The Committee thanked Cipriano for his work and **encourages** him to keep contact with NCBI in the next intersessional period to have further discussion and to make progress on the second proposed mechanism.

In response to a query the Committee was informed that over 250 problematic sequences were identified during the last full review of such issue in 2013 (IWC, 2014d), and these included situations where taxonomic usage had changed or was in flux, use of alternate synonyms for the same species, lack of identification to the subspecies level, and difficulties in identification to species of origin from sequence information alone.

Suggestions for additional improvements were made including adding mechanisms for detecting and correcting duplicate sequences from the same specimen, consistent inclusion of specimen numbers to allow cross-referencing, and noting geographic source of a specimen including latitude/longitude whenever possible.

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, 2012b, p.53) and the new format has worked well in recent 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 Annex N, appendices 2-4 for each country, respectively, covering the period up to and including 2014. The Committee thanked 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 microsatellites 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, item 8.

In response to a query it was clarified that strandings are not considered in the new standard format for the update of national DNA registries as these are not subjected to market operations.

The Group appreciated the efforts of Japan, Norway and Iceland in compiling and providing this detailed information of their registries.

16.5 Work plan

The work plan on general issues related to DNA testing is given as Table 21 (for details see Annex N). Budget implications are discussed under Item 26.

Table 21

Work plan on matters related to DNA testing.

Item	Intersessional period/groups	SC66b
Progress on genetic methods	(1) North Slope Borough workshop (2) Comparison of the methods presented in SC/66a/BRG12 to SNP assessment performed by ddRAD sequencing	Review progress and relevant documents presented to all sub-groups
Amendments to *GenBank*	Continued work on improving methods for amendment	Review progress
Archiving of samples	Continued work by relevant countries	Receive reports
Reference databases	Continued work by relevant countries	Receive reports

17. SCIENTIFIC PERMITS

17. 1 Review report of the NEWREP-A expert review workshop (SC/66a/Rep06)

Table 22

Summary of the objectives of NEWREP-A

1. Improvements in the precision of biological and ecological information for the application of the RMP to the Antarctic minke whales
- a. Abundance estimates taking into account g(0) and additional variance
- b. Improvements in precision:
  - i. age data
  - ii. refinement of SCAA model and estimation of biological parameters
- c. Refined stock structure hypotheses in Areas III-VI
- d. Specification of RMP ISTs for Antarctic minke whales

2. Investigation of the structure and dynamics of the Antarctic marine ecosystem through building ecosystem models.
- a. Krill abundance estimation and oceanographic observation

b. Abundance estimates for some cetaceans as input data for ecosystem modelling
c. Estimation of prey consumption by Antarctic minke whale and its nutritional condition
d. Spatial interaction among baleen whales (Ecosystem Modelling Part 1)
e. Investigation of ecosystem dynamics in the Antarctic Ocean (Ecosystem modelling Part 2)

17.1.1 Chair's summary

The expert panel (hereafter 'the Panel', chaired by Palka, was comprised of 5 current members of the Committee, 3 scientists who have never participated, 1 scientist who rarely participates in the Committee, and the Head of Science (in accord with the guidelines). Expertise in all areas of the research programme was available. Twelve papers were submitted to the workshop: the proponent's proposal, 6 papers by Scientific Committee observers, and 5 papers in response to the observer papers.

The review by the Panel was guided by Terms of Reference for reviews of Special Permit research proposals developed by the Scientific Committee (referred to as 'Annex P', IWC, 2015k, pp.349-53). It also agreed to take into account the instructions from the Commission to the Scientific Committee found in Resolution 2014-5. It followed the working practice of previous Panels in that there were open discussion sessions for presentations by the proponents and observers who had submitted papers, and closed sessions for the Panel to discuss the presentations and documents and write its report.

The Panel report (SC/66a/Rep6) is divided into sections broadly based on the terms of reference: consideration of objectives and sub-objectives and the relationship amongst them; methods to address objectives including consideration of non-lethal alternatives as appropriate, sample size estimation, effect of proposed catches upon the stocks, back-up pan for contingencies, provisions for cooperative research, and finally the conclusions and recommendations. Table 1 of the report summarised the recommendations, Table 2 summarised the Panel's views on matters related to Objective I and Table 3 summarised the Panel's views on aspects of Objective II.

(A) OVERALL CONCLUSION

The report provides 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 NEWREP-A proposal; its task was not to provide either a general condemnation or approval of research under special permit.

As its overall conclusion, the Panel recognised the considerable work that had been undertaken by the proponents in developing the NEWREP-A proposal. However, as detailed in the body of the report, the proposal contained insufficient information for the Panel to complete a full review. The Panel made a number of important recommendations for additional work that it believed to be essential to be completed before a full review of the programme under the Annex P and Resolution guidelines can be completed. It noted that the recommended analyses can be conducted with existing samples/data and new non-lethal sampling efforts.

With respect to timelines, the Panel recognised the value in maintaining long-term datasets. However, the Panel agreed that if there is a short (e.g. 2-3 year) gap in the existing series to enable the recommended analyses to be completed related to fully quantifying and prioritising sub-objectives and determining appropriate techniques (lethal or non-lethal), this will not have serious consequences for monitoring change. The Panel therefore agreed that the recommendations in Table 1 of its report should be completed and the results evaluated before there is a final conclusion on lethal techniques and sample sizes. This consideration does not affect the non-lethal components of the proposal, which can be undertaken without discontinuation of the current research. The Panel's view on the need for new samples and/or data, feasibility, relevance, and contributions to the RMP, scientific research and conservation and management for aspects of Primary Objectives I and II of NEWREP-A are summarised in Tables 2 and 3, respectively.

In summary, with the information presented in the proposal, the Panel noted that it was not able to determine whether lethal sampling is necessary to achieve the two major objectives; therefore, it concluded that the current proposal did not demonstrate the need for lethal sampling to achieve those objectives.

The sections below cover the aspects of the proposal in more detail in light of the Terms of Reference and the Resolution.

(B) PROGRAMME MANAGEMENT, RESOURCES, TIMELINES, FEASIBILITY (CONCLUSIONS AND RECOMMENDATIONS – ITEM 8.2[18])

While welcoming additional information provided during the Workshop, the Panel had noted that a revised proposal must provide more information on programme management, personnel and logistics, to enable it to evaluate this aspect of feasibility for such an extensive programme.

Following the reviews of previous Panels (for JARPN II and JARPA II), the present Panel also highlighted the importance of having sufficient resources allocated to modelling. This is especially important in responding to recommendations that will allow a full evaluation of the feasibility of meeting objectives within the timeframe and sample sizes, irrespective of whether lethal or non-lethal methods are used.

(C) CONSIDERATION OF OBJECTIVES (CONCLUSIONS AND RECOMMENDATIONS – ITEM 8.1; DETAILS ITEMS 2.1.2; 2.2.2,)

The objectives of NEWREP-A are summarised in Table 22 above. The Panel agreed that Objective 1 (Improvement in the precision of biological and ecological information for application of the RMP) was of general importance for conservation and management.

[18] In this Chair's summary, the item numbers in parentheses refer to the items in SC/66a/Rep06)

However, the proposal had not quantified the likely level of improvement which is a vital component for evaluating the proposal in terms of either the feasibility of meeting the objectives or appropriate sample sizes (irrespective of whether using lethal and/or non-lethal methods). The Panel recommended a quantitative method to accomplish this so that a revised proposal could be evaluated.

The Panel also agreed that Objective 2 (Investigation of the structure and dynamics of the Antarctic marine ecosystem through building ecosystem models) was an important area of research. It recognised that because this is a worldwide developing field of research, it was more difficult to evaluate feasibility of meeting the objectives and to determine appropriate sample sizes.

(D) METHODS INCLUDING CONSIDERATION OF NON–LETHAL ALTERNATIVES (CONCLUSIONS AND RECOMMENDATIONS – ITEM 8.1; DETAILS ITEMS 3.1.3, 3.1.5, 3.2.2, 3.3.4, 3.4.3, 3.5.3, 3.6.2, 3.7.2, 3.8.2, 3.9.3, 3.10.2, 3.11.2)

The Panel noted that the evaluation of lethal and non-lethal methods in the proposal and in one of the papers by the observers were largely qualitative. It advised that at least for Objective I, a quantitative approach to the different approaches could be developed using RMP *Implementation Simulation Trials*. The Panel report noted the complexities of a full evaluation of lethal and non-lethal methods that includes concepts of feasibility and validation. It also raises the issue of who is responsible for testing and validating new techniques. The Panel also stressed that for both objectives it is not how much methods reveal about individual metrics but how it contributes overall to the objectives.

The Panel noted that an essential component for several potential non-lethal alternatives is the collection of biopsy samples. It recommended the undertaking of a full field experiment to address this and the factors that must be involved. Several of its recommendations also involved analytical and laboratory work to validate proposed non-lethal alternatives and quantify uncertainties to enable full comparisons to be made (e.g. DNA – methylation techniques for age). It had noted that these could be undertaken using existing samples.

(E) SAMPLE SIZE (CONCLUSIONS AND RECOMMENDATIONS – ITEM 8.4; DETAILS ITEM 4)

The Panel had noted that the data for lethal sampling were proposed for a variety of purposes. Analytical calculations for each purpose with an integration of all for a full programme may be the ideal but is probably not possible in advance for a programme that includes modelling development (e.g. for Objective 2).

The Panel therefore concentrated on the approach used by the proponents to estimate the sample size for a particular purpose – to detect a change in age at sexual maturity (it noted that the proponents had not included a direct link from this to how it would improve conservation and management and recommended an approach to address this). The Panel welcomed the efforts of the proponents to provide a quantitative assessment of the necessary sample size but noted that assumptions made mean that the sample size was underestimated, perhaps considerably. Advice on an improved approach was provided – without this sample size could not be evaluated.

The Panel noted that samples sizes required to produce a specified improvement in the amount of management-relevant information should be undertaken for all aspects of the proposal (irrespective of whether lethal or non-lethal methods are used) to provide an overall view of sample size for the programme.

(F) EFFECT OF CATCHES UPON THE STOCKS (CONCLUSIONS AND RECOMMENDATIONS – ITEM 8.5; DETAILS ITEM 5)

The Panel agreed that given the estimated abundance of the stocks involved, the precautionary nature of the RMP and the nature of the sampling regime proposed, the conclusion (catches of 333 animals every second year in the two study areas will not harm the stocks) is very likely robust to either of the analytical methods used. However an improved approach was recommended.

(G) BACK-UP PLAN FOR CONTINGENCIES (CONCLUSIONS AND RECOMMENDATIONS – ITEM 8.6; DETAILS ITEM 6)

The Panel welcomed the recognition in the proposal of the importance for planning for unexpected disturbances. It noted that although the precise nature of such disturbances could not be known, analyses could be undertaken based upon past disruptions in order to develop contingency plans.

(H) PROVISION FOR CO-OPERATION (CONCLUSIONS AND RECOMMENDATIONS – ITEM 8.7; DETAILS ITEM 7)

The Panel welcomed the recognition in the proposal of the importance of collaboration but noted that at this stage there was insufficient information available on the potential extent and scope of collaborations with national and international scientific bodies. The Panel made recommendations in regard to *ad hoc* and formal types of collaboration. The Panel welcomed the stated intention to submit plans to CCAMLR for advice on the proposed krill research.

(I) RECOMMENDATIONS (ITEM 8)

It was noted that specific Panel recommendations are summarised in table 1 of SC/66a/Rep06. The table also identifies the purpose of the recommendations (e.g. to evaluate objectives, to evaluate feasibility of either lethal or non-lethal techniques, to evaluate whether lethal sampling is required, to evaluate sample size, to improve existing components), the timeframe assuming sufficient resources and whether new samples are required.

Palka completed her summary by noting that the Panel had concluded that additional work was required before a full review of any updated version of NEWREP-A could be completed and in particular before an evaluation of whether proposed objectives were achievable (whatever techniques, lethal or non-lethal were employed).

17.1.2 Committee conclusions on the report of the Panel

The Committee thanked the Panel for its hard work and extensive report. It noted that conclusions and recommendations of the Panel will form an important component of the Committee's review.

The Committee's overall conclusions on the NEWREP-A proposal can be found under Item 17.1.5. These take into account the Panel report, the response of the proponents (Item 17.1.3) and a Committee review of the proponents intersessional work (Item 17.1.4).

17.1.3 Response of proponents to NEWREP-A

SC/66a/SP1 provided the proponents' preliminary response to SC/66a/Rep 6 that had been submitted 40 days in advance of the Committee meeting. It contains two main sections: general comments in light of the Terms of Reference (TORs) of the review workshop prescribed in Annex P; and comments and responses to the conclusions and recommendations of the Expert Panel. The paper is summarised by the proponents briefly below.

With respect to the first TOR (comment briefly on the perceived importance of the stated primary objectives from a scientific perspective and for the purposes of conservation and management, noting particularly its relevance to the work of the Scientific Committee), the proponents believed that the Panel had acknowledged the reasonableness of both Main Objectives I and II.

Regarding the second TOR (provide advice and suggestions on components of the programme that might be achieved using non-lethal methods, including, where appropriate, power analyses and time-frames), the proponents noted that the Panel had agreed that at present, the techniques commonly used for the determination of biological parameters used in the proposed SCAA model require lethal sampling (earplugs for age determination, length and reproductive organs for sexual maturity). It also noted that two important inputs to multi-species modelling can potentially be obtained from lethal sampling; total consumption and prey preference.

Regarding the third TOR (determine whether the proposed field and analytical methods are likely to achieve the stated quantified objectives within the proposed time-frame, where appropriate, commenting on sample size and time-frame consideration), the proponents noted that the Panel had stated that determining the appropriate sample size for the complete programme, although desirable in principle, may not be possible in advance', that the broad approach taken with respect to ASM was not unreasonable and that the proponents had provided a more quantitative approach to examining sample size than in JARPA II. It had also welcomed the additional information on timeframes presented during the workshop that had not been provided in the proposal.

Regarding the fourth TOR (provide advice on the likely effects of the catches on the stock or stocks involved under various scenarios of length of the programme – this will include inter alia examination of abundance estimates provided and may involve a different analysis to that provided in the original proposal, including assumptions that short permit proposals may be projected further into the future), the proponents noted that the Panel had agreed that that the proposed catches in the two study areas will not harm the stocks.

Regarding the last TOR (review the proposed intermediary targets and suggest when an intermediate review or reviews should take place), the proponents noted that the Panel did not make a recommendation on the intermediary targets and the timing of intermediate review(s).

The proponents noted that the Panel had made a total of 29 recommendations. The proponents believed that these can be divided into two groups: (1) those relevant to a 'full evaluation of whether any new lethal sampling is required' and 'issues related to sample size' (13 recommendations); and (2) those not relevant to such issues (16 recommendations). The proponents consider that it is not necessary to address all the recommendations 'before there is a final conclusion on lethal techniques and sample sizes' as more than half of the recommendations are not related to issues on the necessity of lethal sampling and the reasonableness of the sample size. Among the recommendations that are classified in the former category above, the proponents consider that investigations in response to particular recommendations should be accorded the highest priority. These are recommendations 1, 11, 12, 13 and 26 in Table 1 of SC/66a/SP1. SC/66a/SP1SP1 provides detailed responses and a working timeframe for the 29 recommendations while SC/66a/SP8 details progress on work and results for the highest priority recommendations as well a detailed research plan for the dedicated sighting survey in the 2015/16 austral summer season.

The proponents consider that the Panel's conclusions and recommendations provided in Item 8 of SC/66a/Rep 6 appear to assume that the necessity of lethal sampling cannot be proven unless the feasibility studies of all of the conceivable non-lethal research techniques, both current and future ones, are completed and the conclusion is reached that none of the non-lethal techniques is a feasible alternative to lethal sampling. The proponents believe that a more reasonable approach is to determine the feasibility of non-lethal methods based on the scientific and technical knowledge available at present, and if deemed unfeasible, to initiate lethal sampling in the meantime while continuing feasibility studies on non-lethal methods on an ongoing basis.

Finally SC/66a/SP1 states that a consolidated Revised Research Plan for NEWREP-A will be prepared after this the present Committee meeting, taking account of the discussions at the meeting.

SC/66a/SP8, provided in accordance with the normal document rules for annual meeting papers, reported on updates of the analytical parts of NEWREP-A and a research plan for the dedicated sighting surveys in 2015/16 to respond to the relevant recommendations provided by the Expert Panel.

A total of five investigations (a-e) were conducted and reported in Annex 1 of SC/66a/SP8. Item (a) is documentation for describing a specification of the calculation used in analyses based on the statistical catch-at-age analysis (SCAA) model. Items (b) and (c) are exercises to investigate the nature of the SCAA model for Antarctic minke whales using existing data to assess how sensitive the SCAA results are to values of a biological parameter (the age-at-sexual maturity, ASM) and ecological assumptions (a stock boundary position). This exercise provides some information on the impacts of change in age-at-sexual maturity and the assumption concerning stock structure on the estimation of the population dynamics of Antarctic minke whales.

Item (d) is relevant to the proposed sample size for NEWREP-A. The NEWREP-A sample size was determined to achieve sufficient power to detect a future change of a specified size in the age-at-sexual maturity over a specified period of time. In the proposal for the plan, a simulation test was conducted under the assumption of a stable age distribution. However, the Panel recommended a more complex approach to estimate the necessary sample size (SC/66a/Rep06, pp. 31-2). The proponents' response is reported in SC/66a/SP8. The estimated statistical power from this new analysis was a little less than the statistical power reported in the original proposal of the NEWREP-A. Nevertheless, the authors believed that the proposed sample size of 333 guarantees reasonable power to detect a change in the age-at-sexual maturity over time.

Finally in Item (e), given the proposed sample size, the level of expected improvement in the precision of quantities estimated by the SCAA after the 12 year period of NEWREP-A was assessed. The results indicated that the future age-data are necessary to achieve reasonable precision for estimates of recruitment and recruitment rates. The authors considered that these results are a clear indication of the value of age-data to be obtained in NEWREP-A in understanding the population dynamics of Antarctic minke whales and hence improving their management, together with abilities to potentially detect the impact of climate change on this species.

The proponents noted that some analyses are still ongoing and these are planned to be completed before the start of the NEWREP research programme. Results from these analyses will be used to modify the plan of NEWREP-A as necessary.

Annex 2 of SC/66a/SP8 provided a detailed research plan for the dedicated sighting survey in the 2015/16 austral summer season, which incorporates several recommendations from the Panel. Because NEWREP-A is a multidisciplinary survey, Annex 2 provides a summary of activities not only for the sighting survey procedures including the research area, vessels, designs and guidelines for whale abundance estimation, but also includes details of krill surveys, oceanographic surveys, and feasibility studies for biopsy sampling and the telemetry experiment. Detail of the research area (Area V), specification of the vessels to be employed in the 2015/16 season, and tracklines with a combination of closing and IO modes are given. The correspondence between the proposed sighting survey design and the Committee's 'Guidelines for Conducting Surveys and Analysing Data within the Revised Management Scheme' (IWC, 2012d) is also provided in the document. The proposed NEWREP-A sighting survey also includes: (1) krill surveys with an echosounder system and net sampling; and (2) several feasibility studies for biopsy sampling for the Antarctic minke whales, as well as for a number of telemetry experiments.

17.1.4 Evaluation of the intersessional work undertaken by the proponents

A small working group was convened to evaluate the analyses provided in SC/66a/SP8 and additional work presented in Annex Q2-4, in the light of the Panel recommendations (Punt – chair, Butterworth, Cooke, de la Mare, Kitakado, Matsuoka and Palka) and its report is given as Annex Q1. It provides a detailed evaluation of the progress made in meeting the Panel's recommendations.

The Committee **concurs** with the conclusions of the Working Group. The Committee **notes** that SC/66a/SP8 indicated that it is possible to conduct analyses along the lines suggested by the Panel to analyse the available information more fully to determine whether NEWREP-A will lead to better estimates of quantities which could be used for management purposes. It **recognises** that SC/66a/SP8 (and Annex Q2-4) represent a progress report and essentially none of the analyses are final. However, it **agrees** that substantial progress has been made on several of the recommendations. As expected of a progress report, the documentation of the analyses was incomplete which precluded a full review. More detailed information will be needed for any full review. Nevertheless, the preliminary results indicate that collection of age data will reduce uncertainty in estimates of future recruitment. Whether this is likely to lead to substantial improvements in conservation and management is yet to be demonstrated. The approach recommended by the Panel to evaluate how well NEWREP-A could estimate trends in age-at-sexual-maturity was not fully implemented. Nonetheless, the results thus far suggest that higher sample sizes are required to achieve the desired levels of statistical power. The review of the design of the dedicated sightings surveys was undertaken by the sub-committee on in-depth assessments and that can be found in Annex G, item 7.3. As the Panel had noted, fully addressing the recommendations related to surveys and survey design will require several years.

There was relatively little additional discussion of the Panel report within the Committee. SC/66a/SP9 that evaluated the need for lethal sampling was briefly presented and discussed. This paper was a combination of the information already provided to the expert workshop in SC/F15/05 and 06. It had been summarised in Annex D of SC/66a/Rep06 and reflected the authors' view that lethal methods are not required for NEWRPEP-A. The Committee also heard a response from the proponents that expressed their view that lethal sampling was required. This explanation had also been provided to the expert workshop and had been included as Annex F in SC/66a/Rep06.

Some members commented on information provided by the proponents (SC/66a/SP1 and SP8) in response to recommendations by the NEWREP-A review panel with respect to Objective II. They noted that the JARPA II review panel in 2014 had expressed similar concerns to those expressed by the Panel regarding the lack of details of the ecosystem model structure proposed, and the issues associated with the data needed to parameterise the models. In addition they noted that the Committee has repeatedly come up against the issue that the uncertainties in overall consumption rates are such that data from stomach contents have not contributed to narrowing the confidence intervals compared to other methods. Until the success of the proposed telemetry studies has been demonstrated, the likely contribution of these to reducing uncertainty in the length of the feeding season cannot be evaluated, since this requires considerably longer tag deployments than has previously been achieved. These members therefore concluded that the new information presented does not provide the level of detail over and above the information gaps identified in the NEWREP-A proposal to enable a full evaluation.

Other members disagreed. They believed that sufficient information had been provided in SC/66a/SP1, 2 and 8 as well as SC/F14/J26, with respect to model structure for initial work. This initial work had led to the expanded work on krill data contained in NEWREP-A. Ecosystem model development is an iterative process as recognised by the Panel and additional information will be provided in 2016 and 2107. They also believed that the methods proposed in NEWREP-A using stomach content data were appropriate to obtain estimates of consumption rates and that the proposed approach had responded to recommendations contained in the JARPA II review (IWC, 2015e). They noted that the telemetry experiments and night surveys will also contribute to reduced uncertainty. Finally they commented that for multi-species models, as noted by the Committee (IWC, 2015i), it is not the absolute amount eaten, but trends over time that are important such as those provided in Konishi *et al*. (2014; 2008).

Brierley noted that comments in the Panel report regarding what could be obtained from lethal methods must not be interpreted as the Panel agreeing that there was a demonstrated need for the data that would be forthcoming from those methods.

17.1.5 Discussion of NEWREP-A in relation to Resolution 2014-5

In an initial general discussion of this item, a number of comments both supporting NEWREP-A and opposing it were made, some addressing particular issues and others offering broad comments on the general merits or otherwise of the lethal aspects of the proposal, ecosystem management, interpretations of the Resolution from a procedural perspective, a letter[19] from a group of 500 scientists from 30 countries opposing the proposal and various comments on the judgement of the International Court of Justice (and see Annex Q). From this discussion, it was clear that it would not be possible to develop a consensus Committee view of NEWREP-A. The Committee agreed that it would not be helpful to the Commission to provide them simply with a long list of comments. Therefore, it was agreed that in order to provide advice to the Commission as instructed under Resolution 2014-5, it would establish a drafting group (under Palka) to consider the five items in the Resolution in turn, highlighting for each the views of the Panel, agreements by the Committee where they existed, and concise statements of differences of opinion where they existed. Their report as modified by the Plenary has been incorporated into the Committee's report, below and thus represents the Committee's view.

It should be noted that at the time of writing its report, the Panel (SC/66a/Rep06, item 8) had concluded that: it had made a number of important recommendations for additional work that it believed to be essential to be completed before a full review of the programme under the Annex P and Resolution guidelines could be completed; and with the information presented in the proposal, it was not able to determine whether lethal sampling is necessary to achieve the two major objectives. Therefore, it had concluded that the current proposal did not demonstrate the need for lethal sampling to achieve those objectives.

The views expressed by the Committee below also take into account additional work undertaken by the proponents since the Panel report was published (SC/66a/SP1, SP8, Annexes Q2-4 and NEWREP-A addendum).

The Committee **agrees** that in the case of the NEWREP-A, the objectives of this Special Permit research (Table 22) are directed to improvements in the conservation and management of whales. Thus, issues (a) and (b) of the Resolution are tightly related. Therefore, the Committee **agrees** to combine its advice for these two issues.

17.1.5.1 COMMENTS ON ITEMS (A) AND (B) OF RESOLUTION 2014-5

> (a) whether the design and implementation of the programme, including sample sizes, are reasonable in relation to achieving the programme's stated research objectives;
>
> (b) whether the elements of the research that rely on lethally obtained data are likely to lead to improvements in the conservation and management of whales;

In regards to both Objectives I and II, the Committee **agrees** (as did the Panel) that the programme has clearer objectives than JARPA II and that Japan has provided further clarifications and responses to some of the issues raised in the earlier reviews.

[19] : http://icb.org.ar/scientists_on_newrepA_eng.html

OBJECTIVE I

The Panel's views with respect to these items are summarised under Item 17.1.1 (C) and (E) and its recommendations for future work provided in SC/66a/Rep06, table 1.

The Committee noted that at this meeting, the proponents had begun to address the recommendations of the Panel with respect to estimating the statistical power to detect changes in age at sexual maturity (SC/66a/SP8). The simulations conducted generally follow the approach suggested by the Panel. However, as noted in the Technical Group Report (Annex Q1) not all sources of variance were taken into account.

The proponents also provided simulation results to address some of the gaps identified by the Panel, including simulations of the ability to estimate recruitment by the SCAA, although they do not yet evaluate the extent to which the precision of estimates of other parameters such as M and MSYR might be improved given further data. Preliminary results indicate that collection of age data will reduce uncertainty in estimates of future recruitment. Whether this is likely to lead to substantial improvements in conservation and management is yet to be demonstrated.

The Committee **agrees** that additional work needs to be done to evaluate the level of improvement that might be expected either in the SCAA or in RMP performance by improved precision in biological parameters, and it agrees that the current SCAA does not of itself constitute a full specification of the various operating models/*Implementation Simulation Trials* needed for management procedure testing.

Some members concluded that since there was still no valid determination of the sample size required to detect a trend in age of sexual maturity (ASM), it had not been demonstrated that lethal sampling could achieve the objective.

They noted that the Committee had concluded last year that the SCAA estimates of MSYR are not robust. They also noted that the results to date have not shown that the proposed takes would lead to any improvement in the conservation and management of whales. The initial attempts by the proponents to provide this demonstration using the SCAA model show that the changes in the ASM have very little effect on the resulting estimates of MSYR (SC/66a/SP8, table 3), which are well above the range determined by the MYSR review (IWC, 2013c, pp.110-111). This is consistent with the advice of the Panel '... it appears unlikely that allowing for time-varying age-at-50%-maturity will enable quantities such as MSYR to be estimated more accurately and precisely'.

Other members noted that the initial evaluations have shown that all but one of the extra sources of variability mentioned as needing incorporation in ASM calculations, when considered individually, have small impacts. The effect of ageing-error is larger, but not such that it would change the results of the sample size evaluation radically (see Annexes Q2-4).

They noted responses to the Panel report are a work in progress; the proponents have already demonstrated the precision to be expected in estimates of cohort strength which, for example, provide strong potential to assist the determination of the effects of climate change (Butterworth and Punt, 2000; Maunder and Watters, 2003).

They stated that although explicit demonstration of management improvement through the use of catch-at-age data is yet to be demonstrated (this is an important item on the agenda for the remaining work in progress), this must be viewed in the context of the near universal practice in major renewable marine resource scientific committees, of rating assessments and management advice that is based on the incorporation of such data as superior. If such data were not highly valuable for this purpose, these groups would not expend so much of their resources in acquiring them to use in a similar way to the SCAA for Antarctic minke whales for analytically very similar situations. They also noted that the SCAA has been well received by the Scientific Committee (IWC, 2014f, pp.233-5). An interpretation of the roles of the recruitment function parameters in the SCAA as exactly equivalent to the roles they played in RMP trials would be flawed. Finally they commented that that the ICJ found that 'the use of lethal sampling *per se* is not unreasonable in relation to the research objectives of JARPA II.' (Judgement at paragraph 224).

OBJECTIVE II

The Panel's views with respect to these items are summarised under Item 17.1.1 (C) and (E) and its recommendations for future work provided in SC/66a/Rep06, table 1.

The Committee **agrees**, as did the Panel, that the ecosystem and multispecies modelling in the proposal are generally a valid approach to the main Objective II of investigating the ecosystem through modelling studies.

Some members noted that with respect to Objective II, it is already well established that Antarctic minke whales feed almost exclusively on krill. To estimate the total consumption of krill by minke whales, the Panel recommended the use of a bioenergetics model that estimates basic energy requirements using standard allometric relationships and previously collected data. Consequently the collection of further stomach contents is unnecessary. They consider that the additional information presented at this meeting does not change the Panel's conclusion in relation to whether lethal sampling is necessary to achieve the programme objectives nor does it establish that the proposed sample sizes are reasonable.

Other members noted that contributions from NEWREP-A here relate both to Objectives I and II. In respect of the RMP, they noted that the Scientific Committee has agreed as follows: 'The Committee has repeatedly recognised that data currently not used directly by the RMP can play an important role in providing an independent check on the status of the population managed under the RMP. In addition, other important types of biological data are used indirectly, the most obvious example being data clarifying the identity of stocks in the different regions. The types of samples that were considered likely to be of importance were, for example, those

related to reproductive capacity, condition of the animal (e.g. blubber thickness) and various tissue samples to facilitate work on stock identity, growth and contaminant burdens. It was noted that data from such samples could form the basis for a periodic review of evidence for changes in carrying capacity (IWC, 1993, p.61). Thus information from NEWREP-A related to feeding, ASM, and body condition, *inter alia*, all contribute in both respects.

They also pointed out that Committee again confirmed the potential importance of body condition indices to its work (IWC, 2012), and has agreed that a decline in blubber thickness and in fat weight that was statistically significant at the 5% level occurred during the JARPA period (IWC, 2015f, pp.46-47). Stomach fullness data (for which a significant change over time has also been demonstrated recently (Konishi and Walløe, In press) both contribute in the above respect and provide the key information needed to inform estimation of parameters of prey abundance-predator consumption functional forms in ecosystem models. These are considerably more important than absolute estimates of consumption whose uncertainty is common in ecosystem models and can be addressed by sensitivity tests.

They stated their view that SC/66a/SP8 and Annex Q2-4 has shown that the sample size proposed is sufficient to provide SCAA cohort-strength estimates with reasonable precision. They concluded that in their view the situation has changed since the Panel report, given the demonstration in SC/66a/SP/8 and Annex Q2-4 that the non-lethal DNA-methylation approach to ageing does not allow remotely adequate precision to be achieved for cohort-strength estimates from SCAA.

17.1.5.2 COMMENTS ON ITEM (C) OF RESOLUTION 2014-5

> (c) whether the objectives of the research could be achieved by non-lethal means or whether there are reasonably equivalent objectives that could be achieved non-lethally

The Panel's views on this are summarised under Item 17.1.1 (D) and its recommendations for future work provided in SC/66a/Rep06, table 1. It had recommended research on the following non-lethal methods to provide information on evaluating lethal versus non-lethal techniques: the effort required to obtain biopsy samples; satellite tagging; DNA-M technique for ageing; assessing sexual maturity through hormones in blubber from biopsies; aerial photogrammetric techniques to measure whale length. The Panel also noted that there are new techniques to determine biological parameters that require validation and calibration.

The Committee noted that the following data are identified by the proponents as being unobtainable by non-lethal means: morphometrics as part of stock structure determination, age determination, ASM, nutritive condition and food consumption via stomach contents. The question of reasonably equivalent objectives was not considered.

The Committee **agrees** with the Panel that it will not be able to determine whether non-lethal means can be used to achieve certain objectives until the recommended field experiments, laboratory work and analyses are conducted.

Some members noted information on stock structure can be obtained by non-lethal measures. While some non-lethal methods require further development, the calibration of DNA ageing methods and estimation of energy requirements for input to multispecies models could be achieved with existing material. They also pointed out that the earplug method has not been calibrated against known-age animals, and does not achieve substantial increase in precision compared with non-lethal methods (Polanowski *et al.*, 2014).

Other members noted that in respect of variance considerations, recent investigations have indicated that the precision of methylation-based recruitment estimates from SCAA are much worse than those obtainable from ear-plus based readings, with the methylation-based results hardly better than those in the absence of any age information at all (Annex Q2-4). Hence at this time indications are that the non-lethal methylation approach cannot provide ageing information at a level of precision useful to inform assessments and consequently management.

As regards possible bias in earplug readings, they noted that in 2011, the Committee concluded regarding age reading that 'all these issues are largely resolved' (IWC, 2012c, p.180). Furthermore it had reported the previous year that 'studies of fin whales as well as corpora counts and animals with known histories indicated that the growth layers counted to age whales were laid down annually' (IWC, 2011b, pp.191). Reference to a number of experts in the field of earplug age readings have elicited the comment that there is no obvious reason to suspect any major bias in the approach (Lockyer, C.L. and Kato, H. pers.comm.).

Finally, they commented that the ICJ found that 'as a matter of substance, the relevant resolutions and Guidelines that have been approved by consensus call upon States parties to take into account whether research objectives can practically and scientifically be achieved by using non-lethal research methods, but they do not establish a requirement that lethal methods be used only when other methods are not available.' (Judgement paragraph 83).

17.1.5.3 COMMENTS ON ITEM (D) OF RESOLUTION 2014-5

> (d) whether the scale of lethal sampling is reasonable in relation to the programme's stated research objectives, and non-lethal alternatives are not feasible to either replace or reduce the scale of lethal sampling proposed

On the question of the feasibility of non-lethal alternatives to replace or reduce the scale of lethal sampling, the Committee noted that the points noted under item (c) are also relevant.

The Panel's views with respect to this item are summarised under Item 17.1.1 (B), (D) and (E) and its recommendations for future work provided in SC/66a/Rep06, table 1.

The Committee **notes** that the proponents estimated the required sample size only for the objective of detecting a trend in the age at sexual maturity. It **recognises** that during this meeting simulations were presented to evaluate the statistical power to detect changes in age at sexual maturity (SC/66a/SP8). It agreed that the simulations generally followed the approach suggested by the Panel but future recruitment was not stochastic, no allowance was made for cohort-specific deviations in ASM, and over-dispersion associated with the annual proportion mature by age was not modelled. It was noted that more additional variation leads to lower power as does lower effect size. Consequently, the estimated sample sizes are likely to be too small. Ideally, there should be a management-related (or biologically-based) justification for the effect sizes.

In light of the above, some members considered that in the absence of a valid determination of the sample size required to meet programme objectives, the proposed scale of lethal sampling cannot be established as reasonable.

Other members referred to the comments on these points that they provided under Item 17.3.1.

17.1.5.4 COMMENTS ON ITEM (E) OF RESOLUTION 2014-5

> (e) such other matters as the Scientific Committee considers relevant to the programme, having regard to the decision of the International Court of Justice, including the methodology used to select sample sizes, a comparison of the target sample sizes and the actual take, the timeframe associated with a programme, the programme's scientific output; and the degree to which a programme coordinates its activities with related research projects.

The Committee noted that the methodology used to select sample sizes is addressed under Item 17.4.3. It also noted that the NEWREP-A proposal, which is for 12 years, states the intention to evaluate progress after six years, in order to determine the further time frame required to reach the objectives.

The Panel's views with respect to these items are summarised under Item 17.1.1 (B), (D), (G) and (H) and its recommendations for future work provided in SC/66a/Rep06, table 1.

The Committee **agrees** that while noting the additional information provided by the proponents at this meeting, it nevertheless **recommends** further focussed collaboration on those aspects of NEWREP-A highlighted in the Panel report, especially related to the development of ecosystem models, prey studies and evaluation of non-lethal techniques.

Some members concluded that commencement of lethal sampling in the 2015/16 season was not justified and noted that the situation should be reviewed at the next Committee meeting taking account of any new information available at that time (see Annex Q5).

Other members concluded that the Government of Japan had provided their detailed responses to these points in SC/66a/SP1 and SC/66a/SP2. They believed that the utility of the age data to provide estimates of cohort-strength has now been demonstrated, so that there is no reason to postpone immediate initiation which would lead to deterioration in the precision with which the strength of cohorts currently in the population could be estimated. Paragraph IV of Article 8 of the ICRW recognises that the 'continuous collection and analysis of biological data … are indispensable to sound and constructive management of the whale fisheries, Contracting Governments will take all practical measures to obtain such data'. Although some of the Panel's recommendations have yet to be addressed, they noted their view that many of these involve analyses associated with ongoing data collection.

The proponents commented that the main text included responses to the points raised in Annex Q5.

17.1.5.5 CONCLUSION

Despite lack of consensus in the Committee's responses to the questions in the Commission's resolution, the Committee nevertheless **agrees** that the analyses recommended by the Panel and further specified in Annex Q1 should be completed, and that progress should be reviewed again next year.

17. 2 Preparation of JARPN II review workshop

Last year, the Committee had updated Annex P with respect to data availability (IWC, 2015f, p.82). SC/66a/SP3 provided a list of the available data for the review developed by the proponents two months before the Annual Meeting in accordance with the new process. SC/66a/SP4 contained a request to access to data under the Committee Procedure B for Data Access by de la Mare and colleagues for consideration by the Committee, again in accord with the new procedures. He noted his appreciation for the help he received from the government of Japan regarding data availability. The analyses proposed would be along the lines presented in NEWREP-A to investigate sample size.

A small group was established under Fortuna to examine this request. Fortuna reported back that after clarification that the next workshop would be a final review not an ongoing review, the request had been withdrawn.

It was noted that SC/66a/SP5, 6 and 7 would serve as primary background documents for the Steering Group planning for the Expert Panel review of JARPN II. The Committee **agrees** that the JARPN II final review would take place under the revisions to Annex P agreed by the Committee under Item 27.3.

The Committee noted that the proposed JARPN II final review (scheduled for early 2016) would take place before the conclusion of the full field period expected to be 2016). Morishita explained the rationale behind this. As the Committee had been informed