Adonara fisheries operate both inshore and offshore with pole and lines and purse seine as the main gears utilised. The cetacean species most effected were noted to be the bottlenose dolphin (*Tursiops spp*), the spinner dolphin (*Stenella longirostris*), some unidentified 'black fish' (and sperm whales). Data analyses are still underway and the final report will be submitted by the first week of June 2014.

In discussion Porter clarified that dolphins were actively targeted for consumption in some areas but were opportunistically used at other sites when landed. The use of terminology associated with catches was also discussed, with the need for care and consistency emphasised. It was suggested that the term 'takes' and not 'bycatch' be used in this context.

**14.4 Progress on previous recommendations**

*14.4.1 Vaquita*

Great concern over the status of this species has been expressed for many years by the Committee. At last year's meeting the Committee was: (1) advised that the best 2013 abundance estimate for the critically endangered vaquita, long a topic of this Committee, was 189 animals; and (2) commended Mexico's establishment of a new Advisory Commission of the Presidency of Mexico for the Recovery of the Vaquita (CAP). Rojas-Bracho reported that CAP held its fourth meeting in April 2014 where Advisory Commission members were advised of a recent dramatic escalation of illegal fishing and trade of totoaba (*Totoaba macdonaldi*), a critically endangered CITES Appendix I species, in the Upper Gulf of California. This fishing involves the use of large-mesh gillnets which have a high entanglement risk for vaquita. Demand is driven by the high price of totoaba swim bladders in Asian markets. The actions by the Mexican Government to combat this fishery were presented and discussed during the CAP meeting as were further measures to replace gillnets with alternative light trawl gear and to strengthen enforcement.

The Committee also received information on the Second Meeting of the Steering Committee of the Vaquita Acoustic Monitoring Program, which met in Ensenada in April 2014, to review and evaluate technical aspects of the passive acoustic monitoring project and to review results to date. The monitoring array performed well and acquired sufficient data to detect a 4% $year^{-1}$ increase in over a 5-year interval were such an increase to occur. Alarmingly, mid-project results indicate a substantial decline in vaquita numbers since 2011. Raw data indicate declines of 7.5% and 14.9% from 2011 to 2012 and from 2012 to 2013, respectively. Assuming a 14.9% $yr^{-1}$ decline, from the 2013 estimate of 189 individuals, the population could be reduced to fewer than 100 individuals in the next two years. The Steering Committee agreed that these estimated annual rates of decline from 2011 to 2013 are so severe and the vaquita's status so serious that immediate action is essential to save this species. To confirm its findings, the Steering Committee is planning an immediate review of the data, analyses and preliminary findings by a small group of experts before the next CAP meeting in July 2014.

The Committee **reiterates** that the situation for the vaquita is extremely grave and is especially exacerbated by the totoaba fishery. It **expresses grave concern** that the resurgence of illegal totoaba fishing with large mesh gillnets is driving the vaquita more rapidly toward extinction. The Committee **supports** the actions taken and recommendations made by the CAP at its Fourth Meeting and **recognises and commends** the efforts being made by the Mexican Government to combat the illegal fishing of totoaba.

Recalling Committee recommendations from 1991, the Committee **recommends** that further action be taken to stop vaquita entanglement by fully enforcing the closure of the totoaba fishery and that immediate action be taken to stop the illegal shipment of totoaba across the US border.

The Committee **recommends** that the Governments of Mexico and the United States consult on this continuing illegal international trade in CITES Appendix I totoaba and, as necessary, raise it to CITES and its Party government to highlight the effect of this trade in causing additional losses of the critically endangered vaquita, with the goal of enhancing enforcement efforts and awareness.

The Committee **emphasises** that immediate implementation by the Government of Mexico of its strategy to replace gillnets with alternative fishing gear, as required by NOM-002-SAG-PESC-2013, is **extremely urgent**, particularly given the recent major expansion of illegal totoaba fishing and the preliminary results of the acoustic monitoring program, which indicate a rapid decline in vaquita abundance.

The Committee also **reiterates** its previous recommendations (IWC, 2011a; 2012a) to continue research on technologies to replace gillnetting for finfish or otherwise to remove all gillnets from the vaquita's entire range (IWC, 2008d; 2009d; 2010d; 2011d; 2012e; 2013e; 2014j).

The Committee **encourages** the Government of Mexico to maintain and, as necessary, refine or expand the acoustic monitoring programme as the only feasible way of evaluating the effectiveness of the recovery plan contained in the federal Action Program for the Conservation of Vaquita (PACE-Vaquita). The Committee **strongly endorses** and **applauds** the work of the team (Coordinación de Investigación y Conservación de Mamíferos Marinos) at CONANP for the field work and data analysis and of the steering committee for the review and evaluation of the monitoring programme.

*14.4.2 Hector's dolphin*

Currey provided a summary of the Government of New Zealand Ministry for Primary Industries (MPI) science and management actions for Hector's (*Cephalorhynchus hectori*) and Maui's (*Cephalorhynchus hectori maui*) dolphins. The decline of Maui's dolphin is demonstrated by multiple methods. Both the East Coast of the South Island (ECSI) and West Coast South Island (WCSI) Hector's dolphin populations are probably also in decline, although evidence is inconsistent and trends not entirely clear. Since 2008 there has been a substantial reduction in set net effort on the WCSI, while on the ECSI fisheries interactions have declined following the extension of set net area closures. The population of Hector's dolphins along the South Coast of the South Island is small and genetically isolated, but the trend in abundance is unknown.

The Committee **respectfully requests** that the New Zealand government provide updates of the MPI report on a regular basis.

Annex L provides details of criticism by Slooten of aspects of the report relating to abundance and distribution.

Mackenzie and Clement (2014) reported the results of an aerial survey program to estimate the abundance and distribution of the ECSI population of Hector's dolphins between Farewell Spit and Nugget Point and offshore to 20 nm (covering ~42,677km$^2$). The estimates suggest substantially higher numbers in both inshore and offshore areas than previously thought. The discrepancy is more likely attributable to differences in survey methodology (i.e. boat versus aerial surveys) and increased survey effort in offshore areas, rather than to an increase in population size or a change in distribution.

The Committee **agrees** that this matter deserves closer scrutiny than was possible in the time available at this year's meeting. Next year the sub-committee will make provision to ensure appropriate evaluation of abundance estimates.

**14.4.2.1 MAUI'S DOLPHIN**

SC/65b/SM08 presents estimates of the effectiveness of the extensions to protected areas for Maui's dolphin implemented in 2012 and 2013 in terms of reducing bycatch. An 'Expert Panel' of scientists, convened by the New Zealand government in 2012, estimated that five Maui's dolphins were killed each year in trawl and gillnet fisheries (Currey *et al.*, 2012). The level of trawl mortality is unchanged and continued dolphin deaths in gillnets are due to a lack of protection in some areas and incomplete protection in others. The estimated number of bycatch events has decreased from 5 per year to 3-4 per year, reducing the total level of bycatch from >75 to >54 times the safe level estimated using a PBR (Potential Biological Removal). Detailed information on strategies to reduce bycatch below PBR are given in the document and summarised in Annex L.

SC/65b/SM11 recognised the efforts of the Government of New Zealand to date, but provided a critique of the current protection measures stating that they are insufficient. Detailed information is given in the document and summarised in Annex L.

In discussion it was noted that the current management situation falls short of that required to reverse the Maui's dolphin decline. Since the publication of the Expert Panel report (Currey *et al.*, 2012) the New Zealand Government had closed additional fisheries, and a reduction in the number of predicted fisheries interactions is expected. It was noted that bycatch numbers would not be reduced to zero even with the most recent increased area closures.

The Committee **commends** the New Zealand Government for maintaining initial and interim protection measures for Maui's dolphin, and adding an additional 350km$^2$ set net restriction. However, the Committee **emphasises** that these measures fall significantly short of those previously recommended (IWC, 2013a; 2014d). The Committee **reiterates** its **extreme concern** about the continued decline of such a small population as the human-induced death of even one dolphin would increase the extinction risk for this subspecies. It also **reiterates** that rather than seeking further scientific evidence it is of highest priority to take immediate management actions that will eliminate bycatch of Maui's dolphins. This includes full closures of any fisheries within the range of Maui's dolphins that are known to pose a risk of bycatch of small cetaceans (i.e. set net and trawl fisheries).

The Committee **re-emphasises** that the critically endangered status of Maui's dolphin and the inherent and irresolvable uncertainty surrounding information on small populations, require the implementation of precautionary measures.

Ensuring full protection of Maui's dolphins in all areas throughout their habitat, together with an ample buffer zone, would minimise the risk of bycatch and maximise the chances of population increase. The Committee **notes** that the current range of Maui's dolphins comprises the area from Maunganui Bluff in the north to Whanganui in the south, offshore to 20 nautical miles and including harbours. This range reflects all available sightings and strandings data for Maui's and Hector's dolphins along the West Coast of the North Island. The Committee **notes** that data from Hector's dolphins off the South Island, with most sightings in waters less than 100m deep and less than 20n.miles offshore support our understanding of the offshore distribution of Maui's

dolphins and the recommendation that within this defined area, fishing methods other than set nets and trawling should be used.

The Committee **urges** the New Zealand Government to **commit** to specific population increase targets and timelines, and **respectfully requests** that reports be provided annually on progress towards conservation goals.

*14.4.3 Beaked whales*

SC/65b/SM01 provided a short review of strandings of Gervais' beaked whale (*Mesoplodon europaeus*) in the Atlantic Ocean collected since 1995 and SC/65b/SM02 presented stranding records in European waters of Sowerby's beaked whale (*Mesoplodon bidens*) since 1825.

See Annex L, item 6.1 for new information on Mediterranean beaked whales. See also the relevant discussions on beaked whales and anthropogenic noise in Annex K, items 8.3 and 9.4.

*14.4.4 White whales[25] of the Okhotsk Sea*

SC/65b/SM14 provided information on recent and expanding captures of white whales in the western Okhotsk Sea (Russia). Recent studies have identified separate demographic units within the Western-Okhotsk population, including the summer aggregation in Sakhalin-Amur region (details on abundance are provided in Annex L, item 8.4) with Potential Biological Removal (PBR) estimated as 42 (SC/65b/SM23).

Last year (IWC, 2014d), the Committee agreed that the current management scheme for live-capture of white whales in the Sea of Okhotsk was very likely to lead to unsustainable levels of removals, placing at least the Sakhalin-Amur summer aggregation in Sakhalinsky Bay at high risk of depletion.

The Committee **expresses strong concern** given the estimated PBR of 42, that the removal of 81 living white whales, with an additional 12 confirmed and over 30 suspected deaths in summer of 2013, is unsustainable for this local summer aggregation and **reiterates** that removals should be reduced to at least a level that is consistent with available scientific data and that the four summer aggregations in the North-Okhotsk subzone should be managed separately through separate quotas for Sakhalin-Amur region, Ulbansky Bay, Tugursky Bay and Udskaya Bay (IWC, 2014d).

The Committee also **supports** the continuation of the white whale research projects conducted by the A.N. Severtsov Institute and the Marine Mammal Council and **recommends** expanding research efforts into all areas of potential white whale removals.

*14.4.5 Killer whales*

**14.4.5.1 RUSSIAN FAR EAST**

SC/65b/SM07 provided information on killer whales in the Russian Far East, including details of recent captures. Six killer whales were live-captured in different areas of the Russian Far East from 2002-11 and seven more were reported captured in the western Okhotsk Sea in 2012-13. Two of these were transported to China for public display and another two are suspected to be in Moscow; the fate of the remaining three animals is unknown.

The Committee discussed its concern about these captures, particularly the uncertainty of ecotype identification. There is evidence that resident and transient killer whales belong to reproductively isolated populations (SC/65b/SM15, Filatova *et al.*, 2014; Ivkovich *et al.*, 2010), mirroring the situation in the eastern North Pacific (Ford *et al.*, 1998; Saulitis *et al.*, 2000). Based on genetic data similar to that reported in SC/65b/SM07, 'Resident' and 'Transient' killer whales are currently recognised as unnamed subspecies by the Society for Marine Mammalogy Committee on Taxonomy (List of marine mammal species and subspecies. Society for Marine Mammalogy)[26] and some have suggested that these ecotypes qualify as full species (Morin *et al.*, 2010a).

No reliable abundance estimates are available for either ecotypes in the Okhotsk Sea but the available information (e.g. SC/65b/SM07) raises concern that local stock size is fairly small and that only transients have been live-captured in this region. Different killer whale ecotypes are not officially recognised in Russia, and consequently they are not treated as different management units. Currently, the total allowable take for 2014 is zero, but this will likely be reviewed before the 2014 season.

The Committee **reiterates** its longstanding recommendation that no removals of small cetaceans (live capture or deliberate killing) should be authorised until a full assessment of sustainability has been completed and **recommends** transient and resident killer whales be managed as distinct units and that studies in the western Okhotsk Sea be continued and be expanded.

**14.4.5.2 ANTARCTIC KILLER WHALES**

Six papers where presented on six ongoing projects (including SORP) on Antarctic and sub-Antarctic killer whales. All details are provided in the Annex L, item 8.5.2.

The Committee was also informed that Italian National Antarctic Research Programme (PNRA) will conduct research on killer whales in Terranova Bay (Ross Sea) to assess the role and dynamics of killer whales in this highly productive local marine ecosystem.

The Committee **recognises** the importance of these projects on Antarctic and Sub-Antarctic killer whales, **encourages** their continuation and **recommends** any further studies consider any impacts of tagging as part of their ongoing work.

**14.4.5.3 CARIBBEAN KILLER WHALES**

A recent paper on killer whales in the Caribbean Sea (Bolaños-Jiménez *et al.*, 2014) summarises records there and indicates their widespread and year round occurrence. Preliminary morphological analysis suggests that Caribbean killer whales exhibit both characteristics typical of Type 2 killer whales in the North Atlantic and those typical of 'offshore' killer whales in the northwest Pacific.

*14.4.6 Irrawaddy dolphin (Mekong and Ayeyarwady dolphins)*

An update was provided on Irrawaddy dolphins in the Mekong and Ayeyarwady Rivers based upon two meetings organised by WWF-Cambodia in March 2014. The number of dolphins in the Mekong River has declined to well below 100 and their survival is very much in doubt. The most recent reported counts in the Ayeyarwady River have been in the order of only 70 individuals and mortality appears to have increased in the last few years. Bycatch in gillnets remains the most serious problem. The construction of any large hydropower projects in the Mekong basin, especially mainstem dams, will have very serious impacts on the population of Irrawaddy dolphins. The proposed Don Sahong Dam is of immediate concern because Lao PDR has announced it will begin construction of the dam in the near

[25] 'White whale' is the official IWC common name but the species is also known as 'beluga' or 'belukha' in some parts of the Arctic.

[26] *http://www.marinemammalscience.org* consulted on 25 May 2014.

future. A WWF-Cambodia risk assessment found that the extinction risk posed by the Don Sahong dam to the trans-boundary sub-population – the last remaining dolphins in Lao PDR – is 'very high' and the risk to the overall Mekong population is 'high' (Ryan *et al.*, 2014).

The Committee again **re-emphasises** that the situation in Laos and Cambodia is of **serious concern** and that without urgent intervention in the trans-boundary pool, and the surrounding area, the dolphins there will be eradicated.

Effective enforcement of gillnet fisheries ban is essential to the survival of dolphins throughout their remaining Mekong River range and the Committee **recommends** that the governments of Cambodia and Laos give the highest priority to effective enforcement of existing dolphin conservation laws. The Committee **notes with concern** the assessment of the risk of the Don Sahong dam to the transborder sub-population and the Mekong River population as a whole, and **calls** for full and transparent assessment of the environmental impacts of this and other less destructive hydropower options.

The Committee will receive a further update on the ongoing management actions put in place to mitigate threats, including widespread electro-fishing practices next year.

*14.4.7 Yangtze finless porpoise*

SC/65b/SM22 provided recent information on the Yangtze finless porpoise (*Neophocoena asiaeorientalis asiaeorientalis)*, red-listed by IUCN as a Critically Endangered subspecies endemic to Yangtze River system in China. The population in the mainstem of the Yangtze (Yichang to Shanghai) is estimated to have declined from more than 2,500 in 1991 (Zhang *et al.*, 1993) to 505 now (Mei *et al.*, 2014); data suggest a reduction by more than half between 2006-12 with an estimated probability of extinction in the next 100 years of 86%. Bycatch is considered the main cause of the decline. Ship strikes have also increased in recent years. Lack of enforcement of regulations as well as a lack of awareness among fishermen are considered major obstacles to success of conservation measures. The authors emphasised the need for immediate *in situ* conservation actions to save 'seed populations', increased *ex situ* conservation efforts, and strengthened national protective legislation.

The Committee **is concerned** that given the scale of anthropogenic pressures from *inter alia* bycatch, vessel traffic, sand mining and pollution, preventing the extinction of this subspecies will be a daunting challenge. Our concern is heightened because the same decline was witnessed with the decline and extinction of the baiji. Support from government officials at the highest levels, regional and national, is essential. Current conservation measures include reserves that are not appropriately designed or not adequately enforced.

Given its **grave concern** about the rapid, ongoing decline of Yangtze finless porpoises throughout their range, the Committee **recommends** that stronger measures be taken immediately, beginning by upgrading the subspecies to State I Protected status in Chinese legislation and implementing a national action plan with the necessary policy and financial support.

The Committee further **recommends** that all effort be made to protect Yangtze finless porpoises in their natural habitat. These include: (1) identifying river and lake segments with the highest porpoise concentrations, enforcing appropriate protection measures (including fishing bans) there year-round; (2) vigorously enforcing basin-wide prohibitions on electro-fishing and other fishing activities known or suspected to threaten porpoises; (3) vigorously enforcing regional and seasonal closures of sand-mining; (4) strengthening pollution control measures; and (5) ensuring that before any further modification of the natural flow regime (or other natural features) of the Yangtze ecosystem are allowed to take place, the implications for finless porpoises are investigated and taken into account.

The Committee **recommends** that the Secretariat send a letter to the appropriate Chinese Government authorities, drawing their attention to these recommendations.

*14.4.8 Franciscana*

The franciscana is endemic to the eastern coasts of Brazil, Uruguay and Argentina, and is regarded as one of the most threatened small cetaceans in South America due to high bycatch levels as well as increasing habitat degradation, especially in the inshore and estuarine portions of its range.

SC/65b/SM18 reports on nine days of helicopter experiments partially funded by the IWC Small Cetacean Research Fund to evaluate availability bias in franciscana observations made from an aerial survey platform. Results showed that availability bias is underestimated when using data from surface platforms, resulting in overestimation of abundance. The Committee **recommends** that estimates of availability bias derived from aerial, rather than surface platforms be used when analysing aerial survey data for abundance estimation.

Cunha *et al.* (2014) (also discussed in Annex I, item 3.1.1) suggests that there is substructure within each of the four existing Franciscana Management Areas (FMAs; Secchi *et al.*, 2003). The paper recommends division of these areas into smaller management units as data indicate very limited movement of franciscanas between sub-areas and raise concerns over the effects of localised bycatches.

The Committee **expresses its concern** regarding the increase of reported franciscana entanglements in sub-regions within FMA I. The Committee **recommends** that the impacts of bycatch and human-related mortality on franciscanas within sub-regions be assessed and mitigated It further **recommends** the assessment of finer-scale management area boundaries and that FMA definitions be supported to the greatest extent possible by analyses of both nuclear and mitochondrial markers and other indicators. The Committee **agrees** that the goal of species conservation is to maintain viable Franciscana populations in all areas where they occur.

The Committee **reiterates** its previous recommendations:

(1) the need to gather additional basic data on demography and life history, so that the status of each management unit can be evaluated and appropriate conservation measures designed and implemented;
(2) the need for bycatch to be estimated in additional areas and for assessment of other possible threat factors, such as underwater noise, chemical pollution from coastal development and industrial and human waste discharge, oil and gas exploration activities and vessel traffic; and
(3) the need for international collaboration to continue and expand the investigations into population structure and to assess its implications for conservation, especially the strengthening of the regional collaboration between Argentina, Uruguay and Brazil to implement conservation management actions that address bycatch and other threats.

*14.4.9 Amazon River dolphins: boto and tucuxi*

SC/65b/SM24 provides an update on more than 15 scientific expeditions conducted by regional NGOs between 2006 and

2014 in the Amazon River. These have recorded sightings of the three species recognised (*I. geoffrensis, I. boliviensis, S. fluviatilis)*, as well as the recently described but not yet evaluated Araguaia dolphin (*Inia araguaiaensis*) over 5,700km of the wider Amazon basin. The authors encourage strengthening of regional collaboration to manage direct threats, such as mercury contamination associated with mining and the hunting of dolphins for use as bait in the piracatinga (*Calophysus macropterus*) fishery.

SC/65b/SM10 summarised recent efforts by the Brazilian government to limit the illegal use of river dolphins as bait in piracatinga traps. Piracatinga are distributed throughout the Amazon Basin, occurring in Brazil, Bolivia, Colombia, Peru and Venezuela, highlighting legal, enforcement and institutional challenges and approaches. See Annex L, item 8.9 for additional details. Additional attention was drawn to dolphin watching and hand feeding tourism activities in Brazil as described in SC/65b/WW01 (see Annex M, item 5).

The Committee **commends** the Government of Brazil for responding to the current situation, **noting** that emerging cooperative efforts amongst the range states of the Amazon basin present a cause for optimism and that the Brazilian Ministry of Foreign Affairs could play a role in encouraging cooperation with other governments.

The Committee **encourages** further coordination between governments as a means to strengthen the effectiveness of conservation actions. The Buenos Aires Group was recognised as a useful caucus for discussions on conservation actions for the Amazon River dolphins.

The Committee once again **reiterates** its **serious concerns** about the potential population implications of the intentional killing of both botos and tucuxis for use as bait in the piracatinga fishery. It expresses **support** for the priority actions to assess and mitigate the capture of dolphins for bait contained in the Brazilian National Action Plan for Small Cetaceans and **reiterates its previous recommendation** that an international scientific workshop be organised involving scientists and managers from the range states, with the goal of addressing research and conservation priorities, standardising methodologies and planning long-term strategies.

In particular, the Committee **calls upon** the relevant authorities in each range state to continue and strengthen their efforts to:

(1) assess and monitor the impact of intentional and incidental river dolphin capture relative to the density of local populations;
(2) evaluate and monitor the use of botos and tucuxis as bait in fishing for piracatinga; and
(3) test alternative baits (e.g. slaughter house waste products) for use in piracatinga fishing.

The Committee **encourages** the presentation of a report next year on progress in the development and implementation of an inspection plan to combat the targeted catch of Amazonian dolphins for bait.

*14.4.10 Harbour porpoise*

SC/65b/SD04 that describes population differentiation of Baltic Sea harbour porpoises using RAD-tag genotyping. Full technical details can be found in the report of Stock Definition Working Group (Annex I, item 3.2.1). Participants noted that this is a promising method for the future.

*14.4.11 Humpback dolphins*

An expert workshop on 'Sustainable Fisheries and the Conservation of the Critically Endangered Taiwanese White Dolphin (TWD) (*Sousa chinensis*)' in Taiwan (April-May 2014) conducted an assessment of TWD population status, using three approaches, each of which suggested the TWD population is declining. The workshop made a number of recommendations and welcomed the recent decision of the Government of Taiwan to designate 'Major Wildlife Habitat' along a stretch of the dolphins' known current range in the nearshore waters of the west coast of Taiwan, but also highlighted the need to implement its recommendations beyond the proposed area of protection. The workshop suggested a management target of recovering the population to 100 dolphins by the year 2030.

The Committee **endorses** the following recommendations by the workshop:

(1) immediate banning of all gill and trammel nets within the entire known habitat of the Taiwanese white dolphin;
(2) compensation for fishers willing to engage in alternative livelihoods;
(3) compensation to aid in the transition to alternative fishing gear that is both sustainable and dolphin-friendly, such as handlines; and
(4) a strict enforcement of the existing inshore (inshore of 3n.miles) trawler ban.

The Committee also discussed three candidate wind farms planned for the Eastern Taiwan Strait, one of which overlaps with the northernmost range of the Taiwanese white dolphin. Such threats were a global concern for coastal small cetaceans and agreed that future meetings of the sub-committee should consider the impact of offshore renewables and land reclamation on small cetaceans. It **recalls the advice** provided by the Committee with respect to marine renewables provided in IWC (2013a) and **commends** this to the appropriate authorities.

The Committee received a summary of a report from a recent workshop on Marine Protected Areas (MPAs) for the Indo-Pacific humpback dolphin (*Sousa chinensis*) in the East Asia Ecoregion (January 2014). This workshop focused on the usefulness of establishing an East Asian network of MPAs. The Committee **welcomes** the positive steps taken at this workshop towards better protection for populations of *Sousa chinensis* which are under pressure from a multitude of threats associated with resource competition, coastal development and habitat loss throughout the East Asia region. The Committee **highlights** the critically endangered status of Taiwanese white dolphin and stressed the need for expediency in MPA designation and other management strategies.

The question of taxonomy is dealt with under Item 26.

*14.4.12 Japanese drive fishery*

In 1975, 1980, 1990, 1992, 1993 and 1996 the Commission passed resolutions on the Japanese drive fisheries in general or specifically on actions to better assess and prevent further depletion of striped dolphins taken in these fisheries. Those resolutions were based on the discussions and concerns related to the drive fisheries raised in the sub-committee. Last year, the Committee re-iterated a number of recommendations (IWC, 1992; 1993; 1998b) including the that: (1) up-to-date assessments of these exploited populations be undertaken, including studies of population structure and life-history; (2) up-to-date data on struck and lost rates, bycatch rates, directed hunting effort, stock identity and reproductive status and age composition of catches be collected and made available; and (3) catch limits take into account struck and lost bycatch rates and be based on up-to-date population assessments, and be sustainable with allowance for population recovery.

There is no struck and lost rate problem in the drive fisheries. However, there is an important related issue of the total removals in the drive fisheries. These concerns relate to the long holding period before the remaining dolphins that are not ultimately removed are released. This long holding period will lead to cryptic mortality (unobserved, unrecorded deaths) including the following: (1) stress caused by holding the animals for extended periods prior to release; (2) serious injury while held captive; (3) disruption of reproduction during the drive and during holding and/or handling (e.g. abortions caused by stress and mother/calf separation leading to the death of the calf) (Kita *et al.*, 2013); and (4) post-release deaths (e.g. due to pneumonia). These types of cryptic mortality are not estimated or counted against annual catch limits or included in assessments of the effects of drive fisheries on the dolphin populations. Further information is provided in Annex L.

The Committee **agrees** the issue of total removals in the drive fisheries needs to be more critically examined and incorporated into population assessments. Based on detailed information provided in Annex L concerning live captures of bottlenose dolphins during the Taiji hunt and export to *inter alia* China (Zhang *et al.*, 2012), the Committee **also agrees** that the issue of live removals in drive fisheries must also be taken into account in assessments and notes the lack of current data on either stock identity or stock size for the bottlenose dolphins in waters the off Taiji. Finally, the Committee noted that stress experienced during the long processing time of captured animals (up to five days) will increase the likelihood of post-capture mortality (see Annex L).

Based on the foregoing information, the Committee **reiterates its previous concerns and recommendations** that there is an **urgent need** for an up-to-date assessment of the targeted populations. This is especially needed for the common bottlenose dolphins subject to exploitation in the Japanese drive fisheries and live captures. Any new assessment must include, as indicated above, explicit consideration of cryptic mortality and subsequently consider the sustainability of removals for international trade.

Regarding the concerns about cryptic mortality in the drive fisheries in Japan, Kishiro noted that at least the animals found to have died during the period prior to release were actually counted, and included in the number of catch against the catch limit in the drive fishery, even though these animals were not directly killed and landed.

## 14.5 Takes of small cetaceans

*14.5.1 New information on takes*

The Committee received from the Secretariat the summary of catches of small cetaceans in 2013 extracted from this year's online national Progress Reports (see Annex L, Appendix 3, table 1).

#### 14.5.1.1 DIRECT TAKES

Funahashi presented a table of direct takes of small cetaceans in Japan from 2002 to 2012, together with the catch limits for each species from 2007 to 2013 (Annex L, Appendix 3, table 2). The figures were obtained from websites of the Government of Japan. The catch limits given in the table are by season but the catch numbers are by calendar year.

The Committee **reiterates** its long standing recommendation that no small cetacean removals (live capture or directed harvest) should be authorised until a full and complete assessment has been made of their sustainability.

SC/65b/SM17 reports on small cetacean landings recorded in Dixcove Port (Ghana) in 2013-14. Details are given in Annex L. This information raises serious concern for these populations. Animals were mostly captured in large-mesh gillnets of the primary artisanal fishery. There was also evidence of at least occasional directed captures. The products was traded for human consumption, as previously reported (Debrah *et al.*, 2010). The authors stress that sampling has to be improved, possibly by providing support to biology/fisheries faculty students trained to photograph and sample landings. The proportion of total catches the figures in the paper represented are unclear but the authors state that there are many deficiencies in the current monitoring system, including focal instead of national coverage and discontinuous monitoring effort over time. The Committee **thanks** the authors for this important information and **expresses serious concern** over the threat to these populations.

The Committee **welcomes** received new information on the release of three Indo-Pacific bottlenose dolphins in 2013 in Jeju-do, Korea. The animals appear to be interacting successfully with the wild population. The overall population size was estimated at 104 and the population is thought to be stable.

#### 14.5.1.2 ACCIDENTAL TAKES

SC/65b/SM05 documents the ongoing threat from illegal large-scale driftnetting to cetacean populations in the Mediterranean. Illegal driftnetting continues in Albania and Tunisia, at a potentially significant rate, with unconfirmed indications of illegal activity in Italy. The authors recommend further research in order to better understand the threat from driftnetting, including that: (1) methods be developed and applied to estimate driftnet-related mortality of cetaceans in the Mediterranean and the impact on populations, giving special attention to areas where driftnetting overlaps with known concentrations of cetaceans; (2) scientists and other stakeholders collaborate to conduct a regional examination of the impacts of European small-scale driftnet fisheries on cetacean populations; and (3) researchers and relevant national and international agencies collaborate to examine the extent of regulation and impacts of large-scale driftnetting within EEZs globally. Additional information on this issue can be found in Annex L, item 9.1.2.

The Committee **welcomes** the recent improvements in the implementation of the ban and **expresses concern** over the ongoing illegal driftnetting and **recommends** that countries increase enforcement capacity and penalties for any illegal, unreported and unregulated (IUU) fishing. In addition to existing EU legislation, all Mediterranean countries are party to the General Fisheries Commission for the Mediterranean (GFCM) which bans the use of large pelagic driftnets (>2.5km long and mesh size >10cm).

The Committee **agrees** that improving the identification of ports and areas affected by the illegal driftnet fishery was of considerable importance and should be pursued further.

From the progress reports, the Committee noted that the bycatch of finless porpoises in South Korean waters was still high. Acknowledging previous recommendations, the Korean Government has started a monitoring and mitigation programme on the stow net fisheries which are responsible for 95% of finless porpoise bycatch. The Committee **looks forward** to results of the programme next year.

*14.5.2 Follow up on the proposal for a workshop on 'poorly documented hunts of small cetaceans for food, bait or cash'*

Limited progress had been made on this standing agenda item in the intersessional period. The sub-committee decided

Table 17
Overview of the work plan as it relates to small cetaceans.

| Topic | SC/66a (2015) | SC/66b (2016) |
|---|---|---|
| Main topic to be decided by December 2014 | *Tursiops* systematic or regional assessment of the status of small cetaceans | Depends on what happens in 2015 and the venue for 2016 |
| Voluntary fund for small cetaceans conservation research fund | Continue | Continue |
| Review of previous recommendations (priority will be given to vaquita, Hector's and Maui's dolphins, franciscana, beluga, river dolphins) | Continue | Continue |
| Review on takes of small cetaceans | Continue | Continue |

to pursue this further by producing a scaled down agenda from that proposed last year with the intention that this may provide a structure for a series of regional workshops, including southeast Asia, Africa and South America.

New research in southeast Asia, some of which has been supported by the Small Cetacean Voluntary Fund, has led to an opportunity to organise the first workshop there (Annex L, Appendix 4). Members of the steering group will work to formalise a list of attendees and a detailed agenda. The Committee **welcomes** this new development.

### 14.6 Update on proposed joint workshop on monodontids

Bjørge reported that the proposal for a global review of monodontids was discussed at the NAMMCO Council meeting in February 2014. The Council decided to convene a workshop to undertake a global review of narwhal and beluga. This will not be an IWC workshop. The workshop will be convened in connection with the meeting on Marine Mammals of the Holarctic in Russia in 2016.

### 14.7 Conservation and Management Plans

This is considered under Item 21. In addition, the Committee **agrees** to trial a new intersessional approach for situations that are considered high priority from a conservation perspective at the species or population level, especially where the indications are that time is short and no mitigation actions are in place. An intersessional 'task team' of appropriate experts will be identified from the sub-committee on small cetaceans. Task teams would undertake a thorough review of the situation, consulting with local research groups, authorities and others as appropriate, provide written information to the relevant authorities (through the chairs of the sub-committee and Committee in consultation with the Secretariat) if required, and provide scientific or mitigation advice as appropriate. Task Teams would report back to the sub-committee on progress at its next meeting. It was suggested that budgetary needs could be evaluated by the existing Small Cetacean Conservation Research Fund Review Group[27]. Work will continue intersessionally to better define this task team approach.

### 14.8 Other information on small cetaceans

SC/65b/SM12rev describes two unknown beaked whale FM pulse types (Antarctic BW29 and BW37) recorded during the 2014 IWC-SORP-ABWP South American Consortium voyage.

SC/65b/SM03 provided information on seven Longman's beaked whales (*Indopacetus pacificus*) that stranded in New Caledonia during November 2013, the first mass stranding recorded for this species.

SC/65b/SM27 reviewed the information on cetacean strandings and mortality in Venezuela between 1988 and 2014.

### 14.9 Work plan and budget requests

Last year, two previously identified priority topics, a review of Southern Hemisphere ziphiids and an assessment of *Tursiops* systematics and associated conservation issues were deferred. The Committee **agrees** that the former remains a priority that should be addressed when the Scientific Committee next meets in the Southern Hemisphere.

There was considerable discussion over whether the *Tursiops* review was an appropriate priority topic for next year as discussed in detail in Annex L, item 14.9. It was decided to advance the discussion intersessionally.

Recognising that the venues for the 2105 and 2016 Annual Meetings are not yet known, Table 17 presents a tentative two-year work plan for small cetacean work.

## 15. WHALEWATCHING

The report of the Committee on whalewatching is given as Annex M. Scientific aspects of whalewatching have been discussed formally within the Committee since a Commission Resolution in 1994 (IWC, 1995b). The Commission also has a Standing Working Group on Whalewatching that reports to the Conservation Committee (e.g. see Item 15.3.3).

### 15.1 Assess the impact of whalewatching on cetaceans

SC/65b/WW01 described inter- and intraspecific behaviours of pilot whales (*Globicephala macrorhynchus*) from the Canary Islands, Spain, where their behaviours when interacting with swimmers were recorded, and of botos (*Inia geoffrensis*) in Amazonas state (Brazil), where tourists feed and interact but do not swim with the animals. Behaviour was categorised based on *a priori* ethograms and the risk they posed for physical harm to either humans or cetaceans.

Roughly a quarter of the pilot whales reacted neutrally or avoided swimmers; the others initiated one or more interspecific behaviours. Pilot whales were assumed to be disturbed by human swimmers to some extent, although their overall reaction was interpreted as 'indifferent'. The Amazon botos (all males), were attracted to people. This is an unnatural association, as they are generally solitary. The dolphins performed risky behaviours during all encounters and initiated agonistic behaviours towards conspecifics, which could compromise their health and increase stress as well as pose health risks to humans at the provisioning sites. Licensing of operators and regulation of feeding is being experimentally implemented. The authors' recommendations are listed in Annex M, item 5.

The Committee welcomes this information and **requests** that Ritter report back on the implementation of regulations and licensing of boto feeding operations in

[27] *http://iwc.int/sm_fund.*

Brazil. Discussion of the paper is found in Annex M, item 5, including consideration of the subjectivity of assigning behaviours to categories such as 'risky' and 'not risky'. The Committee **agrees** that researchers conducting impact studies with specific species should work to standardise ethograms to ensure comparability of results.

Last year, the Committee had recommended that an international scientific workshop be organised involving scientists and managers from the boto range states, with the goal of addressing research and conservation priorities, standardising methodologies and planning long-term strategies (IWC, 2014d). Given concerns expressed in SC/65b/WW01, which could make the animals more susceptible to hunting, the Committee **reiterates** this recommendation.

SC/65b/WW02 summarised three papers addressing the impacts of whalewatching on cetaceans: Luis *et al.* (2014) documented the vocal responses of dolphins in a control setting (no vessels) and in the presence of different vessel types, including dolphin watching vessels, in the Sado Estuary, Portugal; Christiansen *et al.* (2013) evaluated the energy budgets for Icelandic common minke whales, using both field observations and a step-wise modelling approach; and Perrtree *et al.* (2014) showed that begging and other abnormal behaviour can persist more than 20 years after banning food provisioning, strongly suggesting that this activity could have long-term detrimental behavioural impacts on cetaceans.

In 2012, the Committee expressed concern over the impacts of ineffectively managed dolphin watching in Bocas del Toro, on the Caribbean coast of Panama, and recommended continued monitoring of the impacts of dolphin watching activities on this population (IWC, 2013f). This recommendation was 'strongly' reiterated at SC/65a (IWC, 2014k). The resident bottlenose dolphin population in the entire archipelago of Bocas del Toro is probably less than 250 dolphins of which some 105 frequent Dolphin Bay, where dolphin watching activity is concentrated.

SC/65b/WW06 presented data collected by boat-based surveys monitoring dolphin behaviour in the presence and absence of dolphin watching boats. There were significant differences in dolphin reaction to the research (86% neutral) and dolphin watching boats (80.6% neutral). 'Negative' reactions to boat presence increased four-fold as the number of dolphin watching boats increased from one to more than three. When multiple boats were present, a significant positive correlation was found between diving frequency and boat presence. In contrast, foraging and social behaviours were significantly negatively correlated with an increase in boat presence.

The Committee **welcomes** this update on the situation in Bocas del Toro and **reiterates its continued and extreme concern** regarding the lack of enforcement of regulations (IWC, 2013f; 2014k). It noted with concern that the boat presence (up to 39 boats on one group) reported in SC/65b/WW06 was in the tourist low season; in high season, boats can number up to 100 or more. In addition, in the last three years (2012-14), 10 dolphins have died in Dolphin Bay due to boat strikes.

The Committee **emphasises** that situations of extreme concern like Bocas del Toro, where recommendations need to be directly communicated with governments, need a more focussed mechanism to bring them to the attention of the Standing Working Group on Whalewatching and the Conservation Committee, than a simple presentation of the Scientific Committee report.

The Committee **endorses** the following recommended mitigation measures from SC/65b/WW06, which are consistent with the IWC Guiding Principles (see SC/65b/WW04): (1) licensing should be limited and license issuance should be regularly re-evaluated; (2) operator training workshops and a certification programme for best dolphin watching practises should be developed and implemented; (3) a maximum of two dolphin watching boats should follow a single group of dolphins at one time; (4) new boats arriving and encountering a dolphin group should remain outside a 'waiting zone' of 300m, and allow a 30min 'resting time' before approaching dolphins after a previous interaction; and (5) arriving boats should either stop in the 'waiting zone' if other boats are already present, or move to other parts of the bay to look for a different group of dolphins. The Committee also **agrees** that speed restrictions and propeller shrouding can reduce collision risk and severity between dolphin watching boats and cetaceans.

The Committee **agrees** that responsible whalewatching operators from other areas, using best practises and making efforts to be sustainable in their operations, should attend Bocas (and other area) training workshops, where they could be helpful advocates for encouraging sustainable dolphin watching practises. All stakeholders, (e.g. hotel operators, airlines) should be involved in workshops to help ensure the widest possible buy-in to any management regime.

Further discussions are detailed in Annex M, item 5.

### 15.2 Review whalewatching in the Mediterranean and Red Seas

Annex M, table 1 is a summary from O'Connor *et al.* (2009) on worldwide tourism and expenditure on whalewatching.

It was noted that in general, the response to requests for input on whalewatching in the region of the Committee's meeting was insufficient for a comprehensive and up-to-date review. The Committee therefore **agrees** that the process would be improved if individuals are tasked in advance with compiling a basic review of the industry in the region of the next year's meeting. The review should be widely distributed (see Annex M) for comment and revision in advance of submission as a document for the Committee; the Conservation Committee could be approached for help with this distribution. Kaufman, Weinrich, and Alisa Shulman-Janiger volunteered to draft the review for the 2015 Annual Meeting should the northeastern Pacific be the appropriate region.

### 15.3 Review reports from intersessional working groups

#### *15.3.1 Modelling and Assessment of Whalewatching Impacts (MAWI) steering group*

SC/65b/WW08 summarised the progress with MAWI, established last year, to date. The group was tasked to define specific research questions and hypotheses that would best advance understanding the impact of whalewatching, identify whalewatching locations that would be most suitable and amenable for targeted studies addressing these questions, and summarise the current modelling tools available to analyse the data that will be collected.

Suitable locations should be in accessible areas where: the potential for whalewatching exists; has not yet started or is in its infancy; control areas can be established; there is an elevated site in near proximity allowing for land-based observations; and some data on the target species exists. See Annex M, item 7.1 for details.

A variety of data collection methods have been used when analysing the impacts of whalewatching vessels on

cetaceans. The variety of statistical approaches used to estimate the effects of whalewatching on cetaceans appear to have been determined by the researchers' skill sets, the question under consideration and/or the nature of the data collected. The approaches can be divided into roughly four categories: (1) comparison of groups; (2) regression methods; (3) Markov-chains; and (4) modelling and simulation. The approaches are detailed in Annex M, item 7.1.

The MAWI steering group will be presenting a symposium and small workshop at the 2014 International Marine Conservation Congress in Glasgow (18 August 2014), to receive input and feedback from the wider marine conservation community. The Committee **welcomes** this paper and looks forward to further discussion at the 2015 Annual Meeting.

*15.3.2 Background document for Guiding Principles*

SC/65b/WW04 reported on the intersessional working group on Guiding Principles development. The group was tasked to develop a 'background document' to annotate the Guiding Principles, with an explanation of their origin and evolution, as well as definitions of terms and other explanatory background. Details on annotations and discussions are noted in Annex M, item 7.2.

*15.3.3 Five-Year Strategic Plan Whalewatching Handbook*

Rojas-Bracho presented an outline of the Handbook. A chapter involving significant input from the Committee will be on the Role of Science. This chapter will be amongst the longest in the Handbook and will focus on a number of overlapping themes aimed at providing advice on threats and mitigation measures, and evaluating whether measures are working or are likely to work. It will highlight strengths and weaknesses of various management approaches by operation type and circumstances, as well as species.

The chapter on Management, although not within the Committee's remit, still will be based on the best available science and therefore will require the Committee's input. It will include the Guiding Principles, developed at the 2015 and 2016 Annual Meetings. See Annex M, item 7.3 for discussion.

There was a general desire expressed by the Committee for clarification of the relationship between the Commission and the Committee regarding the development of the Handbook. The whalewatching sub-committee co-Convenors will work with the chair of the Conservation Committee to address this concern. The Committee **agrees** that a budget request for assistance with developing the Handbook should be forwarded to the Standing Working Group on Whalewatching for consideration and submission to the Commission.

*15.3.4 Swim-with-whale operations*

SC/65b/WW03 updated earlier work using web-based searches in English for swim-with-whale operations. Commercial operations increased from 67 as compared to 44 in 2005 and 21 in 2003. Sources of positive and negative bias in data collection, plans for future reviews of swim-with-whale operations and general discussion are in Annex M, item 7.4.

*15.3.5 In-water interactions*

A study is underway in Dominica focusing on sperm whale swims and additional work on ethograms is being undertaken.

**15.4 Consider information from Platforms of Opportunity of potential value to the Scientific Committee**

SC/65b/WW05 reported on *Whale and Dolphin Tracker* (WDT), a web-application for recording cetacean sighting data in real-time. It presented the occurrence of encounters with several cetacean species from data collected on platforms of opportunity using WDT from tour vessels off Maui, Hawaii. This customisable web-application was developed in-house by the Pacific Whale Foundation. Preliminary results indicate that WDT can be a cost-effective web-based data management system providing a large amount of good quality data (including effort). Details and discussion are in Annex M, item 8. The Committee **thanks** the authors for this paper and the work done on WDT.

SC/65b/WW07 proposed guiding principles for data collection from platforms of opportunity, to be hosted by the Commission website, to help ensure a higher standard of data from whalewatching vessels. Basic parameters any data collection system should include were listed, along with explanations on why these parameters are important to record. It also addressed multi-layered data quality control, an important aspect of citizen science. Details and discussion are in Annex M, item 8. The Committee **agrees** that the guiding principles presented in SC/65b/WW07 should be refined and then added to the website. It also **recommends** that the final data collection guiding principles be added to the Handbook. The Committee **agrees** to establish an intersessional working group whose task would be to finalise the guiding principles for SC/66a, with Rose as convenor and a diverse composition, including at least one operator and one researcher who uses data from platforms of opportunity (see Annex M, table 2).

**15.5 Review whalewatching guidelines and regulations**

Carlson noted that the 2014 update of the Compilation of Worldwide Whalewatching Regulations would be submitted for inclusion on the Commission's website by September 2014.

SC/65b/WW02 summarised Dimmock *et al.* (2014), a study of the perspectives of two stakeholder groups (resource managers and commercial whalewatching operators) in relation to industry knowledge and information exchange. See Annex M, item 8.

SC/65b/WW09 evaluated the level of whalewatching guideline compliance and the effects of compliance, or lack thereof, on dolphin behaviour in Bocas del Toro (and see Item 15.1). A total of 63 dolphin encounters were recorded from June through September 2013. During all of the dolphin encounters where dolphin watching boats were present, Panama's 100m minimum distance regulation was violated at least once. Operators violated other regulations regularly. Results of the study and levels of non-compliance are detailed in Annex M, item 8.

The authors noted that sustainable tourism and training workshops for the community and boat operators are urgently needed in Bocas del Toro and recommended that all dolphin watching vessels place the regulations in a visible location on board their vessels, so tourists can be aware of the regulations. In accord with its recommendation under Item 15.1, the Committee **endorses** these recommendations and **agrees** that research on dolphin watching impacts and community engagement in Bocas del Toro is important and should continue identifying funding sources should be a priority.

**15.6 Consider emerging whalewatching industries of concern**

*15.6.1 Review of workshops in Oman*

Last year, the Committee received an update on the development of whalewatching guidelines, an effort

Table 18
Overview of the work plan as it relates to whalewatching.

| Topic | SC/66a (2015) | SC/66b (2016) |
|---|---|---|
| Assess the impacts of whalewatching on cetaceans | This is the ongoing and primary aspect of the work on this topic. | Continue. |
| Review progress on the Commission's five-year strategic plan including the Handbook | Review the work of an intersessional working group. As the Handbook is an online 'living' document then it is anticipated that this will be ongoing work although the initial work will be the most intense. | Continue. |
| Review work of intersessional steering groups | These are listed in Annex M, table 2. | Continue. |
| Review whalewatching in the region of the meeting | The next meeting venue is unknown but this is an ongoing item. | Continue. |
| Consider information from platforms of opportunity | Finalise standard elements and guidelines including data collection items to be hosted on the IWC website. | Review progress and modify if required. |
| Review whalewatching guidelines and regulations | Ongoing work –the most recent compilation is submitted to the IWC Secretariat and included on the IWC website. | Continue. |
| Emerging whalewatching industries of concern | Ongoing work. | Continue. |
| Progress on previous recommendations | Ongoing work. | Continue. |

undertaken as a multi-stakeholder initiative by Environment Society of Oman (ESO) and funded by the Commission. The initiative included a series of workshops held over the past year focusing on delivering and demonstrating whale and dolphin watching guidelines and on-water training sessions. Several ministries were consulted during the process and the team visited with operators in Muscat, Salalah and Dhofar. Continued funding support is requested to consolidate this work, including development of an Oman Whalewatchers' Association.

The Committee thanked Wilson for a further update and greatly **welcomes** the positive nature of developments in Oman, which were partially in response to the recommendation of the Committee (IWC, 2013f). Continuation of training workshops is especially urgent in areas where operators are targeting Arabian humpback whales and local populations of *Sousa*. The Committee **recommends** that this work continues and be funded for at least the next two years and **agrees** to keep this as a standing item on the agenda.

### 15.7 Other issues

The Committee considered several strategies that might make Committee recommendations more visible and effective, especially urgent statements involving highly endangered or isolated cetacean species/populations (see also Annex M, item 5). These include: extracting and combining recommendations in a separate short document, enabling follow-ups by introducing a new agenda item ('progress on previous recommendations') on the agenda of the sub-committee on whalewatching, and establishing intersessional groups with terms of reference related to promoting recommendations beyond the Commission.

The Committee **agrees** to add 'progress on previous recommendations' to the agenda (see Annex M, item 12). In discussion at plenary, the Committee noted that a model highlighting and progressing recommendations on particular issues of concern had been discussed by the Small Cetaceans Sub-committee (Annex L, item 8) and would be a useful model. The Committee **agrees** that an intersessional group to discuss highlighting and progressing recommendations be formed, using Bocas del Toro as an example, to report back to the Committee at the 2015 Annual Meeting.

Funahashi presented information that in June 2014, local whalewatching associations, operators, guides and industry-related personnel will form the Japan Whale-Dolphin Watching Council from seven areas, to promote a responsible, sustainable whalewatching industry in Japan.

The Committee **welcomes** this information and **endorses** the formation of the Council. The Committee **recommends** that the council expand its membership by contacting established operators in other regions of Japan. It was also suggested that the council contact established operators in other countries. Funahashi agreed to draft a document describing the council and its goals for global distribution via Committee members.

Carlson updated Robbins' work to identify data sources from platforms of opportunity of potential value to the Scientific Committee. There have been delays in its development, but it should be online in the near future.

Attention of the Committee was drawn to a new publication for which several members of the Committee are chapter authors and/or editors. Details can be found in Annex M, item 11.

### 15.8 Work plan

The detailed work plan is given in Annex M, item 12. Table 18 provides a short overview.

## 16. DNA TESTING

The report of the Working Group on DNA is given as Annex N. This particular agenda item has been considered since 2000 in response to a Commission Resolution (IWC, 2000).

### 16.1 Review genetic methods for species, stock and individual identification

SC/65b/DNA01 was prepared in response to a recommendation from the JARPA II Review Workshop that a revised paper be submitted that explains in more detail how far the IWC guidelines for DNA data quality control were able to be followed (SC/65b/Rep02, p.15). SC/65b/DNA01 presented a full description of the protocol used by the Institute of Cetacean Research for the genetic analyses in the context of the IWC guidelines. The Committee **welcomes** this document and **agrees** that it responds appropriately to the recommendation.

SC/65b/BRG04 presented an estimate of the genome size of the bowhead whale using flow cytometry. The mean genome size (C value) was estimated to be 2.93 picograms (2.87 gigabases, Gb). This was the first direct genome size estimate for a baleen whale, and is the lowest value reported for any cetacean. It is near the low end of values reported for cetartiodactyls and is relatively low for mammals. The relatively small size of the genome of bowhead whales

could be associated with metabolic rate, oxygen exchange, or simply a plesiomorphic trait shared in common with other basal cetartiodactyls.

The Committee noted that the two suggested explanations are not mutually exclusive, i.e. it can be at the same time plesiomorphic and adaptive. It was also noted that differences between directly estimated (from flow cytometry) and indirectly estimated (from sequence) genome size are considered primarily due to removal of highly repetitive sequences not included in sequence-based estimates. Details of this paper and the discussion are found in Annex N.

SC/65b/BRG09 reported progress on the transcriptome sequence of the bowhead whale. This study compared two methods of RNA sequence to characterise the bowhead whale transcriptome including polyA RNA isolation and RiboZero which does not involve the capture of a RNA molecule by the end of its 3' tail. The study sequenced the transcriptome from pituitary gland, adolescent testis, vibrissa follicle, mesenteric lymph node, and spleen using the RiboZero protocol and the heart, cerebellum, liver, adolescent testis, and retina from 2011 using the polyA protocol for a total of 51,637,573,518 bp of sequence. The data are being explored for the discovery of SNP loci for population genetic studies.

The Committee **commends** the large amount of work undertaken and notes the valuable data being produced in this study. It was noted that SNP discovery using genome and transcriptome sequence has some advantages over the use of anonymous loci, but that there are also some difficulties with this approach. Details of this paper and the discussion are found in Annex N.

SC/65b/BRG13 summarised results from a bowhead whale genetics project. The project had two parts, development of an mtDNA database and identification of SNP loci including the development of a SNP database. Regarding mtDNA loci a total of 570 whales have been sequenced for HVR1, 480 for ND1, and 389 for cyt-b. A total of 155 SNP loci were identified for bowhead whale, including 99 new SNPs reported in SC/65b/BRG13, 14 sex-specific SNPs reported in SC/65b/BRG22 and 42 from the literature (Morin *et al.*, 2010b). It was reported that the data in these databases will continue to be used for monitoring stock structure, population size estimates, and estimates of historical demography. Work is ongoing to fill the gaps in the database.

The Committee again **commends** the amount of work undertaken in this study. The authors clarified that the transcriptome upon which the SNP loci were identified was based on multiple individuals (all from the B-C-B stock), multiple sexes, and multiple tissues.

In discussion, the Committee was informed that most but not all of the mtDNA sequences are from bowhead whale tissues obtained from the aboriginal harvest in Alaska and the sequences are linked to the tissue sample by a unique identifier code. Tissues are archived at the Department of Wildlife Management, North Slope Borough, Barrow, AK, with duplicate samples archived at the Southwest Fisheries Science Center (National Marine Fisheries Service, NOAA) in La Jolla, CA. Published sequences are deposited on *GenBank* and publicly available.

### 16.2 Review results of the amendments of sequences deposited in *GenBank*

Last year, the Committee agreed that the list of accession numbers involving inconsistencies due to a lag in the taxonomy recognised by *GenBank* or uncertainty in taxonomic distinctions currently under investigation (IWC, 2014l) should be sent to *GenBank* with a letter explaining the background and the main reasons for the inconsistencies (IWC, 2014d, p.56).

Cipriano informed the Committee that he had sent the list and letter to *GenBank* during the intersessional period. A positive response was received informing that *GenBank* is willing to work with the IWC on this particular problem, and requested further explanations on the list received on accession numbers associated with problematic taxonomic designations. The Committee **agrees** that Cipriano should continue to work with *GenBank* during the next intersessional period to facilitate the work by *GenBank* staff on the correction of the inconsistencies based on the list sent.

In discussion the Committee was further informed that the NCBI staff is already making changes to taxonomy fields of sequences in *GenBank* on the advice of the Scientific Committee and that additional changes needed in *GenBank* annotations include a mechanism for providing clear and consistent geographic source information. Situations where taxonomy is in flux (such as the revision of cetacean species and subspecies names currently underway) would also benefit from continued dialogue between the Scientific Committee and NCBI.

The Committee also suggested further discussion by the Committee on issues regarding new species descriptions and taxonomy of baleen whales.

### 16.3 Collection and archiving of tissue samples from catches and bycatches

The Committee previously endorsed a new standard format for the updates of national DNA registers to assist with the review of such updates (IWC, 2012a, p.53), and the new format worked well the last two years. This year the update of the DNA registers by Japan, Norway and Iceland were based again on this new format. Details are given in Appendices 2-4 of Annex N for each country, respectively, covering the period up to and including 2013. The Committee **thanks** the countries involved for providing this information.

### 16.4 Reference databases and standards for diagnostic DNA registries

Annex N, Appendices 2-4 summarise the status of mtDNA and microsatellite analyses of the stored samples for Japan, Norway and Iceland, respectively. In almost all cases, the great majority of samples have been analysed for at least one of either mtDNA or microsatellite and in most cases both. Work on unanalysed samples is continuing. Details of the exact number of samples collected and analysed are provided in Annex N.

The Committee **appreciates** the efforts of Japan, Norway and Iceland in compiling and providing this detailed information of their registries.

### 16.5 Work plan

The work plan is discussed in detail under Annex N.

Members of the Committee are encouraged to submit papers in response to requirements placed on the Committee by the IWC Resolution 1999-8 (IWC, 2000). Relevant information in documents submitted to other groups and sub-committees of the Committee will be reviewed next year. Results of the 'amendment' work on sequences deposited in *GenBank* will be reported next year.

## 17. SPECIAL PERMITS

### 17.1 Expert Panel Review of the results from JARPA II

This item was initially discussed by a Working Group (Annex O). Scientists from countries that made a statement at plenary that it was inappropriate for the SC to continue the review of the JARPA II programme under Annex P, did not participate in the discussion related to JARPA II agenda items (see Item 2). These scientists may not agree with any conclusions reached in this report under the relevant agenda items.

This agenda item is related to the Expert Panel Review of the results from JARPA II (SC/65b/Rep02).

The Expert Panel review took place in Tokyo from 24-28 February 2014 and followed the guidelines described in Annex P (IWC, 2013g). The previous Chair of the Scientific Committee (Palka) chaired the review Workshop. Typically, the chair of Special Permit reviews is the current Scientific Committee Chair. However, since the Chair of the Scientific Committee (Kitakado) is a member of the proponents, the Scientific Committee agreed last year that the previous Chair (Palka) would be an appropriate Chair for this review Workshop.

#### *17.1.1 Expert Panel report*

The Expert Panel was chaired by Palka and was comprised of the IWC Head of Science (in accord with the guidelines), three current members of the Committee, two scientists who rarely participate in the Committee and three scientists who have never participated. Expertise in all areas of the research programme was available. Thirty-eight papers were submitted by the proponents (SC/F14/J01-J38), eight papers submitted by other Scientific Committee members (SC/F14/O01-O08), and five papers were submitted in response to the observer papers (SC/F14/R01-R05).

The Panel report (SC/65b/Rep02) is divided into sections based on the stated objectives of the programme: monitor cetacean habitat; elucidate temporal and spatial changes in stock structure; monitor whale abundance trends; monitor krill abundance and feeding ecology of whale stocks; monitor effects of contaminants on cetaceans; model competition among whale species; and improve management procedure for Antarctic minke whales. Each of these sections contained the proponents' summary of their results followed by a review from the Panel that included specific technical recommendations. The final section presented the Panel's general overview and conclusions containing recommendations divided into short, medium and long-term.

The report is a long and detailed review. What follows here is a short Panel Chair's summary of only the broad conclusions. The Panel emphasised that its task was to provide an objective scientific review of the results of JARPA II; its task was not to provide either a general condemnation or approval of research under special permit.

Before considering individual objectives, general comments applicable to all aspects of the programme are identified. The Panel noted that the general and extremely broad nature of the objectives and its ongoing nature made it difficult to fully review how well the programme met its own objectives. It recommended refined objectives and sub-objectives with timelines for progress be developed to provide a basis to more easily assess if the objectives have been met.

Data collection disruption due to weather, ice conditions and increasing sabotage activities by protestors resulted in not achieving the designed sampling scheme for some years, and the Panel was concerned that this could severely compromise the ability of the programme's objectives to be met. The Panel recommended that an explicit protocol be developed to specify *a priori* how the design could be modified if disruption by protestors occurs; simulation studies based on existing data should assist in this.

The Panel recognised that this was the first period of the JARPA II programme but noted that the programme arose out of the long JARPA programme and that many of the papers analysed data from both programmes. The Panel welcomed the considerable work that was put into field and laboratory work and the development of papers, particularly those addressing recommendations made in previous JARPA reviews. However, the Panel recommended that considerably more effort and resources be put into the analytical side of the programme, both via more thorough analyses of individual datasets and through better integration amongst the datasets to integrate the information available from the various aspects of the programme.

The Panel recognised an important component of any programme is archiving data and samples. It agreed that a number of questions potentially could be addressed with material that may have been preserved from the historical commercial catch. While reports from JARPA and JARPA II detailed the availability of tissue samples, no similar information was available from the historical catch. The Panel recommended a detailed list of available historical samples be produced.

While the Panel agreed broadly with the conclusion that JARPA II catches will not adversely affect the stocks in the research area, it also noted that the most appropriate way to assess the impact of future Special Permit catches on stocks is within the framework of an RMP-type process; that approach explicitly accounts for uncertainty.

In regards to the monitoring the cetacean habitat objective, the Panel agreed that the monitoring of the whale habitat is relevant to all of the objectives. Unfortunately this work has been limited. If the programme is to meet its own objectives, the Panel recommended the collection of the full suite of oceanographic data be resumed and the proponents should incorporate other oceanographic and related data that may exist within other international programmes to form a more comprehensive dataset. In addition, the proponents could develop a method to make their data available to other international programmes.

In regards to the temporal and spatial changes in the stock structure objective, the Panel agreed that considerable progress has been made in understanding stock structure within the research area. However, it drew attention to the fact that the programme incorporated little information from outside the research area. For Antarctic minke whales, the Panel welcomed the innovative integrative approach used which incorporated genetic and non-genetic data and it recommended consideration of other potential hypotheses. The Panel welcomed the examination of stock structure of several of the species by integrating data from biopsy samples collected during JARPA and JARPA II with other data collected within the Antarctic and lower latitudes. The Panel suggested increasing the sample sizes by using biopsy samples collected by other programmes (e.g. SOWER) and from earlier commercial whaling, if available.

In regards to the monitoring abundance trends objective, sightings data analyses and statistical catch-at-age analyses (SCAA) were used. The Panel agreed that survey results from the JARPA and JARPA II programmes contribute significantly to the objectives of the programme. The survey

work represents a considerable expenditure of research time and a large dataset for long-term monitoring. The Panel agreed that the papers on Antarctic minke whales (Hakamada and Matsuoka, 2014a) and humpback whales (Hakamada and Matsuoka, 2014b) had adequately addressed most of the concerns raised in the JARPA review meeting. In terms of future field work, the Panel recommended consideration of the use of Independent Observer mode in future surveys to address the issue of $g(0)$ and the collection of killer whale ecotype data.

The Panel noted that the SCAA analyses, whilst using data from JARPA and JARPA II, has been directed by the Scientific Committee and was undertaken by non-proponent scientists. The Panel agreed that the SCAA model is both the best currently available model for examining stock dynamics for the minke whales in the JARPA II area, and that the model performed well in this regard. The Panel noted that certain results from the SCAA model may not be consistent with inferences developed from other components of JARPA II or may suggest potential revisions to the design of JARPA II itself. These points concerned *inter alia* MSYR, stock structure and growth rate changes.

Examining and understanding the distribution of whale species and the reasons for any changes in distribution is central to the objectives. The Panel recommended that more robust and comprehensive analyses of the existing data be undertaken that incorporate many more potential explanatory variables. In addition, a more rigorous area occupancy analysis should be undertaken that incorporates recent advances in spatial modelling. The distributional information was used to formulate their 'competition' hypotheses. The Panel agreed that a conceptual model for such competition should be developed. Additional field efforts will be needed to develop plausible hypotheses, such as focused studies of prey density and swarming behaviour in relation with local whale distribution and abundance or comparison of stomach contents in areas where both species overlap, and in areas where they segregate.

In regards to the monitoring krill abundance objective, the Panel recommended that future krill surveys should be frequent because the density of krill in any given stratum may vary significantly from year to year, and the objectives of JARPA II require an area-based time-series view of how the prey field changes over time. The JARPA II study area is very large, and it is probably not possible to survey the entire study area every year with a single survey vessel. Thus, the Panel recommended either using multiple survey vessels to synoptically cover the JARPA II study area every 1-3 years or using one vessel to survey alternating halves of the study area every year.

In regards to the monitoring feeding ecology of whale stocks objective, the Panel agreed that this work was central to achieving several of the objectives. The Panel agreed that the approach to the feeding ecology study developed by the proponents during the Workshop to address some shortcomings was a useful way forward. The Panel also recommended the work be extended by computing a time series of Monte Carlo results for the total potential consumption of krill using abundance estimates of minke whales and the uncertainties around these estimates. These Monte Carlo results can also be used to re-evaluate the future research and sampling in JARPA II.

In regards to monitoring whale biological parameters, the Panel noted that these analyses assumed that the sampling scheme was broadly representative of the population and was related to the stock structure hypotheses agreed at the JARPA review rather than those that were subsequently presented to this meeting. In regards to the age at sexual maturity and pregnancy rates, the Panel recommended additional analytical work before conclusions can be drawn. The Panel welcomed the work presented on the evaluation of the use of aspartic acid racemisation as an alternative approach to estimating age and made a number of recommendations for an updated paper and future work.

In regards to the studies on nutritive condition, the Panel recognised that the factors considered in the models arose primarily from discussions within the Scientific Committee and were not derived from biological hypotheses. The Panel recommended a conceptual model of the system be developed and then used to identify a set of covariates to consider in the model. The Panel also noted that it is inappropriate to automatically select the 'best model' because such a model can lead to covariates being selected for which there is no reason that they are related to response variable. Despite the complexity of the analyses and the protracted discussion of appropriate statistical techniques, the Panel expressed the opinion that the 'weight of evidence' (i.e. the different measures consistently indicated that there was an overall decline in body condition of minke whales through the JARPA period), as well as the implications of such a result, warrant careful consideration in terms of cause.

Following the discussion at the JARPA review meeting and the advantages of considering lipid content of the blubber as well as thickness, the Panel strongly recommended that any further studies should incorporate blubber lipid content analyses for all samples, and that the collection of current measurements also continue to ensure comparability with past and future data. The Panel also recommended that faecal samples (from the colon) be compared with stomach samples for species composition.

In regards to the monitoring effects of contaminants objective, the Panel noted the low levels observed, and therefore recommended lower priority for pollutant studies in the future and agreed that it would be sufficient to undertake pollutant analyses on a suitably chosen subsample at periodic intervals (say 3-5 years).

In regards to the model competition among whale species objective, the Panel recognised that this work is at a preliminary stage. The Panel stressed the fundamental importance of this work to most of the objectives of JARPA II. The Panel therefore recommended that considerably more effort be allocated to this aspect. The Panel recommended that simulations be used to determine the data needed to reliably distinguish among competing hypotheses to explain the available data, including the proponents' preferred option, competition among species. These simulations may also be used to identify: (1) whether models are able to respond in predictable ways to known signals in the data; and (2) the required level of precision in the data to parameterise them. The Panel emphasised that producing ecosystem models is a long-term exercise, which requires the integration of a large amount of data as well as ecological and biological knowledge of the system. The work conducted to date represented a useful start. To this end, the Panel recommended increased collaboration with other researchers from outside the JARPA II area to improve the modelling exercise.

In regards to the improve the management procedure for Antarctic minke whales objective, the Panel agreed that the information from JARPA and JARPA II, particularly with respect to stock structure and abundance will greatly improve any future *Implementation Simulation Trials,* should these

ever be requested by the Commission. Similarly, SCAA and related analyses could be used to develop hypotheses related to carrying capacity, natural mortality and variation in birth rates. In principle, the work on ecosystem modelling could be used to develop a set of operating models that allow for competition. However, the ecosystem models need to be developed with sufficient resolution (e.g. age- and sex-structure for minke whales).

The Panel agreed that a number of aspects of the JARPA II programme are relevant to the several IWC resolutions and discussions.

Although a comparison of the utility of lethal and non-lethal sampling is not an objective of the JARPA II programme, the samples and data already collected to achieve the objectives can be analysed to investigate this general research question. The Panel recommended that the proponents examine the approaches for comparison used in the Icelandic programme and develop an approach to formally and objectively compare the results from different approaches in the light of the programme's objectives.

In conclusion, the Panel's Chair thanked the Panel, the proponent scientists and the observers for their constructive and patient approach to the Workshop and the Fisheries Agency of Japan for providing excellent facilities and logistic support.

*17.1.2 Response to Expert Panel report*

Pastene presented an overview of SC/65b/SP01. This paper summarises the general response of the JARPA II proponents to the JARPA II Panel Review report (SC/65b/Rep02). The IWC SC convened a Workshop to review the progress made in the research conducted under the Japanese Whale Research Program under Special Permit in the Antarctic - Phase II (JARPA II) in its first six years (2005/06-2010/11). The review followed the guidelines specified in the Annex P. An international Panel of experts (Review Panel) carried out the review on the basis of 38 scientific papers prepared by the proponents, eight prepared by IWC SC members and five prepared by the proponents in response to some of the documents from the IWC SC members. Scientists involved in the JARPA II research participated in the Workshop only to present papers on particular agenda items and to respond to questions of clarification and substance regarding the work that had been undertaken or further work expected to be undertaken. The report of the Review Panel is presented in document SC/65b/Rep02. The present paper summarises the views of scientists involved in the JARPA II research on the evaluation and scientific suggestions from the Review Panel. Short-term recommendations offered by the Review Panel were responded to in different papers presented to sub-committees: SC/65b/EM01-03; SC/65b/IA01-IA02; SC/65b/SD01-03 and SC/65b/DNA01. The proponents agreed with most of the medium and long-term recommendations, and this paper shows the proponent's view and plan regarding those recommendations. This paper also offers some general comments on the JARPA II review process which could be considered to improve future reviews. The proponents consider that, in general, the Review Panel report represents a fair and balanced evaluation of the work conducted by the JARPA II in its first six years. The Review Panel welcomed the scientific contribution of JARPA/JARPA II. At the same time it identified those areas where further work is required and provided suggestions and recommendations that if correctly implemented, will contribute to improve analyses from the first six years of research as well as future research.

Some members of the Committee expressed concern about the JARPA II Expert Panel review, especially with respect to the Panel's ability to evaluate: (1) the utility of lethal research methods during the JARPA II programme; and (2) results based on combined data from both JARPA and JARPA II that formed the basis for a number of the documents reviewed by the Expert Panel, making a review of just the JARPA II programme somewhat difficult. These concerns are summarised in Annex O1.

In response to Annex O1, other members of the Committee stated that JARPA/JARPA II has provided substantial new knowledge related to the management of minke whales in the Antarctic and on the functioning of the Antarctic ecosystem and that much of this information could not have been obtained from non-lethal methods alone (see Annex O2).

In discussion of Annex O2, Wade noted that in response to the Expert Panel review, the proponents of JARPA/JARPA II authored papers that often concluded that they 'did not agree' with the advice provided. Wade stated that he did not find many of the revised analyses to be convincing and found the proponents had often not modified their analyses in response to recommendations from the Expert Panel but had instead agreed to disagree.

Pastene responded that several papers responding to the JARPA II review Workshop had been prepared by Japanese scientists and presented in different sub-committees this year, mainly in the IA (biological parameters), EM (body conditions and stomach content trends) and SD (stock structure) sub-committees. Some of those analyses have been accepted while that for others further work has been required but this is normal in the scientific world. It is clear that many research topics from JARPA/JARPA II, for example body condition, biological parameters and stock structure, have promoted interesting and detailed scientific discussion in the Scientific Committee.

Wade provided several examples of how biopsy sampling could be effectively conducted in the Antarctic. These include the successful biopsy sampling of Antarctic minke whales in nearshore waters (A. Friedlaender pers. comm.; SC/65b/IA12) as well as the previous biopsy experiments during SOWER cruises that showed the practicality of biopsy sampling minke whales in offshore waters, as noted by Gales in his testimony to the International Court of Justice. Experiments in 2000 and 2008 on Japanese IDCR/SOWER cruises showed that Antarctic minke whales could be biopsied, that they could be biopsied at distances similar to the distance used to harpoon minke whales, and that the average time it took to biopsy a minke was approximately the same as the time it took to harpoon a minke whale, and much less considering the handling time of a harpooned whale (information taken from Ensor *et al*. cruise reports, 2001-08). Moreover, the average time to biopsy an Antarctic minke whale was less than any other baleen whale (blue, fin, humpback, and right whales), and this was accomplished under difficult open ocean conditions. Given the success that JARPA II has had biopsy sampling other baleen whales, Wade thought there was no reason that Antarctic minke whales could not be biopsied in large numbers, if the effort was made to do so.

Pastene reiterated that the Scientific Committee has on several occasions recommended the use of multiple techniques, genetics and non-genetic, to resolve questions on stock structure (IWC, 2013a, p.10). Non-genetic approaches include morphometric analysis, which require lethal sampling. Biopsy sampling of Antarctic minke whales has proven to be difficult, particularly in offshore areas and for small schools (see details in Ensor *et al.*, 2004, p.17; Ensor

*et al.*, 2001, p.14) for experiments based on IDCR/SOWER and Nishiwaki (2000) for experiments based on JARPA and JARPN). Even if biopsy sampling became possible under the more challenging conditions, he believes that it would still be difficult to collect the number of samples required for statistical analyses of stock structure.

Wade also debated the statement made in Annex O2 regarding the inadequacy of conducting organic pollutant (lipophilic) and trace elements pollutant analyses from biopsy samples, stating that he has published three studies that used biopsy samples to examine organochlorine concentration in cetacean blubber.

Pastene clarified that his opinion was based on a comprehensive and detailed comparison between lethal and non-lethal techniques made by the Review Panel on the Icelandic Special Scientific Permit Review that concluded that the lethal sampling is more practical than the non-lethal sampling to investigate some pollutants in the common minke whale (IWC, 2014a, p.480).

Víkingsson highlighted the improvement in the working methods of the Committee concerning review of results from Special Permit programmes with the introduction of independent Expert Panels. He commended the high professional quality of the review of the Expert Panel of the JARPA II programme. While generally recognising the scientific value in the great amount of work conducted as a part of the program, the Panel criticised some parts of the analyses and made constructive suggestions for improvements. Víkingsson commended the wide-ranging combination of lethal and non-lethal research techniques used in JARPA II that had helped explain recent changes in the Antarctic ecosystem. Concerning the use of lethal and non-lethal methods, Víkingsson concurred with the suggestion of the Panel regarding further evaluation of the usefulness of biopsy sampling by direct comparisons of different research techniques applied on the same animals as done in the Icelandic research programme reviewed in 2013. Those studies had, for example, indicated variable utility of biopsies (skin and outermost blubber) in studies on diet composition and pollutant levels.

### 17.2 Review results from ongoing permits

The Committee has decided not to discuss annual cruise reports between the periodic reviews. Therefore, the cruise reports are briefly summarised below.

#### *17.2.1 JARPN II*

SC/65b/SP02 outlined the twelfth cruise of the full-scale JARPN II offshore component conducted in the western North Pacific. There were three main research components in the 2013 survey: whale sampling survey, dedicated sighting survey and whale prey survey. The whale sampling survey was carried out from 25 July to 7 October 2013. A total of 1,846n.miles was surveyed in a period of 65 days by the two SSVs. A total of three common minke, 100 sei, 28 Bryde's and one sperm whale was sampled by the SSVs. In August, common minke whales fed mainly on Japanese anchovy, mackerels and Pacific saury in sub-area 9. Sei whales fed mainly on mackerels followed by copepods from August to September in sub-areas 8 and 9. Bryde's whales fed mainly on krill followed by Japanese anchovy and mackerels in sub-areas 8 and 9 from late July to early October. Dominant prey species in the stomach of the sperm whale was various kinds of squids, which inhabit in mid- and deep-waters. Three dedicated sighting surveys were carried out from 18 May to 26 June in sub-areas 7 and 8, from 20 July to 23 August in sub-area 9 and from 12 September to 7 October in sub-areas 8 and 9. A total of 3,470, 987 and 539n.miles was surveyed during those surveys by the SVs, respectively. The whale prey survey was carried out from 24 July to 22 August. The survey was conducted concurrently with SSVs and NM in a part of sub-areas 8 and 9. The main purpose of the prey survey in this year was recording of underwater behaviour of Bryde's and sei whales by using acoustic transmitters. Data obtained in this research will be used in the elucidation of the role of whales in the marine ecosystem through the study of whale feeding ecology in the western North Pacific.

There were two questions of clarification regarding this document on: (1) whether the survey tracklines (depicted within the red block of fig 3.) were designed for abundance estimation; and (2) how the survey tracklines were randomly started. In response, the authors stated that the survey tracklines in question were not designed for abundance estimation and that the starting points of the track lines were randomised following methods described in Matsuoka *et al.* (SC/65b/IA06).

SC/65b/SP03 outlined results of the ninth survey of the JARPN II coastal component conducted off Sanriku. The survey was carried out from 18 April to 3 June, using four small-type whaling catcher boats and one echo sounder trawl survey vessel. Sampling of common minke whales was conducted in coastal waters within 50 n.miles from Ayukawa port in the Sanriku district, and all animals collected were landed at the JARPN II research station established for biological examination in Ayukawa. A total of 7,188.3 n.miles (709.3 hours) was surveyed and 59 schools (59 individuals) of common minke whales were sighted. A total of 34 animals were sampled. Average body length of the animals was 5.02 m (SD: 1.12, $n$=17) for males and 5.21 m (SD: 0.60, $n$=17) for females. Dominant prey species found in the fore stomach of common minke whales collected in the Sendai Bay were juvenile Japanese sand lances, and those collected outside the Sendai Bay were Japanese anchovies. This suggests that common minke whales in the Sendai Bay and in the outside slope feed on different preys. Furthermore, common minke whales significantly fed on juvenile sand lances in 2012 and 2013, with the proportion of adult sand lance decreased in recent years. This result indicates that feeding habit of common minke whales in coastal waters off Sanriku changes year by year.

SC/65b/SP04 outlined the results of the JARPN II coastal component off Kushiro, northeast Japan (the sub-area 7CN) in 2013. The survey was conducted from 6 September to 25 October 2013, using four small-type whaling catcher boats as sampling vessels. During the survey, a total of 4,629.7 n.miles (451.8 hours) was searched, 126 schools/142 individuals of common minke whales were sighted and 58 whales were sampled. Average body length of sampled whales was 6.77m (SD=0.88, $n$=41) for males and 6.55m (SD=1.39, $n$=17) for females, respectively; 27 of the 41 males (65.9%) and seven of the 17 females (41.2%) were sexually mature. The dominant prey species found in the stomach was Japanese sardine *Sardinops melanostictus* (63.8%), followed by walleye pollock *Theragra chalcogramma* (22.4%), mackerel *Scomber japonicas* (6.9%), krill *Euphausia pacifica* (5.2%) and Japanese common squid *Todarodes pacificus* (1.7%). In the 2013 survey, Japanese anchovy *Engraulis japonicus* and Pacific saury *Cololabis saira* could not be found in the stomach. From late 1960s to 1987, Japanese sardine and mackerel were recorded as the major prey species of common minke whales taken by the commercial whaling. But, when the coastal component off Kushiro started in 2002, Japanese anchovy was the

major prey species found in the stomach, and dominance of the Japanese anchovy was continued until 2011 survey. In 2012, Japanese sardine and mackerels were detected again from the stomach by the survey, and in the present survey, Japanese sardine became the most dominant prey species. Conversely, Japanese anchovy was not present. Apparent change in the dominant prey species from Japanese anchovy to Japanese sardine observed here suggested that the distribution and amount of those prey species in the coastal waters off Kushiro were changed, and the stomach contents of the whales could reflect those environmental changes. Such information is valuable in considering the habit of the whales and environmental change in the region, and will contribute to the objectives of the JARPN II feeding ecology and ecosystem studies.

In discussion, the high number of humpback whale sightings in fig. 4 of the paper was noted and it was asked if this represented an increase over what had been observed in past surveys. The authors stated that at the start of the programme in 2002 there was a lower number of humpback whales sighting but beginning about 3-4 years ago the number of humpback whale sightings increased. In discussion, it was postulated that the increased number of humpback whale sightings may be related to changes in oceanographic conditions and available prey species. It was then asked if fluke photographs for photo-identification purposes are being collected. The authors confirmed that fluke photographs are being collected but that humpbacks in this area do not regularly fluke-up dive.

Finally, it was asked if the changes in the diet composition of minke whales as depicted in fig. 6 of the paper were correlated with changes in body condition. The authors stated that an analysis of this type was pending.

*17.2.2 JARPA II*

SC/65b/SP05 report the results of the 2013/14 survey of the Second Phase of the Japanese Whale Research Program under the Special Permit in the Antarctic (JARPA II). Two dedicated sighting vessels (SV), one sighting and sampling vessels (SSV) and one research base vessel engaged in the research for 70 days, from 3 January to 13 March 2014 in Areas V (130°E - 170°W) and VI West (VIW: 170°W-145°W). Unfortunately the research activities were interrupted several times by an anti-whaling group which directed violent sabotage activities against Japanese research vessels in previous seasons. As a result the planned dedicated sighting survey was cancelled in the whole research area because the two SVs had to be dedicated to security tasks. The total searching distance was 3,182 n.miles by the SSV, which was approximately one-third of the searching distance in 'normal' years. Seven species including five baleen (blue, fin, sei, Antarctic minke and humpback) and two toothed (sperm and southern bottlenose) whales were sighted during the research period. A total of 313 schools (531 individuals) of Antarctic minke whales were sighted. It was the dominant species in the research area followed by the humpback whales (82 schools/133 individuals) and fin whales (45/99). The number of sightings of the Antarctic minke whales was about 4.0 times higher than that of humpback whales. A total of 251 Antarctic minke whales was sampled which were examined on board the research base vessel except one whale was lost during the transfer to the research base. Of 250 Antarctic minke whales, 125 were male (50.0%) and 125 were female (50.0%). Photo-ID experiments were conducted and a total of two blue whales were photographed. Oceanographic surveys to investigate vertical sea temperature profiles were also implemented using XCTD system. The research activity of the SSV was also interrupted several times. This situation was continued over three seasons from the 2011/12 surveys. The authors concluded that this represents a great loss for the Antarctic whale research and management under the IWC SC objectives.

**17.3 Review of new or continuing proposals**

*17.3.1 JARPA II*

In light of the announcement by Japan to cancel the JARPA II programme in the 2014/15 season in accordance with the 31 March 2014 Judgment of the International Court of Justice (ICJ), there was no discussion of JARPA II under this agenda item.

In the 2014/15 season, Japan will undertake a sighting survey in the Antarctic areas previously covered by the JARPA II activities.

*17.3.2 JARPN II*

The Committee was advised that following the 31 March 2014 Judgment of the ICJ regarding activities related to JARPA II, the Government of Japan voluntarily reviewed JARPN II. This voluntary review resulted in the reprioritisation of the research focus as well as recalculation of sample sizes to be pursued during the 2014 JARPN II survey.

Some members of the Committee recognised that substantial effort went into the design and planning of JARPN II. Changes in the allotment of lethal versus non-lethal approaches as well as recalculation of sample sizes may impact achieving the stated objectives of the JARPN II programme and that such changes must be accompanied by a scientific justification. Further, some members of the Committee expressed uncertainty about whether the stated changes represent a modification of the existing JARPN II programme or if this needs to be viewed as a 'new' programme.

In response, the proponents of JARPN II stated the overall objectives of the programme remain the same, focusing on the study of interactions between whales and fisheries in the coastal area and interactions among whale species in the offshore area as well as a contribution to the management of whales. The recalculation of sample sizes for target species was conducted to assess the appropriateness of the current target sample sizes (see below) and the non-lethal components of the programme were strengthened in order to address concerns raised by the ICJ in its consideration of JARPA II.

With respect to the 2014 JARPN II Offshore Component, keeping in mind the desire of the Government of Japan to balance scientific objectives with advice stemming from the ICJ decision, the following rationale was provided.

(1) Allocation of some samples to non-lethal means was decided by the Government of Japan based on advice/suggestions from the ICJ.
(2) Sampling of sperm and common minke whales was suspended because their role in the study of interactions between whales and fisheries in the coastal waters (a prime objective of the 2014 survey) seems to be limited.
(3) Sei whale sample size of 100 (as in the original plan, see below) of which 10 will be studied using only non-lethal methods.
(4) Bryde's whale sample size of 50 (as in the original plan, see below) of which 25 will be studied using only non-lethal methods. A larger number of Bryde's whales were allocated to non-lethal methods because they are better studied than sei whales through the *Comprehensive Assessment* and the *Implementation Review*.

(5) A study for verifying the feasibility of using non-lethal method will be carried out and results of the study could be reflected in the future research programmes.

With respect to the 2014 JARPN II Coastal Component, and keeping in mind the desire of the Government of Japan to balance scientific objectives with advice stemming from the ICJ decision, the following rationale was provided.

(1) Allocation of some samples to non-lethal means was decided by the Government of Japan based on advice/ suggestions from the ICJ.
(2) Minke whale sample size of 114 (57 in each of the spring and autumn season as recalculated with the latest information, see below) of which 12 (6 in each of the periods) will be studied using only non-lethal methods.
(3) A study for verifying the feasibility of using non-lethal method will be carried out and results of the study could be reflected in the future research programmes.

When developing the JARPN II research programme, sample sizes of target species necessary for the estimation of food consumption by cetaceans were calculated with the method employed under the Norwegian research (NMMRP, 1992) taking into account the following information derived from its past research.

(1) Composition of prey species (%).
(2) Average weight of each prey species in the stomach contents (kg).
(3) SD and CV of the compositions and weights.

Sample sizes were calculated with a condition that the stomach contents of a target prey species be calculated, with CV =0.2, for each year.

Re-calculation of the sample sizes for the 2014 JARPN II survey was made in the same manner as above while also incorporating the latest information derived from the ongoing JARPN II research. The results of these recalculations are as follows.

#### COASTAL COMPONENT

For Ayukawa (spring), a re-calculation of the sample size for minke whale was made for the main prey species (juvenile sand lance) with CV=0.2 for each year using the results of the latest JARPN II research (Coastal Component conducted in Ayukawa) in 2003-10. The result of the re-calculation was 57 (the average during the research period).

For Kushiro (autumn), a re-calculation of the sample size for minke whale was made for the main prey species (Japanese anchovy and walleye pollock) with CV=0.2 for each year using the results of the latest JARPN II research (Coastal Component conducted in Kushiro) in 2002-10. The results of the re-calculation was 50 for Japanese anchovy (2002-07) and 57 for walleye pollock (2008-10). Taking account the recent possible change of the distribution of prey species, the sample size has been set 57 for walleye pollock (the average during the research period).

#### OFFSHORE COMPONENT

For Bryde's whale, re-calculation of the sample size was made for the main prey species (Japanese anchovy and krill) with CV=0.2 for each year using the results of the latest JARPN II research (offshore) in 2000-12. The results of the re-calculation was 75 (the average during the research period).

For sei whale, a re-calculation of the sample size was made for the main prey species (copepods, Japanese anchovy and krill) with CV=0.2 for each year using the results of the latest JARPN II research (Offshore Component) in 2002-12. The results of the re-calculation was 135 (the average during the research period).

With respect to Bryde's and sei whales, the Government of Japan decided to maintain the sample sizes as originally calculated since recalculation for those species showed the need for substantial increases of sample sizes. The Government of Japan considered that such increases could be regarded as revisions of the programme and therefore should be examined after the due process including review of results that is planned in 2016 for the 2nd period of JARPN II (2008-13).

In discussion, the Committee **recommends** that the proponents of JARPN II develop a more comprehensive document for review at the 2015 Annual Meeting that details how the above recalculations of sample size and changes in allotments of lethal versus non-lethal methods fit with achieving the overarching programmatic objectives. This recommendation is made because the written information available to the Committee was not sufficient to evaluate whether the numbers of animals to be taken had been adequately justified in relation to the specific objectives of the research.

Further, the Committee recalled that the last JARPN II expert review in 2009 (IWC, 2010a) called for certain analyses to be performed to determine appropriate sample sizes for the JARPN II programme. The Panel concluded that it could not complete its review until this information (among other items) was supplied. The Committee (IWC, 2010b) subsequently expressed concern that the Panel was not provided with the information and guidance necessary to review programme progress and to draw conclusions regarding the appropriateness of programme sample sizes. The requested analyses were not performed and the review could not be completed.

Finally, some members of the Committee expressed concern that the effectiveness of non-lethal methods was directly related to effort. That is, non-lethal methods are likely to be more effective given a high level of effort and more likely to ineffective given a low level of effort. Given this concern, evaluating the utility of lethal versus non-lethal methods is not possible.

### 17.4 Work plan (and see Table 19)

*17.4.1 Planning for a periodic review of JARPN II*

According to the procedure outlined in 'Annex P', the JARPN II programme is due to a periodic review in 2016.

The next step of this review process (revised in accord with discussions under Item 27.2) is that the proponents make the data description document available two months before the next annual meeting. Requests for use of the data will be made one month in advance of the 2015 Annual Meeting. The data will be available in electronic form one month after the end of the Annual Meeting. Then the proponents will send a document to the Secretariat describing the analytical methods to be discussed at the Workshop. This will happen nine months prior to the next Annual Meeting; i.e. the beginning of September. Based on the description of analytical methods, the Steering Group (Chair, Vice Chair, Head of Science and the last four Scientific Committee Chairs) will begin the process of identifying experts to participate in the Workshop. Given his involvement in the programme, the Scientific Committee Chair, Kitakado, will not take part in the Steering Group. Palka (as immediate past Chair) will act on his behalf.

Japan announced that the Government of Japan will meet the necessary costs for organising the Workshop to be held in Tokyo in January/February 2016, which includes the cost for the meeting venue and other miscellaneous costs

Table 19
Overview of the tentative work plan as it relates to special permits.

| Species/area | Intersessional (2014-15) | SC/66a (2015) | Intersessional (2015-16) | SC/66b (2016) |
|---|---|---|---|---|
| New Japanese Antarctic proposal<br>Regular review of JARPN II | Follow 'Annex P' with Expert Workshop early 2015.<br>Submission of data description document two months before annual meeting and requests for access to data one month before meeting. | Review of Expert Workshop and comments by Committee.<br>Discussion of any data requests. | Depends on discussions at SC/66a.<br>Follow 'Annex P' with Expert Workshop early 2016. | Depends on discussions at SC/66a.<br>Review of Expert Workshop and comments by Committee. |

other than the travel/stay costs for the participants. Travel/stay costs for the participants at the Workshop (8-10 invited experts and a representative from the IWC Secretariat) are expected to be met by IWC.

The Committee **agrees** to submit a budget request for the 2015/16 intersessional period to cover the travel and stay of the expert panel (see Item 26).

*17.4.2 Planning for review of future Japanese Special Permit research in Antarctic*

Japan announced that the Government of Japan plans to issue a Special Permit for a new research programme in the Antarctic starting in the season 2015/16. Japan wishes this programme to be reviewed at the 2015 Annual Meeting, in accordance with 'Annex P'.

The new proposal will be reviewed under the process stipulated in the Annex P. Japan will submit a new proposal to the chair of the Scientific Committee no later than six months before the next Annual Meeting of the Scientific Committee in 2015 (October/November 2014). The proposal should then be reviewed by a small specialist Workshop with a limited but adequate number of invited experts. The Workshop should be organised at least 100 days before the Annual Meeting in 2015 (January/February 2015). Results of the Workshop should be duly submitted to the next Annual Meeting of the Committee in 2015 for its final review.

The Government of Japan will meet the necessary costs for organising the Workshop to be held in Tokyo in January/February 2015, which includes the cost for the meeting venue and other miscellaneous costs other than the travel/stay costs for the participants. Travel/stay costs for the participants at the Workshop are expected to be met by IWC.

The Committee **agrees** to submit a budget request for the 2014/15 intersessional period to cover the travel and stay of the expert panel (see Item 26).

## 18. WHALE SANCTUARIES[28]

The issues to discuss under this Item were to facilitate the decadal review of the existing Southern Ocean Sanctuary (SOS) and the review of the proposed South Atlantic Whale Sanctuary (SAWS). Kitakado read out instructions from the Chair of the Commission that the decadal review of the SOS and review of the proposal for SAWS should follow the existing instructions and guidance from the Commission for the review of Sanctuaries. The terms of reference for discussions this year are given in Annex R.

### 18.1 Preparation for the regular review of the Southern Ocean Sanctuary

The Chair of the Commission had noted in a letter to the Chair of the Committee that the Commission has not yet agreed scientific objectives for the Southern Ocean Sanctuary as requested through the 2004 review, but that these were expected to be discussed at the Commission meeting in September 2014. She suggested that the Committee may wish to commence its review process by assembling information necessary to establish scientific objectives. The Commission would then provide further advice regarding review of the Southern Ocean Sanctuary.

Some suggestions for the review process were presented in SC/65b/O01. This summarised the previous review of the SOS in 2004 and in particular noted the difficulties of conducting a review without fully specified objectives. In 2004 the Scientific Committee had developed a series of recommendations that, once the overall objectives of the SOS have been refined, would allow these objectives to be evaluated, and would facilitate evaluation in future reviews. These recommendations were endorsed by the Commission in 2004.

Based on the direction from the Chair of the Commission, the Committee **agrees** to establish an intersessional email group (comprising Zerbini [Chair], Bjørge, Donovan, Double, Fortuna, Hall, Jackson, Kitakado, Palka and Robbins) to assemble scientific information that might assist the Commission to establish scientific objectives for SOS. The review from 2004 will provide a useful background document for starting this work. Other relevant information on whales in the Southern Ocean had been compiled for the IWC-CCAMLR Workshop in 2008. The group should focus on existing information from the Committee's reports, assessments and National Progress Reports rather than seeking the latest updates from the many active national research programmes in the SOS area, which would be a major task. The report from the group should provide a summary of information on distribution, migration, current abundance, status and trends, threats, and catches by species/stock in the Southern Ocean Sanctuary. In addition, the report should **reiterate** the Committee's recommendations from the 2004 review to facilitate reviews of Sanctuaries and Sanctuary proposals (item B, numbers (1)-(7) in Appendix 1) and outline how the information provided relates to these recommendations. The report of this email group will be circulated for information of the members of the Committee and submitted to the Commission three weeks before IWC/65.

The Committee **agrees** that there was a need for more discussion of the review process. There were differing views on the merits of the proposals in SC/65b/O01 and the success of the process in 2004. The Committee **agrees** these discussions can better take place at the 2015 Annual Meeting following elaboration of objectives and guidance from the Commission.

### 18.2 South Atlantic Sanctuary proposal

The head of delegation for Brazil (Secretary of Biodiversity and Forests, Roberto Cavalcanti) summarised the proposal for a South Atlantic Whale Sanctuary (IWC/65/08rev1). He

[28]The Committee had established an *ad hoc* working group chaired by Zerbini and Hall to discuss this item at times when there were no other sessions taking place to allow full participation of those who wished to attend. It was agreed to incorporate the report of that group in full into the Committee's report here.

stressed that the IWC is not dealing with a new proposal and that the Commission had been considering this matter for more than a decade. During this period the amount of scientific research in the South Atlantic has increased and the new proposal reflects this. The new version of the proposal is intended to address the guidelines for reviews in Annex R. The SAWS proposal is consistent with modern and emerging management practices including protected areas, and provides an opportunity for countries with different management regimes to coordinate activities to address emerging issues. To give just one example, there are relatively few ports and generally low levels of ship traffic in the South Atlantic but this is set to expand considerably. The coordinated approach provided within SAWS will thus help to address existing and emerging environmental and anthropogenic threats such as shipping while finding a balance with the needs of conservation and industrial development. The primary goal of the SAWS is to promote the biodiversity conservation, non-extractive and non-lethal utilisation of whale resources in the South Atlantic Ocean. To achieve this goal, specific objectives are described in IWC/65/08rev1. The proposed SAWS is intended to promote cooperation well beyond the strict interpretation of preventing commercial direct takes from impacting cetacean populations, including support for the coordination between MPAs established at national levels or under other relevant international initiatives, such as the World Heritage Convention and UNESCO Man and the Biosphere programme.

Iñiguez noted that Argentina had been a proponent of SAWS with Brazil when it was presented for the first time 13 years ago. Later on South Africa and Uruguay also sponsored this proposal. The last review of the SAWS was in Ulsan, Korea in 2005 (IWC, 2006) and subsequently the proponents incorporated the changes requested by the Commission. He added that large whale species were exploited by commercial whaling in the South Atlantic until the mid-1980s. Hunting occurred along migratory routes in addition to feeding and breeding grounds, reducing some populations to very small numbers (e.g. Antarctic blue whales, southern right whales, and humpback whales). Even though whale populations are currently protected, they face other threats including ship strikes, emerging disease, pollution, hydrocarbon exploitation and exploration, entanglement and climate change. The Chairman's report of the Thirty-Fourth Annual Meeting identifies the prime objective of a sanctuary as a place where individual or groups of whale populations are protected from whaling for a specified period with additional objectives related to information and research interests. He noted that the objectives of the SAWS had already been outlined by Cavalcanti and that the SAWS will provide the framework to coordinate and cooperate on cetacean research, conservation and management in the South Atlantic. The proposal was being submitted to SC/65b in the hope that, consistent with its mandate and competences, the Scientific Committee will provide its contribution to improve the proposal as requested by Commission.

In discussion, some members noted that the measures contained in the proposed Schedule amendment that would establish the SAWS would only prohibit whaling. The amendment text does not include any of the other scientific objectives such as the coordination of research. The review of the Southern Ocean Sanctuary had been difficult because the objectives were not clearly specified. The lack of objectives within the proposed Schedule amendment text would make the SAWS difficult to assess following the terms of reference for the review process.

In response, it was noted that the Schedule amendment was just one of the points that needed to be addressed to establish the Sanctuary and that the Schedule contains those regulations applicable to whaling which are mandatory. Previous IWC reviews of sanctuaries had emphasised the need for clear objectives and the SAWS proposal had learnt from this by specifying detailed objectives.

In discussion of one of the primary objective of SAWS (maximise the rate of recovery of depleted whale populations towards their natural carrying capacity levels, and to monitor and maintain these populations at these levels), it was noted that further details of the monitoring plan were needed in order to evaluate whether the monitoring was likely to be successful in assessing whether the objectives had been achieved. In addition, changes to the environment, and particularly the impact of commercial fisheries, are likely to prevent whale populations recovering to natural carrying capacity, since this will have changed. The proposal should give more details of the proposed monitoring programme, including how carrying capacity will be assessed to take into account multi-species effects of mid-latitude fisheries.

In response, it was noted that the proposal mentions that carrying capacity will have been affected by human activities and therefore the objective is not necessarily to return to pre-whaling population levels. The way in which human impacts may have affected carrying capacity is complex and would need the kind of coordinated research outlined in the proposal to address these questions. For MPAs, this level of detail is generally developed once the MPA is established. The SAWS contains some of the best monitored whale populations in the world. The Committee could assist in helping to define objectives in relation to environmental change, and refine monitoring programmes, once the SAWS was in place and a monitoring framework had been established.

The proposal describes general features of critical habitat but it was suggested that insufficient detail was provided in order to provide advice on whether the sanctuary addresses the issue of critical habitat and non-critical whale habitat. The Committee **advises** that a revised proposal, with more detail on the issue of monitoring and objectives with respect to carrying capacity and on critical habitat, would assist with the review. The Committee would also **welcome** further details on how potential threats might be addressed in collaboration with other international bodies.

In 2004, the Committee agreed that the involvement of independent external reviewers in the review of the SOS had been largely positive and that involvement of external reviewers should continue, both for future reviews and reviews of future Sanctuary proposals. It was agreed that external experts should be involved in the SAWS review process but there were different views on the success of the process used to review the SOS in 2004. Some members noted that they did not support the method used in 2004 if the external reviewers operated independently from the Scientific Committee. Therefore, these members only support the use of external reviewers in the upcoming review of the SAWS if they work in conjunction with the Committee. It was suggested that the review process should be initiated with a Workshop or pre-meeting including selected invited experts and members of the Scientific Committee, followed by the review by the full Committee. The Committee **requests** further clarification from the Commission at IWC/65 on recommendations for the SAWS review process. Based on any advice from the Commission, the Committee could then finalise the details of the review process at the 2015 Annual Meeting such that the review can be completed at the 2016 Annual Meeting.

Table 20
Overview of the tentative work plan as it relates to sanctuaries.

| Task | SC/66a (2015 Annual Meeting) | SC/66b (2016 Annual Meeting) |
|---|---|---|
| Review of methods for reviewing sanctuary proposals and periodic reviews of existing sanctuaries | Receive and act in line with advice provided by the Commission at IWC/65. | Perhaps review how new process (if given) performs. |
| Periodic review of Southern Ocean Sanctuary | Receive advice from Commission on objectives. Finalise details of review process. | Finalise review. |
| Review South Atlantic Sanctuary proposal | Perhaps receive revised proposal. Finalise details of review process. | Finalise review. |

### 18.3 Work plan

The Committee developed a draft work plan, **recognising** that the work plan may be modified under new guidance from the Commission at IWC/65. The overview of future work on sanctuaries is given as Table 20.

## 19. SOUTHERN OCEAN RESEARCH PARTNERSHIP

The Scientific Committee received 22 documents detailing progress on the five major projects of the Southern Ocean Research Partnership (IWC-SORP). These included: (1) the Antarctic Blue Whale Project; (2) distribution, relative abundance, migration patterns and foraging ecology of three ecotypes of killer whales in the Southern Ocean; (3) the foraging ecology and predatorprey interactions between baleen whales and krill: a multiscale comparative study across Antarctic regions; (4) the distribution and extent of mixing of Southern Hemisphere humpback whale populations around Antarctica Phase 1: East Australia and Oceania; and (5) acoustic trends in abundance, distribution, and seasonal presence of Antarctic blue whales and fin whales in the Southern Ocean. All of these projects are still on-going and contributing to the work of five sub-committees and working groups. The Scientific Committee **welcomes** the scientific information contributed by on-going IWC-SORP research projects and **recommends** their continuation.

The Committee **expresses concern** that there are few funds remaining in the IWC-SORP budget, including the funds necessary to maintain centralised project coordination. It therefore **recommends** the continuation of a funded coordinator within IWC-SORP in order to sustain the momentum of this large collaborative research effort, to ensure the communication of high-calibre scientific research to the Committee, and to leverage future funding to the project (see Item 26). It also **urges** the Commission to review the funding status of IWC-SORP and to facilitate sustainable support for these long-term research initiatives.

## 20. IWC LIST OF RECOGNISED SPECIES

Mendez *et al.* (2013) described multiple lines of evidence to re-evaluate the genus *Sousa* and four species, one still un-named, were recognised. *Sousa* exhibit some of the greatest degrees of genetic differentiation yet observed in small cetaceans, indicating that migration events are either very infrequent or may no longer occur. The Mendez *et al.* (2013) re-evaluation was accepted by the Society of Marine Mammalogy (SMM) Taxonomy Committee and the Committee **agrees** that the IWC list of recognised species should be amended accordingly.

- *Sousa teuszii* (Kükenthal, 1892) Atlantic humpback dolphin.
- *Sousa chinensis* (Osbeck, 1765) Pacific humpback dolphin.
- *Sousa plumbea* (G. Cuvier, 1829) Indian Ocean humpback dolphin.
- *Sousa* un-named species from Australia[29].

The Committee **appreciates** the work of the SMM Taxonomy Committee and **agrees** that this should be reviewed annually in the context of the IWC list to keep them synchronised.

## 21. CONSERVATION MANAGEMENT PLANS

The Committee had discussed CMPs in the context of large whales last year (IWC, 2014d). This year, there was discussion of the concept of threat-based CMPs that they can apply to a single threat requiring international coordination and affecting multiple species or large habitats. The Committee **reiterates** its recommendation of last year for a review of the template and criteria to enable better consideration of the options for a threat based approach. The Committee **agrees** that the issue of marine debris is appropriate for consideration as a first threat-based CMP.

With respect to small cetaceans, the Committee **agrees** that CMPs for some threatened species and populations would be highly beneficial and would allow coordination of efforts. Their implementation is more problematic when species ranges are limited to a single country, as with the vaquita, Maui's dolphin and Yangtze finless porpoise. The situations of the boto and the franciscana might make them appropriate candidates to be suggested for CMP development.

## 22. UPDATED LIST OF ACCEPTED ABUNDANCE ESTIMATES

The Committee received an update on the work being undertaken by Allison to complete the list of accepted abundance estimates. A number of issues that require clarification had arisen during the year and it was agreed to establish an intersessional group to assist in this work (Allison, Brownell, Butterworth, Donovan, Gunnlaugsson, Kitakado, Palka, Wade, and Witting).

## 23. RESEARCH AND WORKSHOP PROPOSALS AND RESULTS

### 23.1 Review results from previously funded research proposals

Progress on Research Proposals and Workshops funded last year. For details see IWC (2014d), and carryovers from the previous year were primarily discussed in the appropriate sub-groups. Table 21 summarises the results of the items allocated funds under the 2013 Scientific Committee budget (IWC, 2014d, pp.66-70) plus one project that was originally funded in 2012. All projects were completed successfully and made a major contribution to the Committee's work (see

[29]The new species from Australia will soon be named and published. Therefore, both the scientific names and common names should be examined again at the next SC meeting.

Table 21
Progress on Workshop and research proposal agreed last year.

| Number | Title | Status |
|---|---|---|
| (16) from 2012 (IWC, 2013) | Review and guidelines for model-based and design-based line transect abundance estimates | Completed (SC/65b/RMP11) |
| AWMP-1 | AWMP Workshop on developing *SLA*s for the Greenlandic hunts | Completed (SC/65b/Rep06) |
| AWMP-2 | AWMP developers fund | Completed (SC/65b/AWMP03 and AWMP04) |
| BRG/AWMP/1 | Gray whale rangewide Workshop | Completed (SC/65b/Rep08) |
| BRG-1 | Southern right whale kelp gull Workshop | Workshop in August 2014 |
| E-1 | State of the Cetacean Environment Report (SOCER) | Completed (SC/65b/E01rev) |
| E-2 | POLLUTION 2020 | Completed (SC/65b/Rep05) |
| E-3 | Complete implementation of the CERD website | Ongoing |
| E-4 | Joint IWC/IQOE Workshop predicting soundfields-global soundscape modelling | Completed (SC/65b/Rep03rev) |
| E-5 | 2nd phase Workshop on marine debris | Workshop in August 2014 |
| HIM-1 | Ship strike data coordinator | Completed (SC/65b/HIM04-05, HIM09) |
| IA-2 | Statistical catch-at-age issues for further investigation | Completed (SC/65b/IA03) |
| IA-3 | 2014 IWC-POWER North Pacific survey | Completed (SC/65b/Rep01, Rep09, SC/65b/IA05, SC/65b/O11) |
| RMP-1 | Intersessional Workshop on North Atlantic fin whales | Completed (SC/65b/Rep07) |
| RMP-2 | Pre-meeting on North Atlantic minke *Implementation Review* | Completed (Annex D, Appendix 5) |
| RMP/AWMP/SD | Simulations to evaluate power and precision of genetic clustering at critical [demographic] dispersal rates | Completed (van der Zee and Punt, 2014, SC/65b/RMP05) |
| RMP/AWMP-1 | Joint AWMP-RMP Workshop on stock structure hypotheses for North Atlantic common minke whales | Completed (SC/65b/Rep04) |
| RMP/AWMP-2 | Computing support for RMP and AWMP | Completed (Annexes D and E) |
| SH-1 | Minimum abundance estimates of Breeding Stock D humpback whales | Ongoing |
| SH-2 | Modelling work to complete assessments of Breeding Stocks D, E and F | Completed (SC/65b/SH04rev) |
| SH-3 | Antarctic Humpback Whale Catalogue | Completed (SC/65b/SH03) |
| SH-4 | Comparison of JARPA II photographs to Antarctic Blue Whale Catalogue | Completed (SC/65b/SH20) |
| SH-5 | Southern Hemisphere Blue Whale Catalogue 2012/13 | Completed |
| SH-6 | Pre-meeting to complete the assessment of Breeding Stocks D/E/F | Completed (Annex H) |
| SP-1 | Expert Workshop to review JARPA II | Completed (SC/65b/Rep02) |

the relevant sub-group Annexes for details) apart from two Workshop that will be held after the close of this meeting (BRG-02 and E-05) and one project that is ongoing (E-03).

### 23.2 Review Workshop proposals for 2014/15

The Workshop proposals for the 2014/15 period are discussed under Item 26 and summarised in Table 22. The Committee **notes** that these Workshops are essential to it being able to meet its proposed two-year work plan discusses under Item 24.

## 24. COMMITTEE PRIORITIES AND INITIAL AGENDA FOR THE 2015 AND 2016 MEETINGS

Table 23 provides an overview of the main items for consideration based upon the work plans developed by the sub-groups and discussed in detail in their reports and in the relevant Items in this report. The Committee emphasises that much of its work is iterative and thus depends on progress made intersessionally and at Annual Meetings. The progress made is also integrally related to budget requests (see Item 26).

## 25. DATA PROCESSING AND COMPUTING NEEDS FOR 2014/15

Allison reported on the computing needs and requirements identified for the forthcoming year. These are summarised in Table 24.

## 26. FUNDING REQUIREMENTS FOR 2014/15 AND 2015/16

The Committee noted that this year it was expected to put forward a budget for a two-year period. In doing so it **draws the Commission's attention** to the unavoidable mismatch between the Scientific Committee year (May-June year 1 to May-June year 2), the Commission's biennial period (September year 1-September year 3) and the Commission's financial year (1 January-31 December). This makes planning rather more difficult, and is particularly difficult when the tasks undertaken are iterative i.e. the work needed in year 2 is heavily dependent on the results of year 1. This timing difference can be problematic if funded work is expected to be carried out in the period between the close of the Scientific Committee meeting and the adoption of the budget by the Commission which comes into force on the following 1 January (i.e. six months after the Committee meeting).

In response to discussions last year, the Committee discussed the process of developing a budget early in the Plenary. As part of that discussion it received a report from the Secretary on the background to the IWC process and comparative information from other organisations (SC/65b/SCP02) as well as other discussion papers (SC/65b/SCP03 and SCP04).

After some discussion, the Committee **agrees** to the process given in Annex S and summarised in Fig.4. The approach agreed for the intersessional period and next year, based upon the experience gained this year, is given under Item 27.3.

Using the approach in Annex S, and following up to step 4, the Committee **recommends to the Commission** the budget request shown in Table 25, following discussion within sub-groups and a suggestion from the Convenors that was adopted by consensus.

The Committee notes that *pro formas* for all of the funding requests received are available on the Scientific Committee website. The Committee **thanks** the Convenors (and especially the Vice-Chair) for their hard work in developing the proposed draft and for the explanatory text. As the expected budget of £315,800 was exceeded in 2014/15, the explanation for the proposed reduced budget is given below (by project order in relation to the table).

Table 22
Workshop proposals agreed during this meeting.

| | | | Up to SC/66a | | Up to SC/66b | |
|---|---|---|---|---|---|---|
| RP nos* | Title | Relevance | Date | Venue | Date | Venue |
| AWMP01 | AWMP Workshop to develop *SLAs* for the Greenland hunts | AWMP | ?6-10 January 2015 | Copenhagen | Early 2016 | Copenhagen |
| BRG03 | Workshop to forward the modelling process to understand the status of gray whales across the North Pacific | BRG, AWMP, E | 24-26 March 2015 | La Jolla | | |
| E07 | CERD pre-meeting | E | Prior to SC/66a | TBD | | |
| E08 | Investigations of large mortality events and mass strandings | All (incl. SM) | | | Late 2015 | San Francisco |
| EM02 | CCAMLR-IWC Workshop on the development and application of multi-species models to the Antarctic marine ecosystem: pre-meeting | EM | | | Prior to SC/66b | TBD |
| HIM02 | Preventing the entanglement of whales in fishing gear | HIM, COMM | | | April 2016 | TBD |
| IA01 | IWC-POWER planning and Technical Advisory Group meetings | IA, BRG, RMP | October 8-12 2014 | Tokyo | October 2016 | Tokyo |
| RMP02 | Evaluating abundance estimates: diagnostics and testing | All (incl. SM) | | | | |
| RMP03 | Workshops to further progress on the *Implementation Reviews* for the North Atlantic minke and fin whales | RMP, AWMP | ?16-20 February 2015 | Copenhagen | ?Spring 2016 | Copenhagen |
| SP01 | Workshop for periodic review of JARPN II | SP | | | Early 2016 | Tokyo |
| SP02 | Workshop on review of new Special Permit proposals | SP | Early 2015 | Tokyo | | |
| E06 | Climate change meeting | E | 19-20 August 2014 | Glasgow | | |

*The full proposals are available as numbered documents: SC/65b/AWMP-RP01, etc.

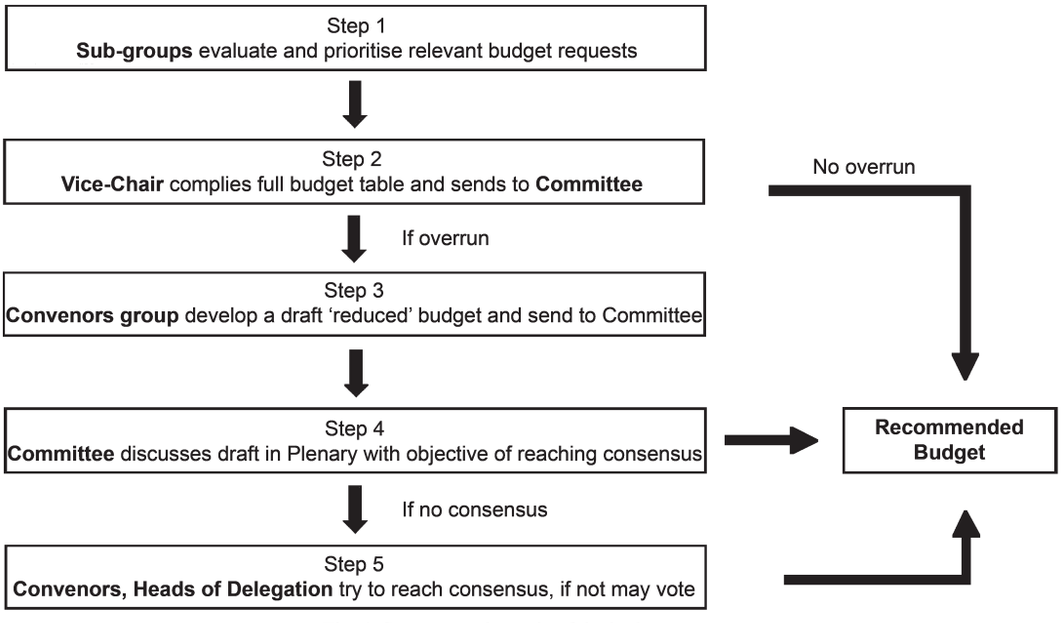


Fig. 4. Summary schematic of the budget process.

## 26.1 Rationale for the reduced budget items

### RMP-RP04. EVALUATION OF DENSITY DEPENDENCE PARAMETERS FOR INCLUSION IN RMP TESTING BASED ON ENERGETICS MODELLING

The Committee **agrees** that this project can be spread over two years with no impact on its outcomes. The results can thus be considered at the 2016 meeting.

### RMP-RP05. GENETIC ANALYSIS TO AID THE FORMULATION OF STOCK HYPOTHESES FOR PRE-IMPLEMENTATION ASSESSMENT OF NORTH ATLANTIC SEI WHALES

The Committee **agrees** that this has scientific merit. However, there had not been time for it to be fully discussed during the sub-committee meeting. The Committee **agrees** that a revised proposal be resubmitted for consideration next year with the possibility that funding may be allocated then, following the process agreed under Item 24.3.

### BRG-RP02. SOUTHERN RIGHT WHALE MORTALITIES AT PENINSULA VALDES: REQUESTED BUDGET FOR POPULATION AND HEALTH MONITORING RESEARCH

In discussing this project the Committee made two general observations.

(1) The Committee has always strongly encouraged long-term monitoring programmes and rec-ommended their continuation. However, given the nature of the Scientific Committee budget, its policy has been only to support such programmes financially if there was an emergency funding situation in a single year (as was the case for southern right whales off South Africa).
(2) This project is of importance for the Conservation Management Plan for South Atlantic right whales approved by the Commission through the Conservation Committee, which receives some partial funding through the CMP fund.

Table 23

Priorities for Committee work in 2015 and 2016.

| Topic | SC/66a (2015) | SC/66b (2015) |
|---|---|---|
| **RMP-related matters** | | |
| Evaluate energetics-based model | Review progress. | Review results. |
| Evaluate *CLA* performance | Review results when density-dependence acts upon natural mortality; evaluate Norwegian *CLA* proposal. | Complete if not done at SC/66a. |
| Other *CLA* related tasks | Review progress. | As above. |
| Abundance estimates | Hold pre-meeting on diagnostic software to assist in evaluating design-based estimates. | As above. |
| | Review results. | As above. |
| Common minke whales (WNP) | Review hybrid RMP variants and research proposals if submitted; agree abundance estimates for use in actual applications of the RMP. | Complete if not done at SC/66a. |
| Common minke whales (NA) | Assign plausibility to trials; review trial results; complete *Implementation Review?* | Complete *Implementation Review* (if needed). |
| Fin whales (NA) | Review trial results; assign plausibility; finish *Implementation Review*? | Complete *Implementation Review* (if needed). |
| Sei whales (NA) | Decide to initiate or not *pre-Implementation assessment*. | *Pre-Implementation assessment* (if agreed at SC/66a). |
| Bryde's whales (WNP) | Review new information. | Review new information. |
| **HIM-related matters** | | |
| Reviews of mitigation measures for ship strikes and entanglement | Produce simple summary information and advice table. | Finalise if not completed at SC/66a. |
| Entanglement | Continue to examine new information on rates, risks and mortality and provide advice. | Continue to examine new information. |
| Entanglement (support Commission initiatives) | Communication of key issues; advice for specific CMPs; review recommendations from workshop; work with other organisations. | Continue to support. |
| Ship strikes | Continue to examine new information on rates, risks and mortality and provide advice. | Continue to examine new information. |
| Ship strikes (database) | Update and improve database, including review process and criteria. | Continue. |
| Ship strikes (support Commission initiatives) | Communication of key issues; advice for specific CMPs; review recommendations from workshop; work with other organisations. | Continue to support. |
| **AWMP-related matters** | | |
| Validate *Humpback SLA* | Receive report formally. | No. |
| *SLA* for bowhead whales | Expect to finalise *SLA* recommendation. | Finalise *SLA* recommendation if needed. |
| *SLA* for common minke whales | Review progress; developers' work. | Hope to finalise *SLA*. |
| *SLA* for fin whales | Review progress. | Review progress; developers' work. |
| Annual review of catch limits | Complete. | Complete. |
| *Implementation Reviews* | None scheduled. | Prepare for gray whale *Implementation Review*. |
| **Whale stocks-related matters** | | |
| Antarctic minke whales | Try to finalise the in-depth assessment with a focus on the Indo-Pacific region. | Finalise if not completed at SC/66a and [consider how to] address the remainder of the Antarctic. |
| Southern Hemisphere humpback whales | Undertake review and synthesis of the completed 8-year circumpolar assessment; begin to evaluate data requirements and process for future assessments. | Complete evaluation and determine future work plan. |
| Southern Hemisphere blue whales (including pygmy blue whales) | Review available existing and new information on stock structure abundance etc. and determine feasibility of conducting area-based assessments with an associated work plan. | Depends on work plan developed in 2015. |
| North Pacific sei whales | Begin in-depth assessment. | Complete in-depth assessment. |
| North Pacific gray whales | See detailed work plan provided in Annex F. | Continue and possibly complete. |
| Southern right whales | Focus on reviewing new information, e.g. with respect to matters related to CMPs. | Continue to review new information and develop work plan with respect to future updated assessments. |
| North Atlantic right whales | Review new information; determine when to undertake a new assessment and develop work plan. | Depends on outcome of discussions in 2015. |
| North Pacific right whales | New information expected from the Sea of Japan/Kamchatka region; determine when to undertake an assessment and develop work plan. | Depends on outcome of discussions in 2015. |
| North Atlantic bowhead whales | Continue to review new information. | Continue to review new information and develop a work plan towards eventual assessment. |
| Okhotsk Sea bowhead whales | Review new information. | Continue to review new information and develop a work plan towards and eventual assessment. |
| Arabian Sea humpback whales | Review new information expected from several research initiatives. Continue to assist in efforts to develop a CMP. | Depends on outcome of discussions in 2015. |
| Sperm whales | Review information and develop a work plan. | Depends on outcome of discussions in 2015. |
| **Stock definition-related matters** | | |
| Terminology review and unit-to-conserve | Continue with a focus on examining terms used for small cetaceans; try to finalise an initial list for use by the Committee. | Finalise if not completed at SC/66a. |
| Updates to genetic data analysis and DNA data quality guidelines | This is part of maintaining an online and evolving set of guidelines. | Review to see if updates are required. |
| Statistical and genetic issues concerning stock definition | Continue to review technical issues regarding papers submitted to all sub-groups of the Committee. | Continue. |
| Testing of Spatial Structure Models (TOSSM) | Examine the future application of TOSSM datasets; advance the use of TOSSM to provide guidelines for setting subarea boundaries for assessment. | Continue based on discussions at 2015. |

**Cont.**

| Topic | SC/66a (2015) | SC/66b (2015) |
|---|---|---|
| **Environmental concerns-related matters** | | |
| POLLUTION 2020 | Refine population modelling approach; finalise priority contaminants list for future studies. | Continue to refine modelling approach; *in utero* transfer analyses and modelling. |
| Oil spills | Review new information. | Plan for an oil spill workshop. |
| Contaminant threat information | Focus sessions on regional trends and POPs in cetaceans. | Data integration and mapping. |
| CERD | Pre-meeting. Data input and website management. | Improved communications on disease issues. |
| Strandings and mortality events | Plan intersessional workshop; review new information. | Receive report of intersessional workshop; review new information. |
| Anthropogenic sound | Continue work on soundscape mapping; plan for 'masking' focus at SC/65b; review new information | Continue work on soundscape mapping; focussed sessions on 'masking'; plan for 'stress and sound' workshop; focus session on effectiveness of marine mammal observers in mitigation. |
| **Ecosystem modelling-related matters** | | |
| Co-operation on ecosystem model development | Discuss how best to further the long-term scientific exchange between IWC SC/EM and SC-CCAMLR WG-EMM. | Receive results of joint CCAMLR-IWC workshop and continue. |
| Processes in ecosystem model development | Receive results of IWC funded project to use tagging data to incorporate into models. | Review progress and continue. |
| Ecological change in the Southern Ocean | Review new analyses of the minke whale body condition and stomach content data to further examine temporal trends. | Continue if necessary. |
| Effects of long-term environmental change | Review work of intersessional group to determine suitable long time datasets and determine work plan. | Depends on discussions at SC/66a. |
| **Small cetacean-related matters** | | |
| Main topic to be decided by December 2014 | *Tursiops* systematic or regional assessment of the status of small cetaceans. | Depends on what happens in 2015 and the venue for 2016. |
| Voluntary Fund for small cetaceans conservation research | Continue. | Continue. |
| Review previous recommendations | Continue (priority will be given to vaquita, Hector's and Maui's dolphins, franciscana, beluga, river dolphins). | Continue. |
| Review on takes of small cetaceans | Continue. | Continue. |
| **Whalewatching-related matters** | | |
| Assess the impacts of whalewatching on cetaceans | This is the ongoing and primary topic. | Continue. |
| Review progress on the Commission's five-year strategic plan including the Handbook | As the Handbook is an online 'living' document then it is anticipated that this will be ongoing work although the initial work will be the most intense. | Continue. |
| Review work of intersessional steering groups | These are listed in Annex M, table 2. | Continue. |
| Review whalewatching in the region of the meeting | The next meeting venue is unknown but this is an ongoing item. | Continue. |
| Consider information from platforms of opportunity | Finalise standard elements and guidelines including data collection items to be hosted on the IWC website. | Review progress and modify if required. |
| Review whalewatching guidelines and regulations | Ongoing work –the most recent compilation is submitted to the IWC Secretariat and included on the IWC website. | Continue. |
| Emerging whalewatching industries of concern | Ongoing work. | Continue. |
| Progress on previous recommendations | Ongoing work. | Continue. |
| **DNA-related matters** | | |
| Progress on genetic methods | Ongoing work. | Continue. |
| Amendments to *GenBank* | Ongoing work. | Continue. |
| Progress on archiving of samples from catches and bycatches | Ongoing work. | Continue. |
| Reference databases and standards for diagnostic registers | Ongoing work. | Continue. |
| **Special Permit-related matters** | | |
| New Japanese Antarctic proposal | Follow 'Annex P' with expert workshop early 2015. | Review of expert workshop and comments by Committee. |
| Regular review of JARPN II | Consider requests for access to data. | Discussion of any data requests. |
| **Sanctuary-related matters** | | |
| Consider review methods | Receive and act in line with advice provided by the Commission at IWC/65. | Perhaps review how new process (if given) performs. |
| Periodic review of Southern Ocean Sanctuary | Receive advice from Commission on objectives; finalise details of review process. | Finalise review. |
| Review South Atlantic Sanctuary proposal | Perhaps receive revised proposal; finalise details of review process. | Finalise review. |

Table 24
Computing tasks for 2014/15.

**REVISED MANAGEMENT PROCEDURE (RMP) – GENERAL ISSUES**
(1) Evaluate the performance of the *CLA* for trials when natural mortality rather than fecundity is density-dependent (Annex D, items 2.3 and 2.4).
(2) Address the remaining tasks related to testing the *CLA* (Annex D, item 2.5).

**RMP – *IMPLEMENTATION*-RELATED MATTERS**
*North Atlantic fin whales*
(1) Assemble data for the combined sub-area EG+WI (stock structure hypothesis VII) (Annex D, item 3.2.1).
(2) Update the catch series to include incidental catches off Eastern Canada (Annex D, item 3.2.1).
(3) Finalise the initial validation of the code (Annex D, item 3.2.1).
(4) Continue to work towards conditioned *Implementation Simulation Trials* (Annex D, item 3.2.2).

*North Atlantic minke whales*
(1) Finalise the catch series (commercial and aboriginal) catch series (Annex D, item 3.3).
(2) Code finalisation and conditioning (Annex D, item 3.3).
(3) Conduct projections and circulate results (Annex D, item 3.3).

*North Atlantic sei whales*
(1) Summarise information on the distribution of sei whales from catch records (Annex D, item 3.4.2).

*Western North Pacific minke whales*
(2) Run 'hybrid' versions of RMP variants if requested by Japan, to allow evaluation of candidate 'variants with research' (Annex D, item 3.1).

**AWMP**
(1) Validate and confirm results for the *Humpback SLA*.
(2) Provide operating model to developers for common minke whales and possibly fin whales (See also related tasks under RMP).

**IN-DEPTH ASSESSMENT**
(1) Validation of the 2012 and 2013 POWER cruise data.
(2) Further validation and correction of IDCR/SOWER data if the problems are elucidated (Item 10.13.8).
(3) Complete validation of the 1995-97 blue whale cruise data and incorporate into the DESS database (carried over).

The Scientific Committee recognises the importance of CMPs and is pleased to provide scientific and technical advice on the relevant components of them. However, it notes that: (1) CMPs may have many scientific actions within them; and (2) that the number of CMPs is expected to increase. It **requests** that the Commission considers whether funding requests for scientific actions of CMPs, especially with respect to long-term programmes such as monitoring, are expected to be considered under the Scientific Committee's regular budget allocation. It notes that, if this is the case, then this may cause difficulties for the Committee to achieve its work plan in the future unless the regular budget allocation is increased.

The Committee recognises that the current worldwide economic situation can cause serious problems for long-term studies and monitoring programmes. It also recognises the present die-off situation in Peninsula Valdes. Recognising that the three components of the project (i.e. aerial survey, photo-identification and post-mortem inspections on stranded animals) also have a strong scientific importance and that their interruption could jeopardise the scientific objectives of the project, it is **agrees** to allocate the related amount for those components (£13,000) for 2015.

The Committee had considered the option to split the funding over two years but **agrees** that this was inappropriate as it would affect the aerial survey component and therefore the achievement of the scientific objectives of the project.

#### BRG-RP04 - IDENTIFICATION OF SNP LOCI IN GRAY WHALES USING NGS SEQUENCING APPROACHES AND GRAY WHALE SAMPLES FROM ACROSS THE NORTH PACIFIC

The Committee **agrees** that this proposal has scientific merit. However, there had not been time for it to be fully discussed during the sub-committee meeting. The Committee **agrees** that a revised proposal be resubmitted for consideration next year with the possibility that funding may be allocated then, following the process agreed under Item 24.3.

#### SH-RP07-SOUTHERN OCEAN RESEARCH PARTNERSHIP (IWC-SORP) COORDINATION

In discussing this proposal, the Committee made the following general observations.

(1) The nature of this proposal is somewhat different to proposals usually received by the Committee. The initial proposal appeared to be primarily an administrative role with a fund-raising component. After seeking clarification, it was found that some 90% of the proposed activities were more science-related. The Committee **seeks guidance** from the Commission as to whether this type of administrative request is appropriate for consideration under the regular Scientific Committee budget in the future.
(2) The Committee is also aware that the Commission has a voluntary SORP fund generously initiated by the Australian Government that may also be appropriate for this kind of request. The Committee **urges** other SORP member countries to consider additional voluntary contributions to that fund. It was noted that since its inception after a similar generous major contribution from Australia, the Small Cetaceans Voluntary Conservation Research fund has received some £170,000.

Having said that, the Committee **recognises** the valuable scientific work being undertaken as SORP projects (see Item 19) and the urgency of the situation (the coordinator contract will expire soon and there is little money in the SORP fund). It **agrees** to fund the 90% activities that are more science-related for the 2015 period on the expectation that further SORP funds will be generated during the 2015 period to pay for future years. The Committee notes that the Commission does not pay 'salary-on costs' so that these have been removed from the budget.

#### EM-RP01. USING BALEEN WHALE TAG DATA TO INFORM ECOSYSTEM MODELS

This is a voluntary rearrangement of the project budget over the two years. The total budget of the project remains unchanged.

#### E-RP06. CLIMATE CHANGE MEETING (AUGUST 2014)

This activity does not fall under the 2015-16 Scientific Committee budget. It is proposed that this is partially funded from a small projected underspend of the 2014 budget.

Table 25

Summary of budget requests for the 2014-16 period. For explanation and details of each project see text.

| RP no.* | Title | Relevance | 2015 | 2015 (reduced) | 2016 | 2016 (reduced) |
|---|---|---|---|---|---|---|
| AWMP01 | AWMP Workshop to develop *SLAs* for the Greenland hunts | AWMP | 7,000 | 7,000 | 7,000 | 7,000 |
| AWMP02 | AWMP developers fund | AWMP | 7,000 | 7,000 | 7,000 | 7,000 |
| BRG01 | Development of an sex- and age-structured population dynamics model for North Pacific gray whales | BRG, AWMP, E | 15,000 | 15,000 | 0 | 0 |
| BRG02 | Southern right whale mortalities at Península Valdés: population and health monitoring research | BRG | 20,000 | 13,000 | 0 | 0 |
| BRG03 | Workshop to forward the modelling process to understand the status of gray whales across the North Pacific | BRG, AWMP, E | 8,000 | 8,000 | 0 | 0 |
| BRG04 | Identification of SNP loci in gray whales using NGS sequencing approaches and gray whale samples from across the North Pacific | BRG | 0 | 0 | [11,000] | [11,000] |
| E01 | State of the Cetacean Environment Report (SOCER) | E | 3,000 | 3,000 | 3,000 | 3,000 |
| E02 | POLLUTION 2020 | E, SM | 4,000 | 4,000 | 2,000 | 2,000 |
| E02b | Contaminant status, trends and risk assessments in cetaceans | E | 0 | 0 | 5,000 | 5,000 |
| E07 | CERD pre-meeting | E | 5,000 | 5,000 | 0 | 0 |
| E08 | Investigations of large mortality events and mass strandings | All (incl. SM) | 5,000 | 5,000 | 0 | 0 |
| EM01 | Using baleen whale tag data to inform ecosystem models | EM | 12,500 | 11,000 | 4,100 | 5,600 |
| EM02 | CCAMLR-IWC Workshop on the development and application of multi-species models to the Antarctic marine ecosystem | EM | 1,200 | 1,200 | 4,000 | 4,000 |
| HIM01 | Ship strikes database coordinator | HIM | 10,000 | 10,000 | 10,000 | 10,000 |
| HIM02 | Preventing the entanglement of whales in fishing gear | HIM, COMM | 0 | 0 | 10,000 | 10,000 |
| IA01 | IWC-POWER cruises 2015 and 2016 | IA, BRG, RMP | 36,000 | 36,000 | 36,000 | 36,000 |
| IA02 | Assessment modelling for In-Depth Assessments of Antarctic minke and North Pacific sei whales. | IA | 0 | 0 | 5,000 | 5,000 |
| RMP01 | Testing proposed new guidelines for evaluating spatial model-based and design-based abundance estimates | All (incl SM) | 2,200 | 2,200 | 0 | 0 |
| RMP02 | Evaluating abundance estimates: diagnostics and testing | All (incl SM) | 14,300 | 14,300 | 0 | 0 |
| RMP03 | Workshops to further progress on the *Implementation Reviews* for the North Atlantic minke and fin whales | RMP, AWMP | 7,000 | 7,000 | 7,000 | 7,000 |
| RMP04 | Evaluation of density dependence parameters for inclusion in RMP testing based on energetics modelling | RMP/EM | 12,000 | 6,000 | 0 | 6,000 |
| RMP05 | Genetic analysis to aid the formulation of plausible stock hypotheses for North Atlantic sei whales | RMP | 4,100 | 0 | 0 | 0 |
| RMP06 | Essential computing support to the Secretariat for RMP | RMP | 10,000 | 10,000 | 10,000 | 10,000 |
| SC | Following up from Workshop recommendations | ALL | 0 | 0 | 20,926 | 31,160 |
| SH01 | Synthesis of the results of the comprehensive assessment of Southern Hemisphere humpback whales | SH | 1,000 | 1,000 | 1,000 | 1,000 |
| SH02 | Modelling support/Southern Hemisphere humpback whales | SH | 2,000 | 2,000 | 2,000 | 2,000 |
| SH03 | Research Contract 16, Antarctic Humpback Whale Catalogue | SH | 15,000 | 15,000 | 15,000 | 15,000 |
| SH04 | Southern Hemisphere Blue Whale Catalogue | SH | 15,000 | 15,000 | 18,300 | 18,300 |
| SH06 | Priority tasks to support the regional conservation effort of Arabian Sea humpback whales | SH | 14,573 | 14,573 | 17,290 | 17,290 |
| SH07 | Southern Ocean Research Partnership (IWC-SORP) coordination | SH, IA, SM | 17,596 | 13,000 | 17,734 | 0 |
| SP01 | Workshop for periodic review of JARPN II | SP | 0 | 0 | 23,000 | 23,000 |
| SP02 | Workshop on review of new Special Permit proposals | SP | 13,000 | 13,000 | 0 | 0 |
| WW01 | Emerging whalewatching industry in Oman | WW | 3,850 | 3,850 | 3,450 | 3,450 |
| - | Invited Participants | All | 76,000 | 76,000 | 76,000 | 76,000 |
| **TOTAL REQUEST 2014-16** | | | **341,319** | **318,123** | **315,800** | **315,800** |
| **Project to be considered for 2014** | | | | | | |
| E06 | Climate change meeting | E | 6,000 | 4,000 | | |
| **Projects to be considered in the 2016-18 period** | | | | | | |
| E03 | Sound field mapping in data-poor and data-rich priority regions | E/HIM | | | | |
| E04 | Masking and ship noise | E/HIM | | | | |
| E05 | Anthropogenic noise and stress | E, SM, BRG, SH | | | | |
| **Unsolicited project that would need to be resubmitted correctly** | | | | | | |
| SH05 | Photo-identification analysis of blue whales from the newly discovered foraging ground in the South Taranaki Bight (NZ) | SH | 1,300 | 0 | 0 | |

*The full proposals are available as numbered documents: SC/65b/AWMP-RP01 etc.

#### SH-RP05. PHOTO-IDENTIFICATION ANALYSIS OF BLUE WHALES FROM THE NEWLY DISCOVERED FORAGING GROUND IN THE SOUTH TARANAKI BIGHT (NZ)

This Committee **agrees** that this project falls under the category of an 'unsolicited' research proposal and had not therefore complied with the correct process (IWC, 1996b). It **agrees** that it should be resubmitted following the appropriate mechanism and timetable (see Item 24.3).

### 26.2 Summary information on all proposals received

#### (1) AWMP-RP01 WORKSHOP ON DEVELOPING *SLA*S FOR THE GREENLAND HUNTS FOR BOWHEAD, MINKE AND FIN WHALES

The Commission has requested that the Committee provide it with aboriginal subsistence *Strike Limit Algorithms* (*SLA*s) for use by 2018, i.e. the Committee must target being able to recommend *SLA*s to the Commission by no later than the 2017 Annual Meeting. The Committee has identified completion of the development of long-term *SLA*s for these hunts as high priority work. In order to meet the proposed timeframe, an intersessional Workshop is required. The focus of the proposed Workshop is to: (1) review the performance statistics and plots for revised candidate *Strike Limit Algorithms* for bowhead whales off West Greenland; (2) identify a work plan to which will allow the Committee to recommend a *Strike Limit Algorithm* for this hunt; (3) review the performance of initial candidate *Strike Limit Algorithms* for minke whales off West Greenland and advice on how these *SLA*s can be adjusted to perform better; and (4) review a draft trials structure for fin whales off West Greenland which can be used to evaluate *SLA*s for this hunt.

The Workshop will be held in early 2015 in Copenhagen, Denmark. It is intended to hold this back-to-back with the RMP Workshop on fin whales to save travel costs given some common participants.

#### (2) AWMP-RP02 AWMP DEVELOPERS' FUND

The developers fund has been invaluable in the work of *SLA* development and related essential tasks of the SWG. It has been agreed as a standing fund by the Commission. It has been proved to be of great value in ensuring progress throughout the *SLA* development period for the Alaskan and Chukotkan hunts as well as recent work on the PCFG and Greenlandic hunts, including the completion of the *Humpback SLA* at the present meeting. The primary development tasks now facing the Committee are for the remaining Greenlandic fisheries.

#### (3) BRG-RP01 DEVELOPMENT OF AN SEX- AND AGE-STRUCTURED POPULATION DYNAMICS MODEL FOR NORTH PACIFIC GRAY WHALES

This proposal is essential to the work plan agreed by the sub-committee on BRG for gray whales and it is connected to the Workshop proposal SC/65b/BRG-RP03. SC/65b/BRG01 presented to this meeting provides an outline of simple modelling framework based on the discussions at the Workshop and explains how it could be implemented for hypothesis 3a. The aims of this project are to implement the model of SC/65b/BRG01, and to extend this model to include age- and sex-structure and apply it to the data available for the North Pacific gray whales. The results of the modelling will be presented to a planned intersessional Workshop (scheduled for April 2015), the model specifications and data updated based on the outcomes from the Workshop and results presented to the SC/66a.

#### (4) BRG-RP02 SOUTHERN RIGHT WHALE MORTALITIES AT PENÍNSULA VALDÉS: POPULATION AND HEALTH MONITORING RESEARCH (AND SEE ITEM 26.1)

The high mortality of right whales at Península Valdés prompted the IWC Scientific Committee to convene a Workshop of specialists in Puerto Madryn, Argentina in March 2010 (IWC, 2010b for further details). In fact, the mortality reported for 2012 at Peninsula Valdés (116 dead whales including 113 newborns) is the highest mortality ever recorded for the species. Among the actions agreed in the Conservation Management Plan (CMP) for southern right whales, top priority was given to 'ensure long-term monitoring of abundance, trends and biological parameters' (objective MON-01) and to 'develop and implement a strategy to minimise kelp gull harassment' (objective MIT-02).

The objective of this proposal was to request funds for the continuation of four research programmes and projects, in order to understand the effects of the increased mortality rates on the population dynamics and to make progress to address the kelp gull harassment issue in the context of the current southern right whale die-off at Península Valdés.

#### (5) BRG-RP03 WORKSHOP TO FORWARD THE MODELLING PROCESS TO UNDERSTAND THE STATUS OF GRAY WHALES ACROSS THE NORTH PACIFIC

This work is an integral part of the assessment process set in place by the Committee last year. It is of particular importance to: (1) the assessment of the status of gray whales in the North Pacific (BRG); (2) the management of subsistence whaling in the North Pacific in conjunction with the work of the AWMP SWG; (3) the evaluation of threats to gray whales in the North Pacific and the determination of future management advice (BRG); (4) the provision of advice in accord with the Commission's Arctic Workshop (E); (5) the western gray whale Conservation Management Plan endorsed by the Commission. This technical Workshop will review the results of the work of Punt (BRG-1) and the Steering Group with respect to modelling the situation of gray whales across the North Pacific. It will *inter alia* review trial structure, conditioning and initial model results from age-aggregated and age-structured models and work towards incorporating any new data obtained as part of the work plan. The results of this Workshop will be presented to SC/66a.

#### (6) BRG-RP04 IDENTIFICATION OF SNP LOCI IN GRAY WHALES USING NGS SEQUENCING APPROACHES AND GRAY WHALE SAMPLES FROM ACROSS THE NORTH PACIFIC (AND SEE ITEM 26.1)

One of the recommendations made at the Rangewide Workshop on gray whales (SC/65b/Rep08) was to develop a panel of Single Nucleotide Polymorphism (SNP) markers for use with gray whales. This project proposal (2016 budget) aims to: (1) utilise next generation sequencing approach to identify a panel of SNPs for use with gray whales; and (2) conduct genotyping by sequencing for 200 samples from three. Expected outcomes are: (1) assessment of population structure of gray whales utilising SNPs; and (2) results can be compared to those generated using microsatellites to evaluate whether both approaches provide consistent results.

#### (7) E-RP01 SOCER REPORT

SOCER is a long-standing effort to provide information to Commissioners and Committee members on environmental matters that affect cetaceans in response to several Commission resolutions. Funds are for salaries, library services, and printing. The focus topic for 2015 will be the Pacific Ocean, and the Arctic Ocean in 2016, together with a section on issues of global concern.

#### (8) E-RP02 POLLUTION 2020

POLLUTION 2000+ has been a flagship programme of the Committee and the Commission has supported it and continued work on pollution in several Resolutions.

POLLUTION 2020 is in effect Phase III of POLLUTION 2000+. POLLUTION 2020 will focus on the biennium 2015-16 on three objectives. (1) To prioritise a list of 'contaminants of concern' for cetaceans (2015 activity) through a questionnaire to a range of acknowledged experts in the field to identify which contaminants are of highest priority and should thus be the focus of future modelling efforts. The output will be the collated results of the survey, with a prioritised tabulation of the listed contaminants. (2) To carry out a literature review and construct a database of appropriate dose-response relationships for the priority chemicals identified in (1) above (2015 activity). The output will be a database of dose-response relationships (in the form of a set of concentration-response functions with associated variability estimates) for the highest priority contaminants, where appropriate data are available. (3) To clarify the areas of uncertainty in the sPOCk population model already developed last year in terms of the amount of contaminants transferred from the female to the foetus *in utero* (2016 activity). The output will be an estimate, with uncertainty, of the proportion of contaminants transferred to the offspring *in utero*. This will replace the current single arbitrary point estimate of 0.6.

#### (9) E-RP02B CONTAMINANT STATUS, TRENDS AND RISK ASSESSMENTS IN CETACEANS

This item addresses the agenda item on Pollution and builds upon the work undertaken by POLLUTION 2000+ to provide an analysis of the trends and status of contaminants of concern in cetaceans globally. Its objectives are: (1) to collect status and trends contaminant data of cetaceans globally through country/region points of contact that were identified as part of POLLUTION 2000+ work (IWC, 2010b) - this will be accomplished through a focus meeting at the 2015 Annual Meeting and cetacean contaminant data available for use in trend and status analyses will be identified by 2016; and (2) to collate data and evaluate comparability of data sets among nations/regions/studies, including geospatial analyses to determine areas or species of concern and assess health and risks to cetaceans. This activity will occur intersessionally and be presented at the 2016 Annual Meeting.

#### (10) E-RP03 SOUND FIELD MAPPING IN DATA-POOR AND DATA-RICH PRIORITY REGIONS (AND SEE ITEM 26.1)

This project aims to assess the feasibility of sound field mapping in data-poor and data-rich areas. This project will follow two approaches: (1) in a high priority region where limited or no sound mapping products exist, preliminary regional to ocean basin scale mapping products should be produced - baseline status and trend analyses should be conducted in these regions, and where there is limited collection of acoustic data, efforts to obtain this data should be expanded; and (2) in a region(s) with high quality data to support high resolution predictive sound mapping, case studies should be conducted quantifying uncertainty in predicted sound levels, model sensitivity to varying input parameters, and ideally, verification or comparison of model results with empirical data.

#### (11) E-RP04 MASKING AND SHIP NOISE (AND SEE ITEM 26.1)

'Masking' will be considered as either a one-day pre-meeting or a focus area at a future Scientific Committee meeting (biennium 2017-18), with a particular emphasis on theoretical and field studies to assess how anthropogenic noise could mask biologically important signals used by cetaceans for vital life functions.

#### (12) E-RP05 WORKSHOP ON ANTHROPOGENIC NOISE AND STRESS (AND SEE ITEM 26.1)

In recent years, there has been a growing recognition that anthropogenic noise can cause physiological stress in marine mammals. This is an active research area, but much of the specialised research results have not yet been presented to the Scientific Committee. The proposal will be for an IWC-hosted intersessional Workshop on noise and stress during the biennium 2017-18.

#### (13) E-RP06 CLIMATE CHANGE MEETING (AND SEE ITEM 26.1)

The IWC Scientific Committee Steering Group meeting on Climate Change is intended to facilitate the ongoing work by the Scientific Committee on climate change. The meeting would review the topic, including the latest work from other IGOs (for example by the Convention for Migratory Species, IUCN and ACCOBAMS) and the latest pronouncements from the IPCC and produce a proposed process for the future engagement in this topic by the SC. The meeting will be held in conjunction to the International Marine Conference occurring in Glasgow in August 2014.

#### (14) E-RP07 CERD PRE-MEETING

Objectives of this 1-day pre-meeting of the Cetacean Emerging and Resurging Diseases (CERD) working group will be: (1) to review website progress; and (2) to develop plans for future work on cetacean emerging and resurging diseases including the possibility of health mapping and consistent reporting standards. This will be held prior to the 2015 Annual Meeting.

#### (15) E-RP08 INVESTIGATIONS OF LARGE MORTALITY EVENTS AND MASS STRANDINGS

The Workshop will bring together biologists, veterinarians, and stranding network investigators from various countries to facilitate the collaboration and coordination between national and regional programmes on responses to and investigations of unusual or large scale mortality events, mass strandings, and disease events. The goals of the Workshop are: (1) to establish common terminology; (2) to facilitate consistency in investigation techniques; (3) to identify common issues and share information on potential solutions relative to causes, responses, and mitigation; and (4) to promote international data sharing and mutual aid particularly for mass strandings and large mortality events. The final agenda will finalised intersessionally and discussed at the 2015 Annual Meeting. This 3-day Workshop will be by invitation and will be held in conjunction to the 2015 Biennial Meeting of the Society for Marine Mammalogy (SMM) in San Francisco, CA. Its final report will be presented at the 2016 Annual Meeting.

#### (16) EM-RP01 USING BALEEN WHALE TAG DATA TO INFORM ECOSYSTEM MODELS

A central focus this year was discussing methods to model competition and competitive interactions between whales. Within this project preliminary analysis on fine-scale and satellite tag data will be conducted and this information will be used to develop individual-based models of cetacean foraging and generate specific hypotheses regarding competition between species from fine-scale foraging observations. The project objectives are: (1) estimates of feeding costs for a range of baleen whales species; (2) measures of how feeding costs change as a function of prey density; (3) analysis of movement patterns, habitat use and foraging bout duration from satellite-linked tags using state-space models. Objectives 1 and 2, including reports to the Committee will be completed by 1 June 2015. Objective 3, including reports to the Committee and manuscript submission will be completed by 1 June 2016.

**(17) EM-RP02 CCAMLR-IWC WORKSHOP ON THE DEVELOPMENT AND APPLICATION OF MULTI-SPECIES MODELS TO THE ANTARCTIC MARINE ECOSYSTEM**

The Joint CCAMLR-IWC Workshop on the development and application of multi-species models to the Antarctic marine ecosystem aims to foster collaboration between the two Committees in the development and application of multi-species models to the Antarctic marine ecosystem. The outcome from the Workshop will be a set of specific and detailed proposals on the way forward in regard to both data collection and analysis, so as to move towards the development of tactical multi-species/ecosystem models of pertinence to the provision of scientific advice which addresses the objectives of both Commissions. It is proposed that this two-day Workshop is convened in advance of the 2016 Annual Meeting.

**(18) HIM-RP01 SHIP STRIKE DATABASE COORDINATOR**

The ongoing development of the IWC ship strike database requires data gathering, communication with potential data providers and data management. Coordinators were appointed last year and the Committee agreed this should continue and a list of tasks was developed. It relates directly to the Commission's Conservation Committee working group on the topic.

**(19) HIM-RP02 PREVENTING THE ENTANGLEMENT OF WHALES IN FISHING GEAR**

This Workshop responds directly to recommendations made in two previous Commission Workshop reports and is of interest to the Commission's Working Group on Whale Killing Methods and Associated Animal Welfare Issues. Its overall objective is to identify methods and encourage further research into ways to prevent the entanglement of large whales; the funds here are for the scientific component of the topic. Detailed Terms of Reference will be finalised at the 2015 Annual Meeting of the Scientific Committee. The scientific output will inform a series of technical recommendations and policy advice to allow the Commission to develop a work programme to prevent entanglement.

**(20) IA-RP01 2015-16 IWC-POWER NORTH PACIFIC SURVEY**

The Committee has strongly advocated the development of an international medium- to long-term research programme involving sighting surveys to provide information for assessment, conservation and management of cetaceans in the North Pacific, including areas that have not been surveyed for decades. The Committee has developed objectives for the overall plan and this money will fund the continuing work initial phase and progress on developing the medium-term phase. The amount of money is extremely small when seen in the context of Japan providing the vessel and associated costs for two years as it has in the past. The IWC contribution is for: (1) IWC researchers and equipment; and (2) to allow the Committee's Technical Advisory Group to meet to review the multi-year results thus far and develop the plans for the next phase of POWER based on the results obtained from Phase I; and (3) to enable analyses to be completed prior to the 2016 Annual Meeting.

**(21) IA-RP02 ASSESSMENT MODELLING FOR IN-DEPTH ASSESSMENTS OF ANTARCTIC MINKE AND NORTH PACIFIC SEI WHALES**

During 2015, the Committee will be starting an In-Depth Assessment of the North Pacific sei whales and will also be completing the In-Depth Assessment of the Indo-Pacific Antarctic minke whale. The project involves developing population dynamics models as required to progress the work of the In-Depth Assessment sub-committee. The funds of this proposal will then be used between the 2015 and 2016 annual Scientific Committee meetings to implement the assessment model (including statistical catch at age assessment model for Antarctic minke whales) and conduct the runs. Results, including software and associated data files used to create the assessments, will then be submitted to the Committee during the 2016 Annual Meeting.

**(22) RMP-RP01 TESTING PROPOSED NEW GUIDELINES FOR EVALUATING SPATIAL MODEL-BASED AND DESIGN-BASED ABUNDANCE ESTIMATES**

This pre-meeting is relevant to all groups of the Scientific Committee. It is the point of delivery for intersessional work which comprises proposing updated guidelines (see RMP-2) for evaluating design- and (spatial-)model-based abundance estimates, and developing software for a diagnostic check on design-based estimates that have applied when the underlying criteria are not strictly met. The main objectives are: (1) to test the proposed new guidelines (see RMP-2) against several test cases of model-based abundance estimates made specifically for and during the Workshop; (2) to demonstrate and discuss the proposed diagnostic software with a wider Committee audience involved in basic line-transect abundance estimation. This will be a 2-day pre-meeting prior to the 2015 Annual Meeting by invitation only for objective (1) and the start of objective (2); and a half day on the first day of the 2015 Annual Meeting for delivery of objective (2) open to more general SC audience.

**(23) RMP-RP02 EVALUATING ABUNDANCE ESTIMATES: DIAGNOSTICS AND TESTING**

Abundance estimates are central to the Committee's work. Spatial modelling is a powerful tool for abundance estimation which, in principle, can: (1) be used in many cases where design-based estimates are inappropriate; (2) overcome some bias associated with uneven survey coverage; and (3) deliver more stable CVs than a standard design-based analysis even when the latter is appropriate. However, spatial modelling requires expertise both to use and to assess. Hence it is important to have clear guidelines both for assessing new abundance estimates made specifically with spatial models, and for handling the situation where a simple design-based estimate has been applied without its assumptions being met; in this latter case some diagnostic software is desirable. The general idea is that surveys with dense and evenly-distributed coverage should readily pass the diagnostic tests, whereas surveys with low or badly imbalanced coverage should raise a flag. Deliverables include software (R package of automated diagnostics based on results of automated trial fits of spatial models), Workshop preparation and delivery (see SC/65b/RMP-RP01), and proposals for new guidelines in the form of a paper to the 2015 Annual Meeting.

**(24) RMP-RP03 WORKSHOPS TO FURTHER PROGRESS ON THE IMPLEMENTATION REVIEWS FOR THE NORTH ATLANTIC MINKE AND FIN WHALES**

Objectives of these back-to-back Workshops are for fin whales: (1) review the conditioning of the initial trials; (2) update the specifications of the trials by defining a full set of sensitivity tests and (3) specify the management variants to consider intersessionally for fin whales. For common minke whales they are: (1) to review the conditioning of the trials; and (2) specify the management variants to consider intersessionally for common minke whales. The outcomes will be: (1) if all the trials for the minke whales can be conditioned successfully, the Committee should be in a position to complete the *Implementation Review* of the North Atlantic minke whales at the 2015 Annual Meeting; (2) if all the initial trials for the fin whales can be conditioned successfully, the Committee should be in a position to finalise

the trial specifications for the North Atlantic fin whales at the 2015 Annual Meeting and complete the *Implementation Review* at the 2016 Annual Meeting. The proposal includes contingency funding for additional Workshops in early 2016 in the event that it is not possible to complete the *Implementation Reviews* for North Atlantic minke and fin whales in 2015. This will be a five-day Workshop held in March 2015 in Copenhagen.

**(25) RMP-RP04 EVALUATION OF DENSITY DEPENDENCE PARAMETERS FOR INCLUSION IN RMP TESTING BASED ON ENERGETICS MODELLING (AND SEE ITEM 26.1)**

The Committee has recognised the importance of the relationship between $MSYR_{1+}$ and $MSYR_{mat}$ in an RMP context and has agreed that it is desirable to explore the relationship arising out of the energetics-based model results further. This work is necessary before any conclusions or the need for additional RMP/*CLA*-related trials are considered. To this end the Committee developed a two-year work plan and this project addresses three elements of that work plan.

**(26) RMP-RP05 GENETIC ANALYSIS TO AID THE FORMULATION OF PLAUSIBLE STOCK HYPOTHESES FOR NORTH ATLANTIC SEI WHALES (AND SEE ITEM 26.1)**

A Steering Group has been given the task of investigating the feasibility of conducting a *pre-Implementation assessment* of North Atlantic sei whales. The further genetic analysis identified in this project will aid the formulation of plausible stock hypotheses for this species. A total of 172 samples from the Eastern, Central and Western North Atlantic have been identified, the analysis of which is likely to inform on potential stock structure. The project involves the generation of ddRAD-based SNP genotypes from the available tissue samples by the Marine Evolution and Conservation Group at University of Groningen in the Netherlands.

**(27) RMP-RP06 ESSENTIAL COMPUTING FOR RMP**

This is to provide essential assistance to the Secretariat with the large computing tasks it is facing in the coming year (see Item 25).

**(28) SC FOLLOWING UP FROM WORKSHOP AND COMMITTEE RECOMMENDATIONS**

This is a new budgetary line necessary in the second year (2016) of the Scientific Committee biennial budget to accommodate additional work that is generated by meetings, Workshops and projects funded and concluded in the first year (2015). This budgetary line can also accommodate new project proposals generated during the 2016 Scientific Committee meeting.

**(29) SH-RP01 REVIEW AND SYNTHESIS OF THE RESULTS OF THE COMPREHENSIVE ASSESSMENT OF SOUTHERN HEMISPHERE HUMPBACK WHALES**

This project will provide a summary overview of results arising from the Comprehensive Assessment of Southern Hemisphere humpback whales, in three parts: (1) assessment of findings by breeding sub/stock; (2) identification of data gaps during the assessment process (including recommendations for future work); (3) methodological developments in terms of analysis and other informative parameters over the period of the assessment (e.g. direct integration of mark recapture into models, $N_{min}$ etc.).

**(30) SH-RP02 MODELLING SUPPORT/ SOUTHERN HEMISPHERE HUMPBACK WHALES**

This project will undertake modelling studies to assist the development of future syntheses of assessments of Southern Hemisphere humpback whales and optimised monitoring of these populations. It will contrast the relative information content of alternative data monitoring approaches to inform on the reliability of current predictions of population trends (and hence on the appropriateness or otherwise of the present population modelling framework).

**(31) SH-RP03 RESEARCH CONTRACT 16, ANTARCTIC HUMPBACK WHALE CATALOGUE**

The Antarctic Humpback Whale Catalogue (AHWC) collates photo-identification information from Southern Hemisphere humpback whales. Increasing awareness of the project among research organisations, tour operators and other potential contributors has widened the scope of the collection; research efforts in areas that had not previously been sampled have extended the geographic coverage. The AHWC has doubled in size in the past five years and grown by more than 10% in the past year, substantially increasing the time required to analyse photographs. In addition to these requested IWC funds, additional funds from other sources will be sought.

**(32) SH-RP04 SOUTHERN HEMISPHERE BLUE WHALE CATALOGUE 2012/2013**

The Southern Hemisphere Blue Whale Catalogue (SHBWC) is an international collaborative effort to facilitate cross-regional comparison of blue whale photo-identifications catalogues. In 2006, the Committee agreed to initiate an In-Depth Assessment of Southern Hemisphere blue whales and in 2008, it endorsed a proposal to establish the SHBWC. Currently the SHBWC holds photo-identification catalogues of researchers from major areas off Antarctica, Australia, Eastern South Pacific and the Eastern Tropical Pacific. Results of comparisons among different regions in Southern Hemisphere will improve the understanding of population boundaries, migratory routes and model abundance estimates. In addition, assessment of blue whales and estimates abundance of populations will require improving software capabilities to access encounter histories of individuals.

**(33) SH-RP05 - PHOTO-IDENTIFICATION ANALYSIS OF BLUE WHALES FROM THE NEWLY DISCOVERED FORAGING GROUND IN THE SOUTH TARANAKI BIGHT (NZ)**

This project falls under the category of 'unsolicited project' and should be resubmitted according to the existing Scientific Committee Rules of Procedure.

**(34) SH-RP06 PRIORITY TASKS TO SUPPORT THE REGIONAL CONSERVATION EFFORT OF ARABIAN SEA HUMPBACK WHALES**

This project will help further two priority activities that were identified by the Committee for the improving conservation and research of Arabian Sea humpback whales for which the Committee has expressed serious concern in the past. These priorities are: (1) genetic analyses of archived samples; and (2) Kutch and Saurashtra coasts of Gujarat, India Exploratory Surveys. Reports will be submitted to the 2015 Annual Meeting and will be used to examine the funding requested for 2016.

**(35) SH-RP07 SOUTHERN OCEAN RESEARCH PARTNERSHIP (IWC-SORP) (AND SEE ITEM 26.1)**

The Southern Ocean Research Partnership (IWC-SORP) was endorsed by the IWC in 2009 and is now fully part of the IWC process. The Partnership includes 11 member States. SORP delivers Southern Ocean whale research, fully aligned with IWC priorities, and benefits from large scale collaboration. Approved funding is to employ an IWC-SORP coordinator for the period of one years (without ineligible local taxes and benefits) to: (1) ensure, facilitate and implement continued delivery of high calibre science; (2) ensure the communication of high-calibre scientific

research to Scientific Committee, IWC and the wider scientific community; and thus; (3) sustain the momentum of the collaborative research effort; and (4) leverage future funding for IWC-SORP.

#### (36) SP-RP01 EXPERT WORKSHOP TO REVIEW JARPA II

The Committee has agreed a procedure for periodic and final reviews of results from Special Permit research (IWC, 2013h). This procedure outlines an intersessional review meeting by an expert panel in accordance with the 'Annex P' process agreed by the Commission. The report from the intersessional expert meeting will be reviewed and discussed at the 2015 Annual Meeting. The experts to the review Workshop will be identified by September 2014 and the expert Workshop will be convened during four days in February/March 2015. The requested funds are for travel for the invited experts.

#### (37) SP-RP02 WORKSHOP ON REVIEW OF NEW SPECIAL PERMIT PROPOSALS

Japan announced that the Government of Japan will issue a Special Permit for a new research programme in the Antarctic starting in the season 2015/16. Japan wishes this programme to be reviewed at the 2015 Annual Meeting, in accordance with the 'Annex P' process agreed by the Commission. In accordance with the provisions for the review process stipulated in the Annex P, Japan will submit a new proposal to the chair of the Scientific Committee no later than six months before the next Annual Meeting of the Scientific Committee in 2015 (October/November 2014). The proposal should then be reviewed by a small specialist Workshop with a limited but adequate number of invited experts. The Workshop will be held in Tokyo in January-February 2015.

#### (38) WW-RP01 EMERGING WHALEWATCHING INDUSTRY IN OMAN

The goals of this three year project (2014-16) are to improve, educate and stimulate the emerging cetacean watching industry in Oman, especially in areas where Arabian Sea humpback whales are sighted. The ultimate outcome is to raise the standards of cetacean watching tourism in Oman in order to actively support conservation of cetaceans and their habitat by: (1) maximising industry benefits; (2) enhancing industry standards; (3) minimising impacts to cetaceans; and (4) obtaining information on cetacean distribution and occurrence. The main task for Years 2 and 3 (2015 and 2016) is to promote a responsible and sustainable approach to dolphin/whale watching. This will be achieved by: (1) continuing hands-on training of operators by area and priority species; (2) identifying a liaison among operators who will represent the industry to continue to monitor guidelines and compliance; (3) continuing to support the data collection process during training exercises to increase knowledge of cetacean occurrence for science and management; and (4) discussing the development of a cooperative of operators with mutual benefit to all members.

### 26.3 Unspent and unallocated budget monies

Over the years, the money allocated to Scientific Committee work has inevitably been based on requests that involved a degree of 'informed guesswork' when putting together proposals. Previously, in the Commission's accounts this money had been held with the expectation that it might be spent in the future but these assumptions were unfortunately not reviewed annually. In the last 12 months, the Secretariat has been carefully reviewing and updating its financial procedures. This has now enabled detailed information on status of all IWC projects including those taking place through the Scientific Committee budget. This review has provided an accurate estimate of the extent of any monies remaining unspent from previous allocations.

Whilst the annual average may not seem so large, this has generated a large total amount of no longer allocated funds over the last ten years amounting to £135,000. This amount has arisen from a combination of underspends (some 'small' from overestimating IP costs at workshops, some 'large' from cruise participants being funded in kind therefore not requiring the grants that had originally been budgeted for) and from projects where funding was originally allocated, postponed and ultimately did not take place (e.g. some Workshops). The £135,000 does not include money that is for ongoing projects earmarked for spending in the next two years but not yet completed.

Improved procedures are now in place so that in future each research budget item code will be reviewed biennially such that large amounts cannot accumulate. A document will be presented to the Scientific Committee showing the actual amounts allocated to a project, spent at the time the document is compiled and projected to be spent by the end of the financial year.

The Bureau of the Commission has indicated that there will be a discussion of how to deal with this unallocated amount at the Annual Meeting in September 2014. There are a number of possibilities. For example, it may be considered that the Commission funds particular items, not absolute amounts – it therefore follows that underspends should be returned directly to the Commission's general funds. Alternatively, there may be a view that these funds were allocated to the Scientific Committee and that they should be used primarily for scientific work. The unallocated monies relate to work similar to that now being carried out by the Committee. Clearly, how to deal with this is a Commission decision.

However, it seems appropriate for the Committee to provide some views on how the matter might be dealt with to assist the Commission in its discussions. One suggestion by the Committee and a variant on that is provided below.

The Committee's requirements can vary considerably from year to year depending on its work plan and priorities – in most years the desired budget has exceeded the amount of funds expected to be received but the extent of the difference vary considerably ranging from around £20,000 to as much as around £180,000 last year.

The Committee **fully recognises** the current economic situation and also **recognises** its responsibility to ensure that funded work is directly relevant to its agenda and work plan as agreed by the Commission. It therefore does not seem appropriate to suggest that all of the money should be allocated to the Scientific Committee to spend in a short time period. The principle that expenditure should be on value-for-money projects that directly support the Committee's ability to meet its agreed work plan and supply the best advice to the Commission remains.

The Committee therefore **respectfully suggests** that one option for a portion of the unallocated money could be for a special fund (say £50,000) to be established that would be available for the Committee[30] in addition to the money available through the Commission's regular budget (at present £315,800) to assist with the yearly variations in requirements. This money could only be used if the regular

[30]And the responsibility of its Chair in accordance with recommendations from the full Committee.

allocation was exceeded, and then only for essential work deemed necessary to meet the Committee's two-year work plan. The fund could be topped up in the future in the event of any future underspends.

A second option or variant upon the first option is relevant if the Commission agrees that it is appropriate for the Committee to receive the full £135,000 allocation. Under this option, the full allocation could be 'protected' within the overall Commission budget. The first option could be maintained but the special fund could be 'topped up' to the chosen level (say £50,000) as necessary. The money would then provide assistance to the Committee over a long time period.

## 27. WORKING METHODS OF THE COMMITTEE

### 27.1 Increasing the support of the Scientific Committee on conservation-related issues

A review of Scientific Committee Reports (1986-2012) regarding conservation-related issues is shown in SC/65b/SCP01. Of 3,259 statements within the Committee's reports, the authors classified 76% as *scientific statements*, 10% as *conservation statements*, while *management* and *administrative* statements represented 7% each (see tables 2 and 3 in SC/65b/SCP01). In addition to this, the authors also examined qualitative aspects in the wording of the reports that could be improved in relation to the strength, clarity or absence of statements. With respect to funding requirements, the paper classified a large proportion (62%) of the funding as directed towards scientific research, 18% as related to management and 11% as related to administrative matters, mainly IPs. It assessed that only 9% has been allocated to scientific work with a conservation perspective (fig. 5 of SC/65b/SCP01). The work of the sub-committee on small cetaceans was not included in these analyses because funding for this sub-committee has come exclusively from the Small Cetacean Voluntary Fund. This funding source varies significantly from year to year and cannot be considered as a stable fund.

A number of recommendations were proposed including:

(1) clearly and consistently highlight conservation concerns that can improve and support the IWC conservation work or as guidance for Range States;
(2) including clear statements to point out the delicate conservation status or increasing risk for cetaceans;
(3) reiterate previous statements where necessary;
(4) include a summary of the status of the species/subspecies/population and the action needed;
(5) whenever there is no agreement among SC members over an important discussion, properly highlight the issue in the report;
(6) increase the funding allocated for conservation-oriented research, such as investigation of conservation or mitigation measures;
(7) include the budgetary needs of the standing sub-committee on small cetaceans into the general Committee budget;
(8) consolidate the mandate of the standing sub-committee on small cetaceans by agreeing the terms of reference;
(9) consider making the results of IWC workshops more accessible; and
(10) make an annual compilation of concerns and recommendations to be forwarded by the Secretariat to Contracting and non-contracting Governments, intergovernmental organisations and other entities to be considered in the development of national and regional cetacean action plans as appropriate.

In addition, it was noted that the topics for the Scientific Committee in its Rules of Procedure have not been updated for many years and it was suggested that these should be updated, and based on this review the Commission may wish to consider amending the Terms of Reference of the Scientific Committee.

In conclusion the authors noted that implementing these recommendations would make an important contribution to the long-term survival of cetacean species, sub-species and populations, where it is most needed.

The Committee **thanks** the authors for the extensive review, recognising that the system for classifying statements, actions and funding was inevitably somewhat subjective. In discussion a number of points were raised. Some members broadly supported the document and its recommendations. Other members commented in particular that the Committee works hard to cover a broad range of topics, most of which are aimed at assessing and improving status, taking into account the many different kinds of potential threats to cetaceans. They did not believe that it was helpful to try to separate out concepts of 'conservation' and 'management' or suggest that they were conflicting within the work of the Scientific Committee. They referred to a number of international definitions that treated sustainable use and associated management as part of 'conservation'. They also noted the value of collaboration among scientists who might be described as working mainly on 'management' or mainly on 'conservation' under the terms as defined by the authors, to improve both conservation and management. In response, it was argued that while both terms looks to maintain viable cetacean populations, currently the Committee includes under agenda items 'management advice' and 'conservation advice' and that the differences between them is clear, being one aimed to direct takes of cetaceans while the other aimed to the rest of the threats.

With respect to small cetaceans, it was noted that although its budget was not included in the general budget request table of the Committee, the information was available within the reports. In particular, since the initial large donation from Australia, the fund had received some additional £170,000 in voluntary donations and had supported some excellent projects. The difficulties within the Commission over competency and small cetaceans are well known and resolving this is a matter for the Commission itself. In response it was noted that there is less stability when relying on a voluntary fund.

In conclusion, while different points of view had been expressed, the Committee broadly agreed with the need to:

(1) work carefully to ensure consistency and clarity over its recommendations especially those the expressed concerns over status and threats that required action by the Commission and others;
(2) improve communication with the Commission and others regarding the recommendations and concerns within its reports;
(3) keep track of recommendations and ensure that they are referred to and/or repeated as necessary;
(4) make workshop reports more accessible; and
(5) consider updating the 'specific topics of current concern' in its Rules of Procedure as had also been suggested in the review of other organisations produced by the Secretary (SC/65b/SCP02).

The Committee noted that the Secretariat is working to improve communications about all aspects of the Commission's work including that of the Scientific

Committee, especially by improving the website. It has introduced the concept of news boxes on specific topics and that will include the work and report of the Scientific Committee. In addition, it had started to build up a series of webpages dedicated to workshops to make their conclusions and advice more accessible. It also annually develops a list of work actions for the Committee members, Secretariat and intersessional groups based on recommendations in the Committee's report and this could be expanded or a separate table be developed to refer to all recommendations.

The Committee **agrees** to keep this item on its agenda.

### 27.2 Data access under Annex P

In the run up to the JARPA II review, a request for access to the data was made as specified in Annex P through Data Access Protocol B. Unfortunately this process proved to be more time consuming and difficult than expected. This situation was caused by a number of different issues including: time zone differences; time for official response from data owners (according to Annex P allows up to 15 days which can become problematic if an exchange of views is required[31]); better guidance on the level of detail required in a proposal; availability of DAG members (e.g. holidays, fieldwork, etc.).

After a discussion amongst DAG members and representatives of data requesters and data owners on this specific case), a proposal for a way forward in regard to improving the efficiency of the process was developed as outlined below. The Committee **agrees** that this is trialled from now, noting that further improvements may be made in the light of experience.

(1) Annex P specifies that a data description document is required at the Annual Scientific Committee Meeting prior to a review. This deadline should be advanced to **two months** before the Scientific Committee meeting. The preliminary data description document (which *inter alia* needs to broadly contain the types of data and the approximate sample size) will then be circulated to members of the Committee. The date for the final data description document remains as in Annex P (i.e. one month after the Scientific Committee meeting to allow for final checking of sample sizes etc.)
(2) Members who wish to develop analyses for the review should then develop those requests for data access for submission as a document to the Scientific Committee **four weeks** before the Scientific Committee meeting. This will allow other members of the Scientific Committee (including the data holders) to consider alternative analyses.
(3) Requests will then be considered at the Scientific Committee Meeting. Initially, data requesters, data owners and the DAG can discuss the request early in the Meeting. This will provide opportunities for clarification and possible amendment of proposed studies. If there is disagreement over (e.g. whether analytical methods are appropriate and within the terms of reference of the Workshop), this will be referred by the DAG to the appropriate sub-committee or an *ad hoc* group. In the hopefully rare event that disagreement remain after the sub-group discussion, then the DAG will be authorised to take the final decision on the request. Data forms and requests can then be signed/authorised at the meeting.
(4) In order to enable the DAG to function if one or more members are unavailable, the membership of the DAG (currently Chair, vice-Chair and Head of Science) will be expanded to include the Chair of the Scientific Permit working group and the Chair(s) of the most relevant sub-group(s). Any decisions (which should be few in view of the approach outlined above) can be taken with a quorum of three.
(5) While Committee members can still submit requests after the meeting in accordance with the existing timeframe in Annex P, they should be aware that the process may take a longer time and the request may not be accepted.

This process requires only minor amendments to the existing process. The revised Annex P process is given as Annex P.

### 27.3 Improving the Scientific Committee budget review process

Following the development of the budget as described under Item 26, the initial feedback on the experiences from various sub-groups showed how complex (and time-consuming) agreeing and prioritising items for the Scientific Committee budget can be.

The primary function of the Scientific Committee budget is to allow the essential work to take place that the Committee needs to fulfil its work plan as agreed by the Committee. It is not intended to be seen as a 'research fund' in the usual sense of the term. Should the Commission wish to establish a traditional research fund then it would be appropriate for this to dealt with outside the Scientific Committee's regular budget and handled in a similar way to the Small Cetaceans Voluntary Fund.

In order to facilitate discussions next year on the budget process and build upon this year's experience, the Committee **agrees** to establish an intersessional Working Group (members: Kitakado, Fortuna [Convenor], Donovan, Double, Holm, Jackson, Rendell, Roel, Rojas-Bracho, Ritter, Víkingsson and Walløe).

That group will:

(1) receive comments from members on any aspect of the process received by 1 September 2014;
(2) review and as appropriate modify revised *pro formas* taking into account the discussions and experience this year by 1 November 2014 which will be placed on the IWC website and circulated to the Committee by 7 November 2014;
(3) develop a discussion document to be available at least one month prior to the 2015 Annual Meeting that includes suggestions/proposals on:
    (a) advice for the Committee and sub-groups on broad 'principles' with respect to examining proposals including: further clarifying what falls into category (c) type requests (see below); the factors to be taken into account when accepting and prioritising proposals of different types (workshops, research, databases etc.); the linkage between agenda, work plan, and budget requests; how to handle 'conflicts of interest'; where flexibility or discretion is appropriate; how to present the results in the report etc.
    (b) proposals or options on the overall process including prioritisation across sub-groups and presentation of the budget to the Commission; and

[31]For example, if the proposal contains unclear aspects, the data owner will reply asking to the DAG to obtain clarifications from the proponents; this can add additional 15-30 days between the first request of clarification and the final response by data owners, via the DAG. If further clarifications are requested this multiplies.

(c) other related issues that might arise out of discussions within the group and suggestions received under Item 1.

In addition, the Committee notes that the types of requests received by the Committee can considered to be of three broad types:

(1) proposals developed directly from discussions within sub-groups that are focused to allow fulfilment of the two-year work plan – examples include targeted workshops and any associated analyses/programming;
(2) ongoing issues that support the work of the Committee and for which data are freely available – this could include items such as databases, catalogues, IWC-designed multi-national long-term programmes; or
(3) research proposals, often for field work, that relate to broad Committee recommendations but do not arise directly out of a specific request from the sub-group during the Annual Meeting at which they are proposed, based upon its work plan.

Recognising that the borderline between the categories can be somewhat grey, the Committee notes that it has been receiving an increasing number that seem to fall into the last category. This is not to say that they are not a valuable contribution to the Committee's work but there has often been be insufficient time (or detail presented in the request) to review them properly in the way that they deserve either from a scientific perspective (can they deliver and are they value for money?) or a priority perspective (how essential are they to an agreed work plan?).

The Committee recalled that the Committee in the past developed an approach for what at the time were called 'unsolicited' research proposals (IWC, 1996b, p.227) i.e. proposals not directly requested by the Committee but of relevance to its work. However, no requests under this system have been received for some time as scientists are aware that there is rarely money left in the Committee's budget. The process requires early submission such that the proposals get reviewed by a smaller group who then report to the Committee – the Committee has the final say as usual.

In parallel with the intersessional working group proposed above, the Committee also **agrees**, on a trial basis for the next intersessional period, the following process (and see Fig. 5) for proposals fitting within category (3) above, including proposals identified under Item 26 this year.

(1) Proposals are submitted **3 months** in advance of the Committee meeting following a standard *pro forma* (see above).
(2) Within **two weeks** of receipt of the proposal, an intersessional review group (IRG) comprising the Chair, Vice-Chair, Head of Science and the most relevant convenor(s) to a proposal will agree two anonymous reviewers (with some experience of the IWC) for each proposal with instructions to comment **within six weeks** on the following aspects (taken from IWC, 1996b):

    (a) relevance to the work of the Committee;
    (b) scientific quality of the project;
    (c) scientific competence of the proposer(s);
    (d) likelihood of meeting its objectives;
    (e) feasibility of the proposed work schedule;
    (f) reasonableness of the budget; and
    (g) multinational context.

(3) The reviewers' comments will be sent to the proposers for comment when both are available and the proposer(s) will be given three weeks to respond.

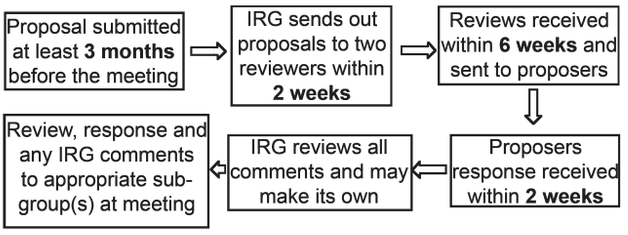


Fig. 5. Summary of the trial process.

(4) The reviewers' comments, the views of the proposers and any views of the IRG will be provided to each sub-group at the annual meeting whose views on the proposal are given to the relevant sub-group when discussing proposals and prioritised budget requests.

## 28. ELECTION OF OFFICERS

The Committee **welcomes** the fact that Kitakado and Fortuna have agreed to continue in their roles as Chair and Vice-Chair respectively. It notes that their three-year terms of office conclude at next year's meeting.

## 29. PUBLICATIONS

Donovan was pleased to report that the *Journal* was now set up to be completely online and free to access. This covers all stages of the review process from submission of manuscripts to publication. This allows papers to be made available immediately they have been accepted and pages finalised which will make the publication process much more efficient. He also noted that although the *Journal* will no longer be available in hard copy, members of the Committee attending Annual Meetings will continue to receive a hard copy of the Supplement as agreed last year. All of the published *Journal of Cetacean Research and Management* (i.e. since 1999) and all of the *Reports of the International Whaling Commission* (i.e. the 48 volumes pre-1999) are now available on the IWC website.

The Committee **welcomes** this news and **thanks** Donovan and his team for their efforts. They **reaffirm** the importance of the *Journal* to the work of the Committee and **encourages** continued submission of papers to the *Journal.*

Donovan also reported on progress with digitising the entire set of papers submitted to the Committee since 1950 with a view to making them available online. This work has been progressing starting with the most recent years and he was now pleased to report that the complete set (over 8,600 papers) has now been digitised. The Secretariat are now focussing on how best to make these available online – this work is ongoing and should be completed before the next Annual Meeting of the Committee. A similar exercise is ongoing for papers submitted to the Commission.

In discussion, it was noted that as part of making the papers online, it was important that the agreed statement[32] on unpublished papers be highlighted when people downloaded papers, i.e.:

> 'Papers submitted to the IWC Scientific Committee are produced to advance discussions within that Committee; they may be preliminary or exploratory. It is important that if you wish to cite this/a paper outside the context of an IWC meeting, you notify the author at least six weeks before it is cited to ensure that it has not been superseded or found to contain errors.'

[32] *http://iwc.int/scientific-committee-handbook#five.*

## 30. OTHER BUSINESS

There was no other business.

## 31. ADOPTION OF REPORT

The Committee adopted the report at 17:00hrs on 24 May 2014, apart from the final items discussed during the last session. As is customary, those items were agreed by the Chair, rapporteur and Convenors. The Chair thanked the participants for their positive and cooperative attitude, particularly given the sensitivity of some agenda items. He especially thanked the rapporteurs, Secretariat and Vice-Chair for their excellent assistance. Finally, he reiterated his thanks to the host Government and the hotel for the excellent facilities which contributed greatly to the success of the meeting. The meeting thanked the Chair for his expert and fair handling of the meeting.

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