Annex O

Report of the Working Group on Scientific Permits

Members: Bjørge (Convenor), An, Baba, Bando, Baulch, Bell, Brockington, Butterworth, Chilvers, Cipriano, Cooke, Currey, de la Mare, Donovan, Double, Elvarsson, Fortuna, Funahashi, Gales, Galletti Vernazzani, Givens, Goodman, Gunnlaugsson, Hakamada, Holm, Ilyashenko, Iñíguez, Jímenez, Kato, Kelly, Kim, Kishiro, Kitakado, Kock, Konishi, Leaper, Leslie, Liebschner, Matsuoka, Miyashita, Morishita, Moronuki, Murase, Palsbøll, Panigada, Park, Parsons, Pastene, Punt, Rendell, Reyes Reyes, Ritter, Rodríguez, Roel, Rosenbaum, Santos, Skaug, Tiedemann, Víkingsson, Wade, Walløe, Waples, Weinrich, Williams, Yoshida.

1. CONVENORS OPENING REMARKS

Bjørge welcomed meeting participants and reminded them that the main purpose of the Working Group on Special Permits is to discuss the special permit activities and results in light of Commission Resolutions and Scientific Committee priorities.

2. ELECTION OF CHAIR

Bjørge was elected Chair.

3. APPOINTMENT OF RAPPORTEUR

Weller served as rapporteur.

4. ADOPTION OF AGENDA

The adopted agenda is provided as Appendix 1.

5. AVAILABLE DOCUMENTS

The following documents contained information relevant to the Working Group: SC/65b/SP01, SC/65b/O02, SC/65b/O03, SC/65b/O04, SC/65b/O05, SC/65b/Rep02.

6. EXPERT PANEL REVIEW OF THE RESULTS FROM JARPA II

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 and therefore did not participate in the JARPA II agenda items (see Item 2 of the main SC report) in this Working Group. These scientists may not agree with any conclusions reached in this report under those agenda items.

This agenda item is related to the Expert Panel Review of the results from JARPA II (SC/65b/Rep02). At the request of Bjørge, a brief spoken presentation summarising the objectives and key results of JARPA II was given by Pastene.

The Expert Panel review took place in Tokyo from 24-28 February 2014 and followed the guidelines described in Annex P (IWC, 2013b). 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 at their last Annual Meeting (SC/65a) that the previous Chair (Palka) would be an appropriate chair for this Review Workshop.

6.1 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 (numbered SC/F14/J01-J38), eight papers submitted by other Scientific Committee members (numbered SC/F14/O01-O08), and five papers were in response to the observer papers (numbered SC/F14/R01-R05). See SC/65b/Rep02 for a full list of documents.

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 be more easily assess if the objectives have been met.

Because data collection disrupted due to weather, ice conditions and increasing sabotage activities by protestors resulted in not achieving the designed sampling scheme for some years, 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 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 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 agrees 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.

6.2 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 International Whaling Commission's Scientific Committee (IWC SC) convened a Workshop to review the progress made in the research conducted under the Japanese Whale Research Programme 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 in different papers presented to sub-committees: SC/65b/EM01-EM03; 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 revisions. 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 SP Working Group 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 data from both JARPA and JARPA II 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 SP Working Group 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 II/JARPN 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 (Gales *et al.*, 2013), A. Friedlaender, pers. comm. 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 Nick Gales in his testimony to the ICJ. 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, and much less considering the handling time of a harpooned whale (information taken from Ensor *et al.*'s 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.11). 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.* (2001, p.14) and Ensor *et al.* (2004, p.17) for experiments based on IDCR/SOWER 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 P2 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, 2014, p.480).

Víkingsson highlighted the improvement in the working methods of the SC 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 programme, 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 techinques 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 programmme 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.

7. REVIEW RESULTS FROM ONGOING PERMITS

Bjørge reminded the Working Group that the SC has decided not to discuss annual cruise reports between the periodic reviews. Therefore, the cruise reports would be very briefly summarised with time allowed for questions of clarification.

7.1 JARPN II

Paper 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 1,846 n.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 539 n.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: (1) were the survey track lines (depicted within the red box of fig 3.) designed for abundance estimation? and (2) how were the survey track lines randomly started? In response, the authors stated that the survey track lines in question were not designed for abundance estimation and that the starting points of the track lines were randomised following methods described in 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 5.02m (SD: 1.12, *n*=17) for males and 5.21m (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 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 (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 1960's 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 form the stomach by the survey, and in the present survey, Japanese sardine became the most dominant prey species. Conversely, Japanese anchovy was disappeared. 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 be contributed to the objectives of the JARPN II feeding ecology and ecosystem studies.

In discussion, the high number of humpback whale sightings in fig. 4 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. Members of the Working Group 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 were correlated with changes in body condition. The authors stated that an analysis of this type was pending.

7.2 JARPA II

SC/65b/SP05 report the results of the 2013/14 survey of the Second Phase of the Japanese Whale Research Programme 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 SV had to dedicate to security tasks. The total searching distance was 3,182.0 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 was 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%) and 125 were female (50%). 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 survey. These are a great loss for the Antarctic whale research and management under the IWC SC objectives.

8. REVIEW OF NEW OR CONTINUING PROPOSALS

8.1 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.

8.2 JARPN II

The SP Working Group was advised that following the 31 March 2014 Judgment of the International Court of Justice (ICJ) regarding programmatic activities related to JARPA II, the Government of Japan voluntarily reviewed programmatic activities of JARPN II. This voluntary review resulted in the reprioritisation of research focus in terms of utilising lethal and non-lethal methods as well as recalculation of sample sizes to be pursued during the 2014 JARPN II survey.

Some members of the SP Working Group 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, the Working Group 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 programmatic changes in 2014 to the JARPN II offshore 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) Sampling of sperm and 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 programmatic changes in 2014 to 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 (six 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); and
(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 were 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

Ayukawa (spring)**: r**e-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 (average during the research period).

Kushiro (autumn): re-calculation of the sample size for minke whale was made for the main prey species (Japanese anchovy and walleye pollack) 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 pollack (2008-10). Taking account the recent possible change of the distribution of prey species, the sample size has been set 57 for walleye pollack (average during the research period).

Offshore component

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 (average during the research period).

Sei whale: 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 (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 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 SP Working Group recommended that the proponents of JARPN II develop a more comprehensive document for review at SC/66a 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 SP Working Group 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 SP Working Group 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.

9. WORK PLAN

9.1 Planning for a periodic review of JARPN II

According to the procedure outlined in 'Annex P' (Revised Suggestions for Improved Review of Special Permit Proposals and Results within the Scientific Committee) the JARPN II programme is due a periodic review in 2016. 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 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 SP Working Group **agreed** to submit a budget request of GBP £23,000 for the 2015/16 intersessional period to cover the travel and stay for 10 invited experts and one representative of the IWC Secretariat.

9.2 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 SC/66a in 2015, in accordance with the 'Annex P: Revised Suggestions for Improved Review of Special Permit Proposals and Results within the Scientific Committee'.

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 SC in 2015 for its final review.

The next step of this review process is that the proponents make data 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.

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 (4-5 invited experts and a representative from the IWC Secretariat) are expected to be met by IWC.

The SP Working Group **agreed** to submit a budget request of GBP £13,000 for the 2014/15 intersessional period to cover the travel and stay for 5 invited experts and one representative of the IWC Secretariat.

10. ADOPTION OF REPORT

The report was adopted at 21:00 on 20 May 2014. The Working Group thanked Bjørge for his chairmanship.

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Appendix 1

AGENDA

1. Convenors opening remarks
2. Election of Chair
3. Appointment of Rapporteur
4. Adoption of Agenda
5. Available documents
6. Expert Panel Review of the results from JARPA II
   - 6.1 Expert Panel report
   - 6.2 Response to Expert Panel report
7. Review results
   - 7.1 JARPN II
   - 7.2 JARPA II
8. Review of new or continuing proposals
   - 8.1 JARPA II
   - 8.2 JARPN II
9. Work plan
   - 9.1 Planning for a periodic review of JARPN II
   - 9.2 Planning for a review of future Japanese Special Permit research in the Antarctic
10. Adoption of Report

ANNEX O1

A REVIEW OF THE UTILITY OF LETHAL RESEARCH METHODS DURING THE JARPA II PROGRAMME

Paul R. Wade, Robert L. Brownell, Jr., Frank Cipriano, Justin Cooke, Giancarlo Lauriano, Simone Panigada, Begoña Santos, Elisabeth Slooten and Howard Rosenbaum

The JARPA II programme was recently reviewed by an Expert Panel at a Workshop held under the Annex P process (SC/65b/Rep02). One of the terms of reference for the Panel is to evaluate the utility of lethal techniques compared to non-lethal techniques. However, given the process that was followed during the review, the Expert Panel was only able to review the combined results from both lethal and non-lethal methods. This makes it difficult to examine whether the lethal methods employed have been useful or necessary. The Expert Panel itself made no statement about the utility, or not, of lethal methods (they did encourage the proponents of JARPA II to make this comparison with their existing data, something that has not been done).

In light of this, we look at the results of JARPA II, including the opinion of the Expert Panel review, from a narrower perspective. Specifically, we examine how many of the claimed 'key results' of JARPA II came from lethal methods. For results arising from lethal methods, we examine whether they could have been accomplished with non-lethal methods. Finally, for results only obtainable from lethal methods, we examine whether those findings were necessary or even relevant to the RMP, or more generally to the objectives of the IWC Scientific Committee.

Another issue in this review is that many of the papers had results based on data from both JARPA and JARPA II, making a review of just the JARPA II programme somewhat difficult. It is beyond the scope of our review to separate JARPA II findings from the overall findings of JARPA/JARPA II, but it remains a problem for evaluating the success of the JARPA II programme itself.

The stated objectives of the JARPA II programme are as follows:

(1) 'monitoring of the Antarctic ecosystem'
(2) 'modelling competition among whale species (to inform) future management objectives'
(3) 'elucidation of temporal and spatial changes in stock structure'; and

(4) 'improving the management procedure for Antarctic minke whale stocks'

As has been previously pointed out, these objectives are so general and broad they are not particularly useful in terms of reviewing the success of the programme. The Review Panel seems to agree:

> 'The Panel noted several times in its discussions that the general and extremely broad nature of the objectives of the original proposal and its ongoing nature made it difficult to fully review how well the programme could be said to be meeting its own objectives.' 'The Panel…notes that within such broad and long-term overall objectives as (1) and (2), almost any information can be said to be contributing to them in some way; this made the task of the Panel to assess how well the programme was meeting its own stated objectives, somewhat difficult.'

The proponents of JARPA II have listed what they view as their key results of the programme in Pastene *et al.* (2014, pp.34-36; 39-40), organised by their four overall JARPA II objectives. We review these claimed key results here, particularly with regard to whether lethal methods were used or necessary for obtaining those data. We particularly focus on results identified by the JARPA II proponents as being the most important during their verbal presentation during the Expert Panel Workshop in Tokyo.

I. Monitoring the Antarctic ecosystem

1. Claim: JARPA/JARPA II successfully tracked changes in the Antarctic ecosystem, especially species composition and distribution

This was primarily based on JARPA/JARPA II abundance estimates that they claim allowed them to successfully track the trends of whales in the Antarctic, and led to results that indicated minke whales were roughly stable in abundance, and there were increases in humpback, fin, and blue whale populations. These are sightings survey data, and so do not require lethal methods. The JARPA/JARPA II abundance estimates are subject to a lot of criticism, primarily from the changing study area through time, and the use of non-ideal Search and Sampling Vessel (SSV) data (from the vessels that capture and sample the whales) during the JARPA years (IWC, 1998, p.379). The Expert Panel recommended the proponents should revise the abundance and trend papers to, among other things, add a section that:

> 'highlights the issues related to small sample size and the recommendations made at the JARPA review meeting, including those relating to use of the SSV data and the treatment of non-surveyed areas' (SC/65b/Rep02, p.23).

2. Claim: JARPA/JARPA II successfully monitored trends in blubber thickness (declined) and stomach quantity (declined) of Antarctic minke whales

These conclusions are subject to question because of the substantial sampling and modelling deficiencies identified by Wotherspoon *et al.* (2014), de la Mare *et al.* (2014b) and the Expert Review Panel (SC/65b/Rep02, p.36), with de la Mare *et al.* (2014a) further demonstrating that the data as currently collected will require many decades of sampling before reliable conclusions can be reached.

Wotherspoon *et al.* (2014) describes three separate 'epochs' of sampling during the JARPA/JARPA II years, which includes dramatic changes in the latitudinal range and seasonal timing of sampling. Wotherspoon *et al.* (2014) make the obvious point that metrics such as blubber thickness and stomach quantity would be expected to be correlated with latitude and the month of collection (e.g. a whale arriving on the feeding grounds would be skinny, a whale already on the feeding grounds for months might be fat), and both of these covariates showed strong trends with year across the JARPA/JARPA II sampling years. de la Mare *et al.* (2014b) applied modelling approaches to the data to attempt to correct for these severe sampling problems, and concluded this:

> 'Our overall conclusion is not that there has or has not been a trend in the body condition of minke whales in Antarctica over the 24 years of JARPA and JARPA II but rather that the poorly controlled data collection means that the programme, as implemented, is incapable of either reliably detecting or precluding such trends. The issues that complicate the body condition analyses apply in some or all respects to the analyses of the other biological parameters collected by the programme. One might be tempted to pursue the model fitting path looking for spatial and temporal subsets of the data and attempt to interpret that there were trends or otherwise. Such exercises would constitute 'data dredging' and should be avoided.'

Moreover, some of the proponent's modelling analyses were not done correctly, due to technical issues of the likelihood calculation for the AIC or BIC model comparisons (detailed under Item 8.3.2, points (2)-(4), SC/65b/Rep02, p.36). The Expert Panel was less blunt in pointing this out, but the fact that the comparison is done incorrectly is implicit in that the Panel provided specific instructions on how the model comparison should be done correctly in the future, and this was stated quite clearly verbally during the Workshop. Unfortunately, a revised analysis using those instructions has not yet been undertaken. These random effects models would be the only possible way that the severe changes in sampling design through time that occurred could potentially be at least partially corrected. However, it should be reiterated that de la Mare *et al.* (2014b) concluded that fixing the poor data collection design through complicated modelling would not work.

Also, the Review Panel strongly criticised the use of blubber thickness rather than lipid content for monitoring body condition, and pointed out that this same recommendation was made during the JARPA review, but this recommendation was not implemented during JARPA II (SC/65b/Rep02, p.37).

3. Claim: Environmental surveys of Hg and organochlorines were undertaken

These data are routinely collected using non-lethal methods (Fossi *et al.*, 2001).

II. Modelling competition

1. Claim: they collected data that can be used as model inputs, and they started the development of two kinds of models

The Review Panel apparently found the ecosystem modelling efforts to this point to be inadequate.

> 'The Panel notes, as did the proponents, that the modelling work is at a preliminary stage. However, the Panel stresses that this work is an integral part of assessing whether the proponents can meet JARPA II objectives 1, 2 and 4.' 'The Panel therefore recommends that considerably more effort and resources are allocated to this aspect of JARPA II...Without this, it is not possible to state whether the programme can meet its objectives.' (SC/65b/Rep02, p.39)

One specific model - the multispecies production model described in Kitakado *et al.* (2014) was criticised for circularity, as the proponents concluded the model indicated there was competition between whale species, but the Review Panel pointed out this was an integral structure of the model, and was therefore a pre-determined result:

> 'A stated aim of the modelling is to compare model results including and excluding competition among species. However, all versions of the proposed multi-species model will include some degree of 'competition' because all of the predator species in the models outlined in SC/F14/J26 [Kitakado *et al.* (2014)] are feeding on the

> same finite krill resource. Consequently, the current model structure cannot be used to test the hypotheses that competition is impacting Antarctic minke whales.' (SC/65b/Rep02, p.40).

As to the utility of model input data, Leaper (SC/65b/O03) highlighted that for estimates of minke whale consumption rates, the Scientific Committee identified three key issues which required more work if the programme were to be able to move further towards its stated aims of generating reliable estimates, which were the length of feeding season, extent of feeding at night and digestion rates, none of which have been addressed to this point. Leaper (SC/65b/O03) concluded it has still not been demonstrated that the analysis of JARPA II stomach contents can contribute to a better quantitative understanding of minke whale consumption rates than the current broad range of estimates. Regarding the oceanographic data collected during JARPA II, the Expert Panel stated:

> '…the Panel is concerned that the necessary analytical work to fulfill the objectives of the programme has not received the attention and resources that it deserves' (SC/65b/Rep02, p.11).

As to whether lethal methods are required to build ecosystem models, there are many examples of similar ecosystem models constructed for the Southern Ocean ecosystem that include whales but do not require new data collected by lethal methods (Plaganyi and Butterworth, 2012; Watters *et al.*, 2013). Additionally, there are excellent non-lethal ways to study competition through the use of sophisticated oceanographic data, sighting surveys, and telemetry (Friedlaender *et al.*, 2011).

III. Elucidation of temporal and spatial trends in stock structure

1. Claim: their genetic work discovered new information – that there was mixing between two stocks of minke whale in areas IVE and VW

Although this work was accomplished using lethal methods, genetic samples can be collected using non-lethal methods (e.g. biopsy sampling), including from Antarctic minke whales (Gales *et al.*, 2013). The cetacean research in the Antarctic Peninsula Programme has collected 29 Antarctic minke whale samples in 2013 and 2014 (Gales *et al.*, 2013), SC/65b/SH12), without it being their primary focus, which was tagging.

2. Claim: they have estimated mixing rate of humpback whale stocks D, E, and F

This work was carried out using non-lethal methods.

3. Claim: they contributed to understanding of feeding area destination of right whale stocks

This work was carried out using non-lethal methods.

IV. Improving management

1. Claim: new information on stock structure and mixing and on abundance will be important for future application of RMP to Antarctic minke whales.

This work was either carried out using non-lethal methods, or could have been accomplished with non-lethal methods. As mentioned, the abundance estimates are not ideal for use in the RMP.

2. Claim: Statistical catch at age analyses (SCAA) showed that minke whales can grow at rates well above the lower bound for MSYR used in RMP trials.

The author of this study concluded 'the estimates of $MSYR_{1+}$ are presented, but are unreliable owing to the lack of contrast' (SC/65b/O02).

V. Additional findings over and above original objectives

1. Claim: Fin whale biology described

This claim is based on a sample size of n=17, which is likely inadequate for these conclusions.

2. Claim: estimation of abundance based on DNA paternity is a useful novel method.

This is a methodological development, so regardless of the legitimacy of the claim, it is not based on lethal methods.

3. Claim: development of aspartic acid determination of age

Until recently, the aging of baleen whales could only have been accomplished through lethal methods (or with stranded carcasses), but new genetic methods (Polanowski *et al.*, 2014) and blubber fatty acid methods (Herman *et al.*, 2008) have shown to be able to provide accurate estimates of baleen whale ages, so this work could be carried out by non-lethal methods.

4. Claim: 'New information was provided to understand the physiology and reproductive biology of AMW. In particular some of the results offered new information for the improvement of in vitro *oocyte maturation and related technologies for whales.'*

These results included papers on the topics of follicular fluid components and oocyte diameter (Nagai *et al.*, 2007), the structure of the placenta (Sasaki *et al.*, 2013), and the morphology of the Purkinje fibre network in the heart (Ono *et al.*, 2009). These results could only be accomplished by lethal methods. However, they are not relevant to the RMP, or any other work of the IWC Scientific Committee.

Conclusions

Overall, we conclude there were few, if any, results derived from lethal methods that could be considered to have importantly or substantially improved our knowledge on the general ecology, conservation or management of minke whales in the area, or on the functioning of the Antarctic ecosystem, particularly in relation to the four objectives stated in the programme:

(1) ecosystem monitoring;
(2) modelling competition;
(3) elucidation of temporal and spatial trends in stock structure; and
(4) improving management.

Our review indicates that lethal methods have not provided significant new data when compared with the information arising from non-lethal methods, or potentially arising from non-lethal methods. The identified trends in blubber thickness and stomach contents cannot as yet be considered conclusive results due to the poorly controlled data collection and modelling/analysis issues discussed above. Because of all the above, we conclude that data collected using lethal methods during the JARPA II programme have not contributed substantially to the objectives of the IWC Scientific Committee, including the *CLA*, nor have they contributed to improve our knowledge on the general ecology, conservation, or management of minke whales in the study area.

An additional point about the process is that the Terms of Reference for the review of Special Permits programmes (Annex P) do not provide a mandate for a periodic 'root and branch' review of temporally indefinite programmes like JARPA II. Consequently the report does not thoroughly assess whether the original objectives, priorities, research

area, sample sizes, and methods, such as lethal versus non-lethal, are current or appropriate and so cannot assess whether the programme is conducted in an efficient and effective manner. The omission of these high-level considerations in the review of an ongoing research programme should be addressed in any revision of Annex P.

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ANNEX O2

RESPONSE TO ANNEX O1

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Institute of Cetacean Research

In Annex O1, Wade *et al* conclude that*:*

(1) 'there were few, if any, results derived from lethal methods that could be considered to have importantly or substantially improved our knowledge on the general ecology, conservation or management of minke whales in the area, or on the functioning of the Antarctic ecosystem, particularly in relation to the four objectives stated in the programme.'

(2) 'lethal methods have not provided significant new data when compared with the information arising from non-lethal methods, or potentially arising from non-lethal methods.'

(3) 'The identified trends in blubber thickness and stomach contents cannot as yet be considered conclusive results due to the poorly controlled data collection and modelling/analysis issues'.

(4) 'data collected using lethal methods during the JARPA II programme have not contributed substantially to the objectives of the IWC Scientific Committee, including the *CLA*, nor have they contributed to improve our knowledge on the general ecology, conservation, or management of minke whales in the study area'.

These conclusions are not supported by the substance of Annex O1 and conflict with their own statement that 'it is difficult to examine whether the lethal methods employed have been useful or necessary'.

The substance of Annex O1 quotes documents that have already been responded to but without reference to these responses (see for example 'body condition analyses' below). Also Annex O1 misinterprets several of the conclusions of the Review Panel for results based on both lethal and non-lethal analyses.

Here we attempt to clarify those issues following the order of the topics in Annex O1.

1. Abundance

'The JARPA/JARPA II abundance estimates are subjected to a lot of criticism…..' (Annex O1).

This contradicts the fact that both Antarctic minke and humpback whales abundance estimate and abundance trends have been reviewed and published in a peer-reviewed journal (Hakamada *et al.*, 2014; Matsuoka *et al.*, 2011). The Review Panel conclusion on abundance and abundance trend was the following:

> 'The Panel welcomes the presentation of results from the JARPA and JARPA II programmes. This represents a considerable expenditure of research time and a large dataset for long-term monitoring. It complements the work of the IDCR/SOWER programme that has now finished. The importance of monitoring trends in abundance for cetacean species is of general conservation and management interest as well as providing information relevant to the JARPA II programme objectives and especially as input to ecosystem models. It is particularly important in the context of documenting the recovery of species/populations that had been extensively depleted by commercial whaling, as well as investigating variation in species mix compared to the period prior to exploitation. The JARPA review meeting (IWC, 2008) had examined the survey information available at that time and had identified a number of items that required further investigation before acceptable abundance estimates could be obtained. The Panel agrees that the papers on Antarctic minke whales (Hakamada and Matsuoka, 2014a) and humpback whales (Hakamada and Matsuoka, 2014b) had adequately addressed most of these concerns and had in some cases identified further work that would be undertaken see the discussion in Matsuoka *et al.* (2011); and Hakamada *et al.* (2014)' (SC/65b/Rep02, p.22).

Furthermore, when one considers the results presented at this meeting in SC/65b/IA03 (the SCAA work by Punt), and in particular fig. 10 of that paper, it is very clear that the length and age data from JARPA and JARPA II have led to far superior and more informative estimates of minke whale abundance and trends than is possible from sighting survey data alone. It is obvious that these lethally obtained data provide an improved basis for efficient use of the resource; these are clearly significant new data of considerable use, quite contrary to the claims of Annex O1 quoted above.

2. Body condition analyses

Responses to Wotherspoon *et al.* (2014), de la Mare *et al.* (2014b) and de la Mare *et al.* (2014a) cited in Annex O1 were provided to the JARPA II Review Panel (Hakamada and Konishi, 2014; Konishi *et al.*, 2014; Konishi and Walløe, 2014). Annex O1 does not reflect the responses given in these papers nor the additional analyses made in response to the Review Panel recommendations (SC/65b/EM02 and SC/65b/EM03) presented to this SC meeting. Annex O1 also does not reflect the discussions in the SC concerning trends in blubber thickness, girth, fat weight and stomach quantity, which do not dismiss Japan's claim that JARPA/JARPA II have successfully monitored trends in these parameters.

In our response paper to the Review Panel we clarified our position regarding the Panel Review's recommendation on blubber lipid content (SC/65b/SP01, pp.18-19). The original recommendation by the SC was 'consideration should be given to whether the particular blubber thickness measurement chosen was actually a good proxy for energy storage (for example lipid content can vary considerably without necessarily affecting the thickness of the blubber)'. In response to this recommendation, at the JARPA II review workshop new data were presented that showed a significant correlation between blubber thickness and amount of lipid content. I believe that this analysis responded appropriately to the previous SC recommendation.

3. Environmental survey

The reference in Annex O1 for the use of biopsy sampling for pollutant analysis (Fossi *et al.*, 2001) was for inshore dolphin species and is therefore not relevant to JARPA II where the focus is the Antarctic minke whales in the open waters of the Antarctic. The Review Panel for the Icelandic scientific programme concluded that the lethal sampling has a 'High' practicability and the non-lethal sampling a 'Medium' practicability for the organic pollutant (lipophilic) and trace elements in the case of the NA minke whale (IWC, 2014a, p.480).

Marine debris survey which was highly appreciated by the JARPA II Review Panel involved the examination of debris in the stomach contents of whales, which require lethal method.

4. Modelling competition

As recognised by the proponents this work has just started and requires further effort to continue its development. The Review Panel provided very useful suggestions on how to further progress this work (SC/65b/Rep02, pp.39-40).

Annex O1 suggests that lethal methods are not required to build ecosystem models and that there are excellent non-lethal ways to study competition. As discussed by the SC last year these non-lethal methods are welcomed but they cannot replace the lethal method. The best way is the combined use of both approaches - see discussion in IWC (2014b).

On the estimates on the prey consumption rates (one of the input data for one of the models), Annex O1 mentioned paper SC/65b/O03 but again ignored the response the proponents gave to this paper (Tamura, 2014). Regarding this response paper the JARPA II Review Panel stated the following:

> 'The Panel agreed that the approach proposed in SC/F14/R01 [(Tamura, 2014)] is both a positive development and a useful way forward. However this work is at its beginnings only; without the results of a thorough analysis, the Panel is unable to determine whether JARPA II has provided or will provide consumption estimates within a sufficiently narrow range. The Panel recommends that work proposed in SC/F14/R01 [(Tamura, 2014)] be further developed and allocated high priority.
>
> Ideally a new paper should be submitted to the next meeting of the Scientific Committee. As a minimum, this should advance the outlined work plan by including in the Monte Carlo simulations, uncertainty in:
>
> (1) *r* (the ratio of low/high feeding intake) and the length of the feeding season for Method 1; and
> (2) the extent of night feeding for Method 2.
>
> The Panel also recommends that the work is extended by computing a time series of Monte Carlo results for the total potential consumption of krill using abundance estimates of Antarctic minke whales (preferably those estimated by the SCAA model) and the uncertainties around these estimates'.

Subsequently the proponents submitted a revised paper in response to those recommendations (SC/65b/EM01), which was discussed at this SC meeting.

5. Stock structure of minke whale

First the Review Panel concluded the following regarding the stock structure studies under the JARPA and JARPA II:

> 'The Panel agrees that information resulting from the JARPA and JARPA II programmes has considerably increased our understanding of stock structure within the research area, which directly addresses Objective 3.' (SC/65b/Rep02, p.14).

One of the key papers on stock structure of minke whale (Kitakado *et al.*, 2014, and see also SC/65b/IA13) include modelling work and the use of genetic and morphometric data. This work has been very well evaluated by the Review Panel and the SC. Morphometric data cannot be obtained by non-lethal approach. This information was ignored in Annex O1.

Feasibility of biopsy sampling is different among baleen whale species. For example it is more feasible to take biopsies from humpback and right whales than from minke whales.

Annex O1 wrongly asserts that because biopsy samples of minke whales have been taken in the calm near-ice waters of the Antarctic, a sufficient number of biopsy samples could be taken in the rough seas of the open water in the Antarctic for the DNA (stock structure and mixing) and pollutant analyses that were a part of JARPA II (Annex O1) - see also discussion in IWC (2014b). Again, with regard to improving management, JARPA/JARPA II has provided important new information for future application of the RMP. Annex O1 wrongly suggests that such information could have been obtained using non-lethal means.

6. Improving management of Antarctic minke whale

On this topic the Review Panel concluded the following:

> 'The information from JARPA and JARPA II, along with other information obtained since the original trials were developed, would be very useful if the current protocol were to be applied, as they should refine the set of hypotheses on which trials would be based. In particular, the information on stock structure collected during JARPA/JARPA II could be used to develop stock structure hypotheses for Areas III-E to IV-W which are conditioned on data, while the revised estimates of abundance would be used for conditioning. The information from the SCAA and similar analyses could be used to develop hypotheses related to changes in carrying capacity, natural mortality, and variation in birth rates.
>
> The operating models on which *Implementation Simulation Trials* have been based have considered multiple stocks but have not explicitly allowed for hypotheses related to competition and ecosystem change. In principle, the work on ecosystem modelling could be used to develop a set of operating models which allow for competition. However, the ecosystem models need to be developed with sufficient resolution (e.g. age- and sex-structure for minke whales)' (SC/65b/Rep02, p.41).

As noted above key research on stock structure involved both genetics and morphometric, the latter requiring lethal sampling. SCAA analyses have been thoroughly examined by the SC through the years. These analyses have provided population trend, which are more precise than those from sighting surveys. SCAA analyses for population trend, develop hypotheses on changes in carrying capacity, natural mortality and variation in birth rates are based on abundance and age data. Lethal sampling is required for getting age data information.

Recently new developments of age determination based on DNA have been reported (Polanowski *et al.*, 2014). DNA-based age determination could be obtained by biopsy. However the technique is still in a preliminary stage and they have not been validated and are at best crude at this stage. On the other hand the feasibility to get a large number of biopsy from minke whale, particularly in offshore areas, is still in dispute.

7. Other important topics not mentioned in Annex O1

Annex O1 did not mention the JARPA/JARPA II research on age at sexual maturity (ASM) and apparent pregnancy rate (APR). Interesting temporal trends have been observed for those parameters, and the JARPA II Review Panel provided useful suggestions to improve the analyses and then be able to give a better interpretation of the trends. In response, papers SC/65b/IA01-IA02 were prepared and discussed at the SC meeting this year (in the IA sub-committee).

ASM and APR rates require lethal sampling.

Conclusion

In summary, we strongly disagree with the conclusions of Annex O1 and reassert our view 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. These useful results have been possible because an appropriate combination of lethal and non-lethal methods. The JARPA II programme has therefore contributed substantially to the objectives of the IWC Scientific Committee and the Commission.

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