Annex P

Matters Related to Special Permit Discussions

Annex P1

RELATIVE EFFICIENCY OF BIOPSY VERSUS LETHAL SAMPLING: A RESPONSE TO SC/67A/SCSP11

Phil Clapham

In SC/67a/SCSP11, Yasunaga *et al.* report the results of experiments to compare the relative success of lethal sampling and biopsy sampling of Bryde's, sei and minke whales in the North Pacific. The paper concludes that biopsy sampling 'is not feasible' for minke whales.

There are several problems with this conclusion. First, the sample size involved in the biopsy experiment was very small (only 14 trials, with 2 samples obtained). Second, it appears likely that those responsible for the biopsy sampling lacked experience (this appears to be acknowledged in the final paragraph of the paper), and were very unlikely to improve their aim in only 14 trials. In this context, I would note that I have observed several individuals routinely, and with high success, take biopsy samples from animals smaller than minke whales (including baleen whale calves 5m in length). If this experiment is repeated, it should involve numerous attempts, and should employ an individual with proven high success in sampling minke whales or animals of similar size.

Third, during the presentation of the paper it was noted that the experiments were conducted in sea conditions typical of those occurring during lethal sampling; this included higher sea states than typically exist during biopsy sampling. This would certainly favour lethal sampling since a harpoon has sufficient force to penetrate a whale even if water is covering the body at the time of the hit. However, this misses the main point of sampling, which is not to compare methods but rather to obtain a sufficient sample size to address the biological questions being asked. If, for example, calculations indicate a required sample size of 50 to address a particular question, that does not require that those samples be gathered in sub-optimal sea conditions, only that they be obtained over a reasonable period of time. It should be noted that tens of thousands of biopsy samples have been obtained from baleen whales, including from numerous relatively small animals; Japan appears to be alone in rejecting the utility of this widely used non-lethal method.

Finally, I would suggest that the use of a Generalised Linear Model to assess the relative efficiency of the two methods represents an inappropriately complex statistical approach in light of the very small sample size involved with the biopsy sampling. In short, it is 'statistical overkill' that cannot validate the conclusions of a poorly designed experiment with inadequate trials.

Annex P2

RELATIVE EFFICIENCY OF BIOPSY VERSUS LETHAL SAMPLING: A RESPONSE TO ANNEX P1

Genta Yasunaga and Tsutomu Tamura

First of all, it is important to note that the purpose of this experiment was to conduct a comparative study between lethal and non-lethal methods. The experiment was thus designed to verify a hypothesis that lethal methods could be replaced by non-lethal methods. Unfortunately, the Annex P1 seems to be based on the author's misunderstanding of the purpose of this study, which was that it explores the utility of non-lethal methods.

The aim of document SC/67a/SCSP11 was to refine the preliminary analyses presented to the NEWREP-NP review workshop on the efficiency of biopsy sampling in relation to lethal sampling (Yasunaga *et al.*, 2017), which was conducted using the evaluation framework developed by Mogoe *et al.* (2016). The statistical analyses reported in SC/67a/SCSP11 were in specific response to recommendations from the Expert Panel for NEWREP-NP.

In Annex P1, Clapham disagrees with the main conclusion of SC/67a/SCSP11 that biopsy sampling is not feasible for coastal common minke whale, arguing as follows:

'The sample size involved in the biopsy experiment was very small in common minke whales'

While the sample size of biopsy experiment is considered by Clapham to be 'very small', the basic statistical analyses based on GLM already indicated a significant difference given this sample size. The statement of 'very small' is therefore of little relevance. The proponents have shown that the results of the analyses suggested by the Expert Panel for NEWREP-NP basically confirm the original conclusion submitted to the workshop that biopsy sampling is not feasible in practical terms (too inefficient) for coastal minke whale (Yasunaga *et al.*, 2017; SC/67a/SCSP11).

'It appears likely that those responsible for the biopsy sampling lacked experience'

The reference to 'experience' in SC/67a/SCSP11 was in comparison to the experience of the shooters in offshore waters. However the proponents consider that all shooters (coastal and offshore) have sufficient experience and ability with the Larsen system because essential experience/ requirements for biopsy sampling (e.g. finding, scoping and shooting whales) are almost the same as those for lethal sampling. Our carefully considered view is that dramatic improvement cannot be expected for the success rate of biopsy sampling for common minke whales, even if shooters had more experience and training time in biopsy sampling, because their skill and long experience as whalers are already sufficient.

'I have observed several individuals routinely, and with high success, take biopsy samples from animals smaller than minke whales (including baleen whale calves 5m in length)'

The proponents consider that the fundamental issue here is not animal size itself, but rather a matter of behaviour (in this case of common minke whales in western North Pacific). Typically, the behaviour of these whales is quick and unpredictable movements. The Expert Panel of NEWREP-NP has agreed '… it is more difficult to biopsy sample common minke whales than the other species' (SC/67a/Rep01). No evidence is provided in Annex P1 that invalidates the conclusion of the Panel.

'This misses the main point of sampling, which is not to compare methods but rather to obtain a sufficient sample size to address the biological questions being asked'

It should be made clear that the purpose of this research was to COMPARE non-lethal methods to lethal method rather than just exploring the utility of biopsy sampling. Therefore, the experiments needed to be conducted in sea conditions typical of those occurring during lethal sampling. We have already estimated the expected number of biopsy samples of common minke whales obtainable using the Larsen system in each coastal survey component. The expected sample size of biopsy samples of minke whales in the Sanriku and Kushiro surveys are 3.8 and 6.2 whales/research period respectively. These results make very clear that a reasonable number of biopsy samples of common minke whales cannot be obtained by biopsy sampling in the Sanriku and Kushiro surveys (Yasunaga *et al.*, 2017).

'It is "statistical overkill" to compare two methods using GLM analyses'

The author of Annex P1 comments that 'the use of a Generalized Linear Model to assess the relative efficiency of the two methods represents an inappropriately complex statistical approach in light of the very small sample size involved with the biopsy sampling.' First, the proponents note that the Expert Panel of NEWREP-NP requested statistical analyses of the type presented in SC/67a/SCSP11. Specifically, the Expert Panel of NEWREP-NP recommended that 'analyses that provide a proper comparison of biopsy sampling and catching (including time to process samples under various variables such as experience of sampler, vessel, equipment, effort under similar conditions)' (SC/67a/Rep01). The analyses in SC/67a/SCSP11 were conducted to check that the preliminary comparative analysis presented to the review workshop was not misleading, and this aim was achieved by the additional analyses presented in SC/67a/SCSP11.

The author of Annex P1 states that 'Japan appears to be alone in rejecting the utility of this widely used non-lethal method'. However, the proponents have not rejected the utility of biopsy sampling *per se*. Rather, the proponents have demonstrated that the efficiency of biopsy sampling is significantly and substantially inferior to the lethal method, to the extent that biopsy sampling for common minke whale is practically unfeasible for reasons of inefficiency. Japan has extensively collected and used a large number of biopsy samples for other large whale species such as humpback, right and blue whales. In fact Japan has collected the largest number of biopsy samples of humpback and southern right whales in the Antarctic Ocean. Furthermore, Japan will conduct some further experiments for common minke whales in order to improve the technical aspects of the biopsy sampling equipment under NEWREP-NP, following the advice of foreign experts.

REFERENCES

Mogoe, T., Tamura, T., Yoshida, H., Kishiro, T., Yasunaga, G., Bando, T., Kitamura, T., Kanda, N., Nakano, K., Katsumata, H., Handa, Y. and Kato, H. 2016. Field and analytical protocols for the comparison of using lethal and non-lethal techniques under the JARPNII with preliminary application to biopsy and faecal sampling. Paper SC/66b/SP08 presented to the IWC Scientific Committee, June 2016, Bled, Slovenia (unpublished). 10pp. [Paper available from the Office of this Journal].

Yasunaga, G., Mogoe, T., Tamura, T., Yoshida, H., Bando, T. and Kato, H. 2017. Results of the feasibility study on non-lethal techniques to address the key research objective of JARPNII, based on data and samples obtained in the period 2014-2016. Paper SC/J17/JR03 presented to the Special Permit Expert Panel Review Workshop on NEWREP-NP, January 2016, Tokyo, Japan (unpublished). 39pp. [Paper available from the Office of this Journal].

Annex P3

COMMENTS ON JAPAN'S SPECIAL PERMIT WHALING PROGRAMS

G.J. Pierce, R. Almeida, E. Arguedas, C.S. Baker, E. Bell, R.L. Brownell Jr., E. Burkhardt, D. Cholewiak, P. Clapham, J. Cooke, M. Cosentino, W. de la Mare, M. Double, P. Fruet, P. Gallego, A.M. Gonzalez, N. Hielscher, M. Iniguez, Y. Ivashchenko, K. Jeliæ, G Lauriano, R. Leaper, K. Long, D. Lundquist, S.D. Mallette, J. McKinlay, S. Panigada, S. Reeves, V. Ridoux, F. Ritter, J. Rodriguez, H. Rosenbaum, M.B. Santos, M. Scheidat, M. Sequeira, M. Simmonds, M. Stachowitsch, A. Strbenac, E. Vermeulen, P. Wade and A. Zerbini

At an IWC Workshop in January/February 2017, the independent Expert Panel reviewing Japan's Proposed Research Plan for New Scientific Whale Research Programme in the western North Pacific (NEWREP-NP) concluded, with consensus, that:

> 'in its current version: (1) the Proposal does not adequately justify the need for lethal sampling and the proposed sample sizes, particularly with respect to quantifying the likely extent of management and conservation improvement in the context of the IWC; and (2) has basic design shortcomings. The Panel recommends that the lethal sampling components of the programme should not occur until the additional work identified in its report is undertaken and reviewed.' (SC/67a/Rep01, p.44)

Specifically, the Panel concluded that the proponents had not provided sufficient justification for either the proposed sampling design or the sample size, nor had they demonstrated that additional age data obtained from lethal sampling would significantly improve conservation and management. In addition, the Panel expressed concern regarding the potential effect of the catches on minke whales, notably with regard to J stock (for which there are already known conservation concerns relating to high levels of bycatch). The papers presented by Japan to IWC SC/67a (SC/67a/SCSP01, SC/67a/SCSP09-SCSP10, SC/67a/SCSP12) did not address these substantive issues identified by the Expert Panel. A detailed description of the problems identified by the Panel can be found in SC/67a/Rep01 and is not repeated here.

This is the second IWC Expert Panel to conclude that Japan has not demonstrated the need for lethal sampling. In February 2015, another independent Expert Panel reviewing the proposal for the Antarctic Special Permit program, NEWREP-A, concluded that:

> 'with the information presented in the proposal, the Panel was not able to determine whether lethal sampling is necessary to achieve the two major objectives; therefore, the current proposal does not demonstrate the need for lethal sampling to achieve those objectives... the Panel agrees 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 nonlethal), this will not have serious consequences for monitoring change. The Panel therefore agrees that [its] recommendations... should be completed and the results evaluated before there is a final conclusion on lethal techniques and sample sizes.' (IWC, 2016)

Thus, the conclusion that lethal sampling is currently unjustified, and should be halted at least until more research has been conducted, now applies to both of Japan's active whaling programs; the additional work performed since publication of the two panels' reports has not yielded results that change the situation (for example, with respect to age data, the Committee agreed in 2015 that whether the further work was 'likely to lead to substantial improvements in conservation and management is yet to be demonstrated').

Despite this, and the availability of non-lethal alternatives to achieve proposal objectives, Japan has disregarded the major conclusions of both independent Expert Panels as well as the view of many members of the Scientific Committee, and is continuing to conduct lethal sampling in the North Pacific and Antarctic.

REFERENCE

International Whaling Commission. 2016. Report of the Expert Panel to Review the Proposal by Japan for NEWREP-A, 7-10 February 2015, Tokyo, Japan. *J. Cetacean Res. Manage. (Suppl.)* 17:507-54.

Annex P4

RESPONSE TO: COMMENTS ON JAPAN'S SPECIAL PERMIT WHALING PROGRAMS GIVEN IN ANNEX P3

Government of Japan

Pierce *et al.* (Annex P3) claim that lethal sampling in Japan's research programs (NEWREP-NP and NEWREP-A) is unjustified and should be halted.

This claim is however without foundation and thus invalid.

With respect to NEWREP-NP, they reference four documents submitted by the proponents (SC/67a/SCSP01, SC/67a/SCSP09-10 and SC/67a/SCSP12) and argue that the proponents 'did not address these substantive issues identified by the Expert Panel'. This conclusion is however incorrect, as Pierce *et al.* clearly fail to consider the most important document that addresses the major concerns of the Expert Panel, namely SC/67a/SCSP13, as well as the results of deliberations on that document in the sub-committee on the RMP.

For example, the Expert Panel recommended further analyses to assess the potential effects of catches. The proponents presented results of the additional analyses (SC/67a/SCSP13, pp.45-56), and the sub-committee on the RMP, which reviewed the progress in detail, commended the considerable work conducted by the proponents, and further agreed that the analyses of SP13 'address[ed] the major concerns raised by the Expert Panel' (see Annex D).

While the Expert Panel also expressed its concerns about the justification of sample sizes for the lethal components, the proponents conducted further analyses and presented the amended sample sizes of minke and sei whales (SC/67a/SCSP13, pp.2-38 for common minke whale; pp.39-44 for sei whale), together with provision of additional clarification and scientific justification for their overall approach. As recorded in the report of the sub-committee on the RMP, while the existence of 'widely different opinions' was noted (see Annex D), the justification of sample sizes of NEWREP-NP was duly recognized and supported by a number of members of the Scientific Committee.

Pierce *et al*. thus ignore the additional analyses and justifications provided by the proponents in responding to the recommendations by the Expert Panel as well as the conclusion of the sub-committee on the RMP. Furthermore they query the need for the collection of age data while ignoring the fact that this is regarded as of high priority by many other RFMOs (among other marine resource management groups) for improved resource management (see SC/67a/SCSP13, pp.6-7); their position implies that these many organisations are incorrect in this regard, but they offer no scientific analyses to justify this implication of their stance.

Furthermore, it should be noted that the proponents responded, in good faith, to all other recommendations by the Expert Panel providing scientific justifications, in addition to the major concerns mentioned above (see SC/67a/SCSP01 and SC/67a/SCSP10). The proponents' responses were supported by a number of members of the Scientific Committee.

It is unfortunate that Pierce *et al*. demonstrate their unwillingness to understand and appreciate the considerable efforts made by the proponents in sincerely responding to the comments by the Expert Panel Workshop, as well as the discussion thereon that ensued at SC/67a.

With respect to NEWREP-A, Pierce *et al*. also refer to the report of the Expert Panel for NEWREP-A held in 2015, and argue that 'lethal sampling is currently unjustified'. However, it should be noted that the proponents have already reported to last year's Scientific Committee that they had sufficiently completed responses to the recommendations to be addressed prior to the start of the program, and their view was shared by other scientists who 'commented that the proponents had responded satisfactorily to most of the recommendations of the Expert Panel, noting that some of the suggested further analyses have already been completed, while others are in progress or will be addressed within a reasonable timeframe' (IWC, 2017). The proponents reported further progress on their additional analyses in response to the recommendations made by last year's Scientific Committee (SC/67a/SCSP12) to this year's Scientific Committee and will continue to do so. Unfortunately, however, Pierce *et al*. hardly indicate any willingness to consider this and accept that progress has been made by the proponents.

In conclusion, the proponents have demonstrated the justification for lethal sampling sufficiently for both NEWREP-NP and NEWREP-A. The statement by Pierce *et al*. that 'Japan has disregarded the major conclusions of both independent Expert Panels as well as the view of many members of the Scientific Committee' shows only their absence of consideration of all the pertinent information.

REFERENCE

International Whaling Commission. 2017. Report of the Scientific Committee. *J. Cetacean Res. Manage. (Suppl.)* 18:1-109.

Annex P5

SUMMARY TABLES OF PROGRESS ON RECOMMENDATIONS FOR NEWREP-A AND JARPN II

NEWREP-A: Summary table of progress with recommendations

Key for 'Purpose': A: To evaluate contribution of a particular objective or sub-objective of the programme to meet conservation and management needs. B: To evaluate feasibility of particular techniques (whether lethal or non-lethal). C: Relevant to a full evaluation of whether any new lethal sampling is required D: Relevant to issues related to sample size (irrespective of method used to obtain data). E: Relevant to improve existing components of the proposed programme. Note that under 'Suggested timeframe' this was a rough estimate by the Panel and will depend on the amount of time and effort available. A considerable number of the recommendations require analytical work (this includes simulation modelling). Achieving all of these within the timeframe estimated for each individual item will require considerable resources. Those that relate to purposes A, B, C and D are higher priority for completion.

Item	Summary	Purpose	Panel's suggested timeframe	Needs new samples/data? Effort type	Proponents comments on progress (see SC/67a/SCSP12)	*Committee comments on progress in 2016* **Committee comments in 2017**
2.1.2 (1)	Evaluate the level of improvement that might be expected either in the SCAA or in RMP performance by improved precision in biological para-meters using simulation studies including updated *Implementation Simulation Trials*.	A, C, D	Within 6 months	No, analytical	**Completed to a reasonable level** (see details in Government of Japan, 2016b). The RMP/*IST*-like simulations conducted show that in nearly all cases, the modifications of the RMP's *CLA* to include information from catch-at- age data lead to either or both of catch being increased and low levels of lowest depletion being improved (where necessary) compared to the *CLA*. This also applies given periods of especially low or especially high recruitment to the minke whale populations under consideration.	*2016: The proponents have decided to evaluate how the availability of age data can improve management performance rather than assessing the extent to which estimates of management quantities (such as MSYR) can be improved given additional data from NEWREP-A. The RMP/IST-like simulations are conceptually the appropriate way to conduct this evaluation. However, the MCLA needs to be tuned to ensure better comparability with the CLA to allow appropriate comparisons to be made (see Item 5.1.1) and the scenarios need to linked more clearly to information from SCAA (i.e.be conditioned on the data). This could be achieved, for example, by assuming that the past changes in carrying capacity and/or growth could occur in the future. An Advisory Group has been established to provide advice with respect to mathematical specifications (see Annex T4). The Committee recognized a range of opinions as to the extent to which this recommendation has been addressed.* **2017: No new information (see SC/67a/SCSP12). The 2016 comments remain valid. See also Recc. 26 and Item 19.2.1.**
3.1.3 (2)	Analyses to distinguish between two stocks with mixing versus isolation by distance.	A, D	Within 3 months	No, analytical	**Already in progress.** Preliminary analyses have been conducted between the ICR and the Tokyo University of Marine Science and Technology (a document with results will be prepared for the 2017 SC meeting). As expected by the proponents, preliminary results showed that the effect size of the stocks in the Antarctic is too low to allow for the methods proposed by the review workshop to distinguish between the two hypotheses. The proponents consider that the hypothesis of at least two stocks with mixing in the research area is the hypothesis better supported by the genetic and non-genetic data.	*2016: The Committee notes that the work will be presented at the 2017 meeting.* **2017: No new information (see SC/67a/SCSP12). The 2016 comments remain valid.**
3.1.3 (3)	Simulation study to examine how additional sampling could be expected to improve precision and/or reduce bias in estimates of mixing rates.	A, D	Within 3 months	No, analytical	**To be completed in the next 1-2 years.** The original timeframe for this recommend-ation was for report at the 2016 IWC SC. However, the proponents consider that the work associated with this recommendation has lower priority among the remaining recommendations as this topic is not related to the main objectives of NEWREP-A. The proponents plan to conduct the relevant analyses to be reported to the 2018 SC meeting.	*2016: No progress reported although the Committee notes that the work will be presented at the 2018 meeting.* **2017: No new information (see SC/67a/SCSP12). The 2016 comments remain valid.**
3.1.3.1 (4)	Comprehensive biopsy sampling feasibility study.	B, C, D, E	1-2 field seasons	Yes, field effort	**Already in progress.** Explanation of the design of the biopsy sampling feasibility studies has been included in the research plans for the dedicated sighting surveys presented annually to, and endorsed by the IWC SC (Government of Japan, 2015d; Hakamada *et al*., 2016). The design has considered all elements in the recommendation. Results of the feasibility study conducted in Area IV in 2015/16 were presented by Isoda *et al.* (2016), and those obtained in the study conducted in Area V in 2016/17 are presented in SC/67a/ASI07. A Generalized Linear Model (GLM) used to compare the efficiency between biopsy and lethal sampling, indicated that the success of biopsy sampling was significantly lower than the lethal sampling (SC/67a/ASI07). Final results will be presented to the 2018 SC annual meeting.	*2016: Hakamada et al. (2016) summarised the research plan for the 2016/17 survey, including the biopsy feasibility study. Isoda et al. (2016) reported preliminary results on biopsy sampling obtained during the 2015/16 NEWREP-A survey.* **2017: SC/67a/ASI07 reported results on biopsy sampling obtained during the 2016/17 NEWREP-A survey.**
3.1.5 (5)	Comprehensive telemetry feasibility study.	B, E	2-3 field seasons	Yes, field effort	**Already in progress.** Explanation of the design of the telemetry feasibility studies has been included in the research plans for the dedicated sighting surveys presented annually to, and endorsed by the SC (Government of Japan, 2015d; Hakamada *et al.*, 2016). The design has considered all elements in the recommendation. Results of the feasibility study conducted in Area IV in 2015/16 were presented by Isoda *et al.* (2016), and those obtained in the study conducted in Area V in 2016/17 are presented in SC/67a/ASI07. The focus on the first feasibility studies was on the attachment system, which was improved in the second study. Details of the attachment system, effort, number of successful trial and tracking of the whales are shown in Isoda *et al*. (2016) and SC/67a/ASI07. Final results will be presented to the 2018 SC annual meeting.	*2016: Hakamada et al. (2016) summarised the research plan for the 2016/17 survey, including the telemetry feasibility study. Isoda et al. (2016) reported preliminary results on tagging obtained during the 2015/16 NEWREP-A survey.* **2017: SC/67a/ASI07 presented results on telemetry obtained during the 2016/17 NEWREP-A survey**

Item	Summary	Purpose	Panel's suggested timeframe	Needs new samples/data? Effort type	Proponents comments on progress (see SC/67a/SCSP12)	*Committee comments on progress in 2016* **Committee comments in 2017**
3.2.2 (6)	Estimate *g*(0)for all species.	E	Through-out	Yes, field effort then analytical	**Already in progress.** Survey design and protocols with both the IO and closing modes were implemented during the dedicated sighting surveys in Area IV in 2014/15 (Matsuoka *et al.*, 2015), in Area IV in 2015/16 (Isoda *et al.*, 2016), and in Area V in 2016/17 (SC/67a/ ASI07). The analysis of data collected will allow the estimation of *g*(0) for large whales.	*2016: Hakamada et al. (2016) summarised the research plan for the 2016/17 survey, which includes the estimation of g(0) for large whale species (using the IWC- SOWER approach). The proposed field plan was approved by the Committee.* **2017: SC/67a/ASI04 summarised the research plan for the 2017/18 survey. The Committee endorsed the cetacean abundance estimation component of this proposal and Matsuoka was appointed to provide IWC oversight.**
3.2.2 (7)	(1) Review survey design and methods taking into account: (a) analysis of IWC IDCR/SOWER cruises; (b) spatial modelling developments; (c) experience of previous multi-disciplinary surveys; (d) JARPA II review recommendations; (e) the possibility of focused surveys on specific issues in some years; (f) whales within the ice; and (g) updated power analyses of the effects of survey interval and estimation of trend. (2) Work closely with the IWC Scientific Committee before finalising survey approaches. (3) Ensure that future survey plans submitted to the Scientific Committee follow fully the guidelines for such survey plans, including incorporating proposed tracklines.	E	Within 6 months then through-out	Yes, analytical then field effort then analytical	**Already in progress.** Research plans including the elements in the recommendations above have been presented annually to the IWC SC. See Government of Japan (2015c) for the survey in 2016/17; Hakamada *et al.* (2016) for the survey in 2016/17, and the research plans have been endorsed by the Committee. The plan for the survey in 2017/18 is presented to the IWC SC in SC/67a/ASI04.	*2016: The Committee approved the proposal in Hakamada et al. (2016).* **2017: See previous recommendation.**
3.3.3 (8)	Examine feasibility of using DNA methylation ageing technique with Antarctic minke whales using good quality earplugs, testing against geo-graphical areas and different time periods and using several laboratories.	B, C, D	Within 1 year	No, laboratory then analytical	**Already in progress.** After technical consultation with one of the authors of Polanowski *et al.* (2014) it was confirmed that genes and position of age-related DNA methylation sites in the Antarctic minke whale were almost homologous to those in the humpback whales. The procedure for identification of age-related DNA methylation site (CpG) and measurement of methylation level followed previous study on humpback whale by Polanowski *et al*. (2014). DNA methylation rate of seven CpGs on three different loci were scored successfully. Furthermore regression analyses of each CpG against age (determined by earplug reading) were conducted. The regression coefficients of each CpG were lower than in the case of the humpback whale study. The next step will involve multiple linear regressions analyses for combined CpG. Final results of the feasibility study will be presented to the 2018 IWC SC annual meeting. Depending on the results and evaluation, further analyses could be conducted considering other whale species and a larger number of loci.	*2016: The Committee was informed that this work has started in collaboration with other research institutions. Results will be presented in 2018.* **2017: See comments in SC/67a/SCSP12.**
3.4.3.1 (9)	Examine use of hormones in blubber to detect sexual maturity.	B, C, D	Within 2 years	No, laboratory	**Already in progress.** The idea here is to estimate reproductive status in females using the concentration of progesterone in blubber, with appropriate accuracy. To this end, a total of 230 female blubber samples (157 pregnant, 17 non-pregnant and mature, and 56 immature) of Antarctic minke whales from Area IV and V sampled in the 2015/16 NEWREP-A survey will be analyzed by ELISA assay, using Crocodile mini-workstation (Titertek-Berthold). The hormone extractions from blubber samples and ELISA assay follow mainly the procedure by Nagata *et al.* (1996) and Perez *et al.* (2011), respectively. The analytical validation and procedure are consulted with the Faculty of Agriculture, Tokyo University of Agriculture and Technology. Measurement of progesterone in the above indicated blubber samples are ongoing. These data will be compared with reproductive information (from anatomical studies on ovaries) to evaluate the feasibility of this progesterone technique to determine reproductive status. As blubber can be obtained by biopsy samples, this technique can potentially be used by non-lethal means. Final results will be presented to the 2018 SC annual meeting.	*2016: The Committee was informed that this work has started in collaboration with other research institutions. Results will be presented in 2018.* **Some information is available (see SC/67a/SCSP12).**
3.4.3.1 (10)	Evaluate the effect on SCAA of assuming 'resting' females are immature females.	A, C, D	Within 6 months	No, analytical	**To be completed in the next 1-2 years.** The proponents will complete this evaluation when conducting additional *IST*- like simulation studies to further validate the improved performance of RMP in the context of recommendation 1*.	*2016: No methods or results presented at this meeting but see discussion under Recommendation 1.* **2017: No new information (see SC/67a/SCSP12). The 2016 comments remain valid.**

Item	Summary	Purpose	Panel's suggested timeframe	Needs new samples/data? Effort type	Proponents comments on progress (see SC/67a/SCSP12)	*Committee comments on progress in 2016* **Committee comments in 2017**
3.4.3.2 (11)	Update SCAA with respect to density-dependence following Punt *et al.* (2014), and stock mixing based on existing data.	A, C, D	Within 3 months	No, analytical	**Completed.** See Government of Japan (2015b). The density- dependence had already been incorporated (the panel comment reflected a misunderstanding). Sensitivity to an extreme alternative boundary was tested and found to make little difference to combined abundance trends. Hence this recommendation is considered to have been addressed, though mixing issues may be considered further when the proponents conduct additional *IST*-like simulation studies to further validate the improved performance of RMP in the context of recommendation 1*.	*2016: The SCAA has been updated using the density-dependence function suggested by the Panel – task complete. However, the SCAA has yet to be updated to include the data on stock mixing and to estimate mixing rates (rather than changing the assumed fixed boundary in the SCAA). Punt advised that this recommendation was not intended by the Panel to be related to RMP/IST testing, but rather to the structure of the SCAA.* **2017: No new information (see SC/67a/SCSP12). The 2016 comments remain valid.**
3.4.3.2 (12)	Identify more fully the data to be used to inform the time-varying natural mortality in the SCAA and analyse existing data to determine the feasibility and accuracy of obtaining such estimates.	A, C, D	Within 6 months	No, analytical	**To be completed in the next 1-2 years.** The proponents will complete this identification when conducting additional *IST*- like simulation studies to further validate the improved performance of RMP in the context of recommendation 1*.	*2016: No results nor methods presented but see discussion under Recommendation 1. The Siler model in De La Mare (2016) is one way to account for time-varying natural mortality.* **2017: No new information (see SC/67a/SCSP12). The 2016 comments remain valid.**
3.4.3.2 (13)	Develop metrics to evaluate the benefits of including time varying ASM data in the SCAA.	A, C, D	Within 3 months	No, analytical	**Already in progress.** The proponents have shown the impact of time varying ASM on the results of the SCAA (IWC, 2016b). The integration of time varying ASM into ISTs will take place when the proponents conduct additional *IST*-like simulation studies to further validate the improved performance of RMP in the context of recommendation 1*.	*2016: The approach outlined by the proponents should be able to address the recommendation – it would involve imposing time-trends in ASM and evaluating the impacts on performance measures when catch limits are set using the CLA (after NEWREP-A is completed). The analyses to address this recommendation could be used to select an effect size which could then have formed the basis for a power analysis to determine sample size.* **2017: No new information (see SC/67a/SCSP12). The 2016 comments remain valid.**
3.6.2.1 (14)	Consider the adoption of this multibeam sonar in krill surveys.	E	Within 6 months	No, logistical	**To be addressed.** Careful consideration will be given before the first dedicated krill survey (CCAMLR-type survey) tentatively scheduled for the 2018/19 austral summer season.	*2016: The Committee was informed that this recommendation will be addressed in consultation with CCAMLR specialists.* **2017: No new information was presented (see SC/67a/SCSP12).**
3.6.2.3 (15)	Trial the ship and echosounder system(s) in Japan well before going to the Antarctic to determine the likely effective acoustic sampling range and potential for detecting krill for multiple frequencies over the required survey depth. Conduct for both annual and broad-scale survey vessels.	B, E	Within 1 year for annual surveys	Yes, logistical, field effort, analytical	**Completed.** Calibration of the echosounder system (EK80) was conducted in Japan before the start of 2016/17 NEWREP-A. Details of this work are provided in SC/67a/EM09.	*2016: This work was completed before the start of the first whale sighting-based krill survey and results were presented in Wada et al. (2016). The Ecosystem Modelling working group encouraged further work on the survey in consultation with CCAMLR specialists.* **2017: Results of the krill and oceanographic survey under the NEWREP-A in the Antarctic in 2016/17 were presented in SC/67a/EM09.**
3.6.2.5 (16)	In the years (two out of 12) when both NEWREP-A and CCAMLR-type surveys are conducted, try to survey the same transects by both vessels in near synchrony.	E	Within prog-ramme	No, logistical	**To be addressed.** Tentatively the first dedicated krill survey (CCAMLR-type survey) will be conducted in the 2018/19 austral summer season. Research plans will be presented to CCAMLR's EMM workshops in 2017 and 2018. This recommendation will be considered in the research plan. The research plan will be adjusted in the light of these recommendations from these meetings.	*2016: The Committee was informed that this recommendation will be addressed in consultation with CCAMLR specialists.* **2017: No new information was presented (see SC/67a/SCSP12).**
3.6.2.6 (17)	Conduct full analysis of statistical power to detect changes in krill abundance from proposed techniques.	A, E	Within 6 months	No, analytical	**To be addressed.** This has been deferred until planned discussions with CCAMLR experts have taken place.	*2016: The Committee was informed that this recommendation will be addressed in consultation with CCAMLR specialists.* **2017: No new analysis was presented (see SC/67a/SCSP12).**
3.6.2.7 (18)	Develop more detailed plans to consider whether comparisons between stomach contents and proposed krill survey data are feasible and if so, how they can be done.	A, B, C	Within 3 months	No, logistical	**To be addressed.** This has been deferred until the planned discussions with CCAMLR experts have taken place.	*The Committee was informed that this recommendation will be addressed in consultation with CCAMLR specialists.* **2017: No new analysis was presented (see SC/67a/SCSP12).**
3.7.2 (19)	Ensure that sufficient time is allocated for adequate net sampling, based an analysis of previous net sampling data (e.g. BROKE/BROKE West data).	E	Within prog-ramme	No, logistical, analytical	**To be addressed.** Tentatively the first dedicated krill survey (CCAMLR-type survey) will be conducted in the 2018/19 austral summer season. Research plans will be presented to CCAMLR's EMM workshops in 2017 and 2018. This recommendation will be considered in the research plan. The research plan will be adjusted in the light of the recommendations from these meetings.	*The Committee was informed that this recommendation will be addressed in consultation with CCAMLR specialists.* **No new analysis was presented (see SC/67a/SCSP12).**
3.8.2 (20)	Give careful consideration to scale and design of oceanographic sampling, taking into account BROKE/BROKE West data.	E	Within prog-ramme	No, logistical, analytical	**To be addressed.** Tentatively the first dedicated krill survey (CCAMLR-type survey) will be conducted in the 2018/19 austral summer season. Research plans will be presented to CCAMLR's EMM workshops in 2017 and 2018. This recommendation will be considered in the research plan. The research plan will be adjusted in the light of the recommendations from these meetings.	*2016: The Committee was informed that this recommendation will be addressed in consultation with CCAMLR specialists.* **2017: No new analysis was presented (see SC/67a/SCSP12).**
3.9.3.1 (21)	Compare overlap in diet amongst fin and Antarctic minke whales using stable isotopes in skin, with concurrent analyses of krill samples to obtain stable isotope baselines.	E	Through-out prog-	Yes, field effort, analytical	**In progress.** The study involves two steps: the first is the stable isotope analyses of the prey species (krill) samples to ensure the correct determination of stable isotope baselines; and the second is stable isotope analyses of skin samples of Antarctic minke whales and of biopsy samples of fin and humpback whales. At this juncture, the stable	*2016: The Committee was informed that this work was started in collaboration with other research institutions. Final results will be presented to the mid- term review.* **2017: No new analyses (see SC/67a/SCSP12).**

Item	Summary	Purpose	Panel's suggested timeframe	Needs new samples/data? Effort type	Proponents comments on progress (see SC/67a/SCSP12)	*Committee comments on progress in 2016* **Committee comments in 2017**
			ramme		isotope analyses of four Antarctic krill samples and of 16 Antarctic minke whale skin samples have been conducted. The isotope value of δ13C and δ15N at the base of four krill samples were -26.90±0.45‰ and 3.68+0.36‰, respectively. The isotope value of δ13C and δ15N at the base of 16 skin samples of Antarctic minke whales were -25.04±0.43‰ and 7.26+0.61‰, respectively. Further analyses will be conducted on additional samples to obtain a correct determination of stable isotope baselines. This study is being carry out in collaboration with the Laboratory of Marine Ecosystem Change Analysis, Field Science Center for Northern Biosphere, Hokkaido University. Final results will be presented to the mid-term review meeting.	
3.9.3.1 (22)	Develop a more powerful approach to esti-mating energy intake (requirements) using a bioenergetics model; evaluate non-lethal methods for obtaining a time series of tuning data for such models.	A, B, D	Within 6 months	No, analytical	**To be addressed.** Need clarification from the IWC SC.	*2016: The Committee was informed that this work will be completed in 1-2 years.* **2017: No new information (see SC/67a/SCSP12).**
3.9.3.1 (23)	Investigate stable isotopes along edge of baleen plates to see if this provides insights into duration of time on feeding grounds.	B	Within 6 months	No (if existing samples), laboratory	**In progress.** Stable carbon and nitrogen isotope ratios will be determined along edge of the baleen plates of 10-20 Antarctic minke whale baleen plates. Each baleen plate will be examined at around 20 places following Mitani *et al.* (2006). The analysis of baleen plates from ten Antarctic minke whales sampled by the NEWREP-A in the Ross sea in 2016 were already conducted to understand annual cycle of nitrogen and carbon, and to estimate prey species among five potential prey species: Antarctic krill, ice krill, silver fish, Australian krill and Australian pelagic fish. The annual cycle of nitrogen in baleen plates was 7.7±2.0cm (mean±SD, range: 6.0-10.0cm), while no constant cycle was observed in carbon. The stable isotopic values at the base of baleens in carbon and nitrogen were -25.01±0.49‰ and 7.03+0.33‰, respectively. Assuming that the trophic enrichment factor in this species is the same as that in fin whales (2.77‰), the Antarctic krill was the most likely prey as the difference in nitrogen between the baleen and prey was the minimum (3.48‰) among five potential prey species. No seasonal variation in carbon suggested that they were fasting after feeding in the Antarctic, while there were two individuals which had a nitrogen cycle of more than 12cm in baleen plates. The extended period of nitrogen cycle suggested that they remained at the Antarctic to save their energy and to accumulate the energy for their growth to prepare for the next year by skipping migration to the breeding grounds. This study is being carried out in collaboration with the Field Science Center for Northern Biosphere, Hokkaido University. Final results will be presented to the 2018 IWC SC meeting.	*2016: The Committee was informed that this work has been started in collaboration with other research institutions. Final results will be presented at the 2018 Annual Meeting.* **2017: Some new information was presented in SC/67a/SCSP12**
3.9.3.3 (24)	Use 'non-lethal' techniques on all animals; develop 'condition indices'; work to develop non-lethal techniques for total consumption.	E	Within prog-ramme	To be deter-mined after relevant anal-yses related to purposes A-D are completed	**To be addressed.** This needs careful consideration. Clarification from the IWC SC is required.	*2016: No new information.* **2017: No new information (see SC/67a/SCSP12). (See comments from the proponents).**
3.11.2 (25)	Provide an improved outline of the pro-posed ecosystem and multispecies model structures and provide a data gap analysis.	E	Within 3 months	No, analytical	An update of the Mori- Butterworth Antarctic ecosystem model, taking JARPA and JARPAII data into account was presented in SC/67a/EM14.	*2016: The Committee notes that the work will be presented at the 2017 meeting.* **2017: Some results were presented in SC/67a/EM14. The Proponent will present results in 2018 (see SC/67A/SCSP12).**
4.2.1 (26)	Provide a thorough power analysis of sample sizes required to detect change in ASM and follow the other recommendations in this Item.	D	Within 3 months	No, analytical	**Completed to a reasonable level.** See details in Government of Japan (2016b; 2015a). The proponents conducted re- analyses and the results indicate that the point estimate of the cohort random effect is zero. The results therefore do not lead to any strong reason to change the sample size. Consequently the proponents have concluded that the reasonableness of the proposed sample size (333) has now been adequately demonstrated.	*2016: The analyses now reasonably account for three of the six aspects that constitute a realistic model (i.e. ageing-reading error, overdispersion in catch composition, recruitment variation).* ***Overall, the approach being taken to address the recommendation is appropriate but some further refinements are required***. • *Government of Japan (2016b) restricts the data used to fit the models to ages 4- 13 and 1980-87 and 1992-99. All of the data should be used to estimate the amount of extra- age, -cohort and -year variation rather than restricting the analysis to a subset of years and ages. Doing this also avoids the need to simulate the process of excluding some cohorts and ages when analysing future (simulated) age data.* • *The estimates in Government of Japan (2016b) of the variance of cohort random effects and extra-binomial variation (i.e. overdispersion) are zero, which makes these asymptotic estimates potentially questionable. Use a method (such as likelihood profile or the R package blme) to better quantify the*

Item	Summary	Purpose	Panel's suggested timeframe	Needs new samples/data? Effort type	Proponents comments on progress (see SC/67a/SCSP12)	*Committee comments on progress in 2016* **Committee comments in 2017**
						uncertainty of these variances and develop probability distributions for them. An example of a likelihood for the overdispersion parameter was provided, confirming that the asymptotic estimate of variance is too small. The simulations to evaluate power should then sample from these distributions. • *The current analyses do not attempt to specifically quantify the effects of year-to-year sampling variation, which reflects the impact of, for example, the locations of sampling (for examples, in some years in regions where mature animals predominate) although overdispersion arising from this sort of heterogeneity was considered to some extent in Government of Japan (2016b) in beta-binomial model.* • *Though challenging, simultaneous estimation of random effects of year and cohort can be explored using the type of model used to estimate cohort random variation in Government of Japan (2016b).* **2017: No new analysis was presented (see SC/67a/SCSP12) and Item 19.2.1. The 2016 comments remain valid.**
5.2 (27)	Provide additional analyses on effect of catches upon the stocks for comparison with those presented.	E	Within 3 months	No, analytical	The proponents had provided results based on one application of the *CLA* and by using the program Fitter. The NEWREP-A review workshop agreed that the conclusion that catches of the order of 333 every 2nd year form these analyses will not harm the stocks is very likely robust to the analytical method applied (IWC, 2016a). Therefore the proponents see no real need to implement this recommendation.	*2016: The Committee notes the rationale for the additional work provided in the Panel report and agrees with that position.* **2017: No new information (see SC/67a/SCSP12). The 2016 comments remain valid.**
7.2 (28)	Improve mechanisms for co-operative research.	E	Within 3 months	No, logistical	**Already in progress.** The proponents have already posted a formal protocol for outside scientists to submit proposals for both field and analytical work. Expanded information on the mechanisms for co-operative research was presented in the revised research plan proposal for NEWREP-NP (GOJ, 2017), which is also valid for NEWREP-A (see section 6 and Annexes 20 and 22 of the NEWREP-NP revised research proposal).	*2016: The Committee noted the protocol placed upon the ICR website.* **2017: See comments in SC/67a/SCSP12.**
8.2 (29)	Provide information on programme management, personnel and logistic resources.	E	Through-out prog-ramme	No, logistical	**Already in progress.** Expanded information and explanation of the logistics and project management was presented in the revised research proposal for NEWREP-NP (Government of Japan, 2017), which is also valid for NEWREP-A. In particular refer to section 5 and Annex 21 of the research proposal.	*2016: Government of Japan (2016a), Appendix 1 contains a progress report on management, personnel and logistic resources.* **2017: See comments in SC/67a/SCSP12.**

*As described in the sub-section 4.4 of Government of Japan (2016a), the proponents believe that the response required for recommendation 1 has been provided. Building upon this, the proponents are aware that, for justifying the adoption by the Committee of a modified *CLA* with age data (MCLA) for Antarctic minke whales in preference to the existing *CLA*, further work would need to be specified by and then undertaken through the Committee. This would involve both refinement of the MCLA developed here and its testing under a more extensive set of trials/OMs, and such further work would desirably be pursued in the future. However, in line with the Committee's customary practice, a pre-requisite for this further work, is for the Committee to provide a pre-specified set of agreed trials (the proponents, if contributing to such further work, should not be expected to invest considerable time in developing and running further trials, only to be informed later by the Committee that they would have wanted different trials run). Accordingly, the proponents look forward to the Committee agreeing on the specifications of an extension to the trials undertaken here (or at least, more immediately, on a process to develop those specifications in the Committee), so that work can continue in the Scientific Committee with the aim of ultimately adopting a MCLA making use of age data which would be suitable for implementation for setting catch limits for Antarctic minke whales.

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JARPN II: 2017 Scientific Committee discussion and the current status of progress.

	Topic (and agenda number from the 2016 Panel review)	2016 Panel suggested timeline, progress by 2017 Panel meeting and 2017 Panel comments and conclusions	Comments by the Proponents (SC/67a/SCSP09)	**Progress at SC/67a (2017)**
Sampling design and areas (Item 3.4.2.1)				
(1)	A new paper that in addition to the information on sightings, it should document, for each year and season: (a) the predetermined tracklines for sampling and the rationale for those lines; and (b) the actual coverage of those tracklines and the rationale for any decisions taken to deviate from the predetermined lines including the rationale for any new lines developed. (c) It should also address the issue of whether the actual sampling that occurred can be said to be representative of: (a) the animals in the surveyed area; and (b) those in the biological population(s) and discuss the extent to which this may affect those objectives/ parameters/analyses for which this is or may be important.	By SC/2016 - The proponents responded in Bando *et al.* (2016). The Committee discussed this at some length (see Item 18.2.3.1). Suggestions were made to improve the manuscript and to better evaluate the appropriateness of the pooling of data. This requires analyses that disaggregate the data collected according to the two different sampling strategies. This may allow pooling of data but the precision of estimated quantities, and hence required sample sizes, should also be examined. Issues related to the sample representativeness and the effect of this are partially addressed. **2017 Panel comment: Relevant to discussion under Item 4.2.**	**Already in progress.** The proponents responded to the above recommendations in Tamura *et al.* (2016a) and Bando *et al.* (2016). Several analyses are ongoing.	**No new information presented (see SC/67a/SCSP09).**
(2)	Papers using data from the inshore component must fully address the implications of the logistical rather than scientific sampling design.	By SC/2016 - Partially addressed in Bando *et al.* (2016) but further analyses required to make allowance for non-random sampling. **2017 Panel comment: Relevant to discussion under Item 4.2.**	**Already in progress.** The proponents responded to the above recommendations in Tamura *et al.* (2016a) and Bando *et al.* (2016). Several analyses ongoing.	**No new information presented (see SC/67a/SCSP09).**
Sample size (Item 3.4.2.2)				
(3)	A new paper should be developed that: (a) provides a clearer rationale for the changes in sample sizes initiated in 2014 and any implications for meeting the original objectives of the programme; and (b) provides the field and analytical protocols for the comparison of using lethal and non- lethal techniques for each key parameter taking into account the advice provided in 2009.	By SC/2016 - (3a) The proponents provided some information in Tamura *et al.* (2016a). The Committee noted that this largely referred to information already available to the Panel and Committee and noted that further information, especially with respect to the implications for meeting the original objectives would be helpful. By SC/2016 - (3b) The proponents presented the field and analytical protocols in Mogoe *et al.* (2016). Committee advice on presentation of results and analyses in a final report is given under Item 18.2.3.2 of SC/66b (IWC, 2017). **2017 Panel comment: Relevant to discussion under Item 3.**	**Already in progress.** Update of analyses on efficiency of biopsy sampling presented in SC/67a/SCSP11.	**See information presented in SC/67a/SCSP11.**
Stock structure (Item 4.4.3)				
(4)	All inferences regarding 'randomness' of observations (e.g. satellite tracks, mitochondrial DNA haplotypes and unassigned common minke whales) should be substantiated by a statistical assessment of the presumed randomness.	By SC/2016 (or 2017 at latest) - Tamura *et al.* (2016a) indicates this will be addressed and proposes two approaches.	**Already in progress.** *Progress was shown in Appendix 1 of Tamura et al. (2017) and SC/67a/ SDDNA05.*	**Partially addressed. Regarding J and O stock, the random effect of microsatellite locus selection on stock assignment was investigated (see SC67a/ SDDNA05). Further, the occurrence of Parent-Offspring pairs within and among stocks was statistically compared to random expectations (SC67a/SDDNA01).**
(5)	The presence of multiple stocks within sample partitions should be assessed (employing, e.g. STRUCTURE and DAPC).	By SC/2016 (or 2017 at latest) - In progress (see discussion in SC/67a/Rep01. **See Item 3.3.1 for 2017 Panel's full comments.**	**Already in progress.** *STRUCTURE analyses for Bryde's and sei whales were conducted and presented in Appendix 2.1 of Tamura et al. (2017). DAPC analysis is in progress (Appendix 2.2 of Tamura et al. (2017). The final results of DAPC for Bryde's whale were submitted to the Bryde's whale Implement-ation Review Workshop held in March 2017.*	**Addressed for Bryde's whale.**
(6)	More explicit information on quality checks be provided in each study as well as study-specific estimates or genotyping and DNA sequencing error rates.	By SC/2016 (or 2017 at latest) - Goto *et al.* (2016) fully addresses this (see SC/67a/Rep07). **The 2017 Panel agreed that this recommendation has been completed.**	**Completed.** *See Appendix 3 of Tamura et al. (2017).*	**Completed.**
(7)	To facilitate more definitive discrimination between single and multiple stock hypotheses, undertake work to determine the demographic dispersal rates among areas at which whales in different areas can be managed as a single stock. Identifying 'critical' dispersal rates by specific case and the corresponding levels of genetic divergence, should enable such discrimination. The approach of Van der Zee and Punt (2014) is commended. This will allow the development of a working definition of a 'stock'.	2-3 years after the 2016 Annual Meeting - The proponents noted that work had begun to address (7), (9) and (10). They propose use of kinship analyses to address (8). Progress is discussed further in SC/67a/Rep01. **2017 Panel: No progress presented at the meeting.**	**To be completed in the future.** *This recommend-ation will be addressed after a discussion on direction of the analysis at the IWC SC.*	**To be completed by 2019.**
(8)	Analytical approaches should be applied that do not assume mutation-drift-migration equilibrium (Hey, 2010).		**Will not be addressed.** *This may not be feasible for the cases of O stock common minke, Bryde's and sei whales where the effect sizes are low. Instead, kinship information will be used as a way to estimate migration rates, as this is an approach that does not depend on the assumption of genetic equilibrium.*	**To be completed by 2019.** See comments from the proponents.
(9)	Serious consideration should be given to using genome-wide SNP geno-typing approaches, such as RAD sequencing and GBS (Elshire *et al.*, 2011; Miller *et al.*, 2007). This will increase the data per sample thereby improving the accuracy and precision of genetic parameter estimates and facilitate additional analyses (Hey and Machado, 2003; Robinson *et al.*, 2014).		**Already in progress.** *Novel SNPs for minke whale species were developed under the collaborative research with Norway (Malde et al., 2017), which will be used for the subsequent genetic analyses.*	**To be completed by 2019.**

	Topic (and agenda number from the 2016 Panel review)	2016 Panel suggested timeline, progress by 2017 Panel meeting and 2017 Panel comments and conclusions	Comments by the Proponents (SC/67a/SCSP09)	**Progress at SC/67a (2017)**
(10)	A focused satellite tagging programme should be developed to greatly increase sample size to assess individual migration in the context of stock structure hypotheses more thoroughly.		**Already in progress**. *The proponents agree to make efforts to increase the number of satellite tagging experiments. In the case of the Bryde's and sei whales, this information should be examined in conjunction with the available information on mark- recapture from the period of commercial whaling. Effort to collect tagging data will be increased in the NEWREP-NP.*	**To be completed by 2019.**
Feeding ecology and ecosystem studies – Oceanography (Item 5.4.3.1)				
(11)	Chl-a concentration should be examined as a potential proxy for the food environment for whales.	2 years after the 2016 Panel review - Used in some analyses already and discussed in Tamura *et al.* (2016a).	**Completed.** Used in some analyses already and discussed in Tamura *et al.* (2016a).	**Completed**
(12)	Oceanographic monitoring is required to compare with prey species distribution and abundance in the new 'decadal regime'.	Several years - The proponents agreed – this is long-term monitoring.	**To be addressed**. *Long-term monitoring.*	**To be completed in future**
Feeding ecology and ecosystem studies – Distribution (Item 5.4.3.2)				
(13)	With respect to papers Murase *et al.* (2016), Murase *et al.* (2014), Matsuoka *et al.* (2016), Sasaki *et al.* (2013) and Tamura *et al.* (2016b), develop revised versions that: (a) include statistical summaries on model fit (R2 and % deviance explained) and model comparison and spatial covariate selection (e.g. AIC, GCV scores); (b) avoid extrapolation of the regression models outside to data-poor areas or areas lacking coverage (especially when combining food consumption with sightings data); and (c) include variance plots of the fitted prediction surfaces in order to address precision and data sparseness.	By SC/2016 - (13a) The proponents provided statistical summaries relating to model fits in papers Murase *et al.* (2016), Murase *et al.* (2014), Sasaki *et al.* (2013) and Tamura *et al.* (2016b), but not in Matsuoka *et al.* (2016). (13b, 13c) No information received. **2017 Panel: no progress presented at the meeting. See new details on plans in Annex D**.	**To be addressed.** *Improvement of analyses of Matsuoka et al. (2016) (spatial abundance estimation) and Tamura et al. (2016b) (spatial prey consumption estimation) is ongoing. Because they are companion papers, the improvement is conducted in parallel. Some of the results were presented to 2016 PICES annual meeting (Sasaki et al., 2016) to invite comments from regional experts. The improved version will be presented to 2017 PICES annual meeting for further consideration. Fully improved version would be submitted to IWC/SC after 2018. Revision of published papers (Murase et al., 2014; Sasaki et al., 2013) will not be conducted because they only used part of JARPN II data and full consideration can be achieved by improving Matsuoka et al. (2016) and Tamura et al. (2016b).*	No information presented.
(14)	Considerable effort be put into the methodological improvement of the spatial modelling in the various analysis related with the objectives on distribution of large whales and oceanography. A particular focus must be on the combination of survey data from the different years to make them more comparable in terms of distribution (and abundance) over time; use of data from other sources (e.g. the IWC-POWER programme). This work is not only valuable in itself but is essential for a better parameterisation of ecosystem models.	2-3 years after the 2016 Annual Meeting - The proponents agreed and will undertake in light of guidelines to be developed by the Scientific Committee in 2017 (see Annex D). Will also include additional data. **2017 Panel: no new analyses presented at the meeting although the proponents suggested that a new paper will be presented at the 2018 Scientific Committee meeting.**	**To be addressed.** *See also comments to Recommend-ation 13.*	**To be completed by 2019.**
(15)	Additional effort be placed on fulfilling the 2009 recommendation with respect to the photo- identification data to contribute to the understanding of large scale movements and whale distribution within and outside the JARPN II survey area for several species.	2-3 years after the 2016 Annual Meeting - The proponents agreed that consideration will be given to sharing photo-ID data. **2017 Panel: no progress presented at the meeting.**	**To be addressed.** *The database validations work started for several species.*	**To be completed by 2019.**
Feeding ecology and ecosystem studies – Distribution (Item 5.4.3.2)				
(16)	Explore methods to account for sampling differences between areas and years to obtain measures of short- and long-term variation and trends and estimates the extent of additional variance due to changes over time in spatial distribution (essential for modelling efforts, for example, in food consumption models and ecosystem models).	2-3 years after the 2016 Annual Meeting - The proponents agreed and expect to achieve this within the timeframe. **2017 Panel: no progress presented at the meeting.**	**To be addressed.** *The proponents will explore the method using models such as mixed effect model.*	**To be completed by 2019.**
(17)	Compare results from the design-based estimates of abundance with those of model-based estimates to potentially address problems of unequal sampling coverage between surveys and to potentially account for additional sources or causes of variability.	2-3 years after the 2016 Annual Meeting - The proponents agreed and expect to achieve this within the timeframe and in line with the IWC guidelines discussed under (14) above.	**To be addressed** Work are ongoing.	**To be completed by 2019.**
Feeding ecology and ecosystem studies - Field and laboratory studies				
(18)	The sampling distribution for the parameters should be used in the assessment of the uncertainty associated with the estimation of consumption.	By SC2016 (or 2017 at latest) - Proponents agreed and will complete by 2017. **2017 Panel: see Item 3.3.2 for full comments.**	**Already in progress.** *Progress summarised in Appendix 4 of Tamura et al. (2017).*	**No information presented.**
(19)	Clarification should be provided on how density and diet consumption have been extrapolated outside the areas and months covered during the surveys and diet studies.	By SC2016 (or 2017 at latest) - Response provided in Bando *et al.* (2016) and discussed.	**Already in progress** Analyses are ongoing.	**No information presented.**
(20)	All sources of uncertainty should be quantified and an evaluation of which parameters contribute the most to uncertainty be conducted and taken into account in the analyses and modelling.	2-3 years after the 2016 Annual Meeting - The proponents agree. **2017 Panel: no progress presented at the meeting.**	**Already in progress** *Analyses are ongoing.*	**To be completed by 2019.**
(21)	The studies on allometric relationships should be developed further to refine the range of suitable allometric-energy intake/consumption relationships.	2-3 years after the 2016 Annual Meeting - The proponents will complete the work within the timeframe. **2017 Panel: no progress presented at the meeting.**	**Already in progress** *Analyses are ongoing.*	**To be completed by 2019.**

	Topic (and agenda number from the 2016 Panel review)	2016 Panel suggested timeline, progress by 2017 Panel meeting and 2017 Panel comments and conclusions	Comments by the Proponents (SC/67a/SCSP09)	Progress at SC/67a (2017)
(22)	The analyses of diet composition should consider the effect of seasonal changes in energy density of the various prey species.	2-3 years after the 2016 Annual Meeting - Proponents agreed and will complete by 2017. **2017 Panel: see Item 3.3.2 for 2017 Panel's full comments.**	**Already in progress.** *The proponents considered the effect of seasonal changes in energy density of the various prey species. Table 3 of Tamura et al. (2016b) indicated seasonal changes in energy density of the various prey species. Table 4 of Tamura et al. (2016b) indicated prey composition (W%) of each whale sampled. Table 5 of Tamura et al. (2016b) indicated the energy contents consumed by whales calculated based on their prey composition in research area based on Tables 3 and 4. See Appendix 5 in Tamura et al. (2017).*	**To be completed by 2019.**
(23)	Stable isotope analysis of whale tissues and their prey should be introduced not only into the assessment of diet, but also to statistically evaluate overlap in distribution and trophic niche between baleen whale species.	2-3 years after the 2016 Annual Meeting - With respect to (23) a study has begun with Hokkaido University. **2017 Panel: see Item 3.3.2 for 2017 Panel's full comments.**	**Already in progress.** *Preliminary result is shown in Appendix 6 of Tamura et al. (2017).* From this feasibility study, it was revealed that stable isotope ratio of both whale skin and prey species shows seasonal and yearly variation and it is necessary to analyze samples covering the whole feeding season and area. Although only skin was analyzed in this study, other tissues such as muscle or liver would be useful to consider turnover time. Further analysis will be carried out to evaluate the possibility of contribution by stable isotope analysis to feeding ecology study of whale species in the western North Pacific. The final report will be presented at the 2018 IWC/SC meeting.	**To be completed by 2019**
Feeding ecology and ecosystem studies – Ecosystem modelling (Item 7.4.3)				
(24)	Generic recommendations identified by the 2009 Panel remain.	2-3 years after the 2016 Annual Meeting	**Already in progress**	**To be completed by 2019**
(25)	Generic recommendations identified by the 2009 Panel remain.	2-3 years after the 2016 Annual Meeting - The proponents agree.	**Already in progress**	**To be completed by 2019**
(26)	Establish clear objectives on the ultimate use of the models to make further progress (e.g. better understanding ecosystem linkages, delivering advice for fishery management) – ecosystem models are not suitable for tactical management.	2-3 years after the 2016 Annual Meeting - The proponents agree. **2017 Panel: no progress presented at the meeting.**	**Already in progress.** *Objective will be considered by a domestic group comprising scientists and managers in parallel with improvement of basic structures of models.*	**To be completed by 2019**
(27)	Use models in concert e.g. use food web modelling to establish key predation linkages for extended single-species or multispecies models. In such a way the suite of available modelling tools can be used to integrate available knowledge.	2-3 years after the 2016 Annual Meeting - The proponents agree. **2017 Panel: no progress presented at the meeting.**	**Already in progress.** *The proponents have been under-taking some basic analysis especially on the effect of presence of ghost population etc. Construction of food web model at local scale (e.g. off Sanriku) will also be considered.*	**To be completed by 2019**
(28)	Use stable isotopes to provide information on long term feeding patterns and inform models about trophic relationships between whales and their prey (see also Item 6.4).	2-3 years after the 2016 Annual Meeting - The proponents agree in broad terms but note the use in modelling may be limited. **2017 Panel: no progress presented at the meeting.**	**Already in progress.** *See also comments to Recommendation 23.*	**To be completed by 2019**
(29)	With respect to the EwE modelling: (a) evaluate data quality for each input parameter (the 'pedigree', e.g. Gaichas *et al.* (2015) to characterise uncertainty in model inputs; (b) further evaluate PREBAL and other diagnostics; (c) present more clearly and evaluate further the estimated vulnerabilities and other fit diagnostics (including sensitivity analysis using ranges of consumption estimates).	2 years after the 2016 Panel review - The proponents agree and will undertake analyses within the time frame but note some limitations with EE in the western North Pacific situation. **2017 Panel: no progress presented at the meeting.**	**Already in progress.** *Improved version of the model was presented to 'ICES/PICES: Drivers of dynamics of small pelagic fish resources' in March 2017 to invite comments from experts of small pelagic fish (Watari et al., 2017). Further improvement will be considered based on the comments if any. Fully improved version would be submitted to IWC/SC after 2018.*	**To be completed by 2019**
(30)	With respect to extended single-species modelling: (a) ensure that the majority of predation mortality is captured; (b) carry out additional diagnostics: (1) examine the fits to: (i) fishery-independent survey data; (ii) proportion information; and (iii) trends in fishing mortality; (2) use posterior predictive checks to evaluate Bayesian model. (c) provide thorough justification for the current spatial boundaries of the model and the use of fishery CPUE as an index of abundance. (d) focus the model fitting on the fishery- independent survey if CPUE not considered likely to index abundance; (e) examine sensitivity to alternative plausible functional forms of the feeding relationship; and (f) explore the causes of the implausible posteriors, e.g. Kitakado *et al.* (2016) by changing the weights assigned to the data sources and fitting the model.	2-3 years after the 2016 Annual Meeting - The proponents broadly agree with all components of this recommendation, but identify some difficulties with lack of data for item (e). **2017 Panel: no progress presented at the meeting.**	**Already in progress.** *Some works have been undertaken such as standardisation of CPUE series and use of them in the model fitting. In addition to Bayesian methods, estimation with ML method has been revisited. All but (e) will be finalised in 2018.*	**To be completed by 2019**
Monitoring environmental pollutants in cetaceans and marine ecosystem (Item 8.4.3)				
(31)	To improve the statistical analyses based on clear and well-formulated hypotheses.	By SC/2016 (or 2017 at latest) - Addressed in Yasunaga *et al.* (2016b) and Yasunaga *et al.* (2016a), although additional consultation with statisticians would be beneficial.	**Completed.** Addressed for Hg Yasunaga *et al.* (2016b) and PCB Yasunaga *et al.* (2016a).	
(32)	Recalculate OC concentrations as values on a lipid weight basis, and Hg concentrations on a dry weight basis.	By SC/2016 (or 2017 at latest) - The proponents elucidate some difficulties to address this recommendation due to e.g. loss of samples by tsunami ensued the 2011.	**Cannot be addressed.** Difficulties to address this recommend-ation due to e.g. loss of samples by tsunami in 2011.	**See comments from the Proponents**

	Topic (and agenda number from the 2016 Panel review)	2016 Panel suggested timeline, progress by 2017 Panel meeting and 2017 Panel comments and conclusions	Comments by the Proponents (SC/67a/SCSP09)	**Progress at SC/67a (2017)**
(33)	Explore trends in pollutant concentrations using generalized additive models (GAMs) or other non-linear approaches, in addition to the linear models.	By SC/2016 (or 2017 at latest) - Addressed in Yasunaga *et al.* (2016b) and Yasunaga *et al.* (2016a).	**Completed.** Addressed for Hg Yasunaga *et al.* (2016b) and PCB Yasunaga *et al.* (2016a).	
(34)	Evaluate the pollutant concentrations found in comparison with data from previous studies conducted in comparable species and available in the literature.	By SC/2016 (or 2017 at latest) - More discussion on comparisons with previously published studies were included in Yasunaga *et al.* (2016b) and Yasunaga *et al.* (2016a).	**Completed.** Addressed for Hg Yasunaga *et al.* (2016b) and PCB Yasunaga *et al.* (2016a).	
(35)	Since body length is a poor proxy for age, particularly in sexually mature whales, incorporate age data into the multivariate analysis of pollutant concentrations as soon as they become available.	2-3 years after the 2016 Annual Meeting - The proponents agree and will undertake work. **2017 Panel: no progress presented at the meeting. However, in light of the proponents' comments, the Panel stresses that this recommendation can be implemented without collecting additional samples and the results can be presented within the suggested timeline.**	**Already in progress.** Analyses are ongoing.	**To be completed by 2019**
(36)	To include stable isotope values in the analyses to investigate the bioaccumulation process of pollutants through the food chain.	2-3 years after the 2016 Annual Meeting - The proponents agree and will undertake work. See comments in Tamura *et al.* (2017).	**Already in progress.** *See progress on Recommendation 23. Proponents will integrate this result for investigating the bioaccumulation process of pollutants.*	**To be completed by 2019**
(37)	To assess more widely the risk that these chemical pollutants present to the populations' abundance or distribution.	2-3 years after the 2016 Annual Meeting -The proponents agree but for long-term. They note no health risk from OCs or Hg thus far. **2017 Panel: no progress presented at the meeting. However, in light of the proponents' comments, the Panel stresses that this recommendation can be implemented without collecting additional samples and the results can be presented within the suggested timeline.**	**Already in progress.** *This item will be addressed under Ancillary Objective I (iii) of the research plan for NEWREP-NP.*	**To be completed by 2019**
Ageing (Item 9.1.2)				
(38)	To investigate into whether there is any relationship between age or sex and readability that may affect the representativeness of the earplugs that can be read.	2 years after the 2016 Panel review - The proponents agree and work is underway. **2017 Panel: progress in this area was presented at the meeting (see Annex D). See Item 3.3.3 and 4.4.3.2 for 2017 Panel's full comments.**	**Already in progress.** *Some progress on ageing was provided at the NEWREP-NP Review Workshop (Government of Japan, 2017) and Implementation Review Workshop for western North Pacific Bryde's whales (Bando and Kato, 2017); SC/67a/Rep01; SC/67a/Rep07).*	**To be completed by 2019**
(39)	To age as many of the existing samples as possible and to incorporate age where appropriate in updated analyses (e.g. see the recommendations on pollutant studies).	2 years after the 2016 Panel review - Work is underway. **2017 Panel: no progress presented at the meeting.**	**Already in progress.** *Some progress on ageing was provided at the NEWREP-NP Review Workshop (Government of Japan, 2017) and Implementation Review Workshop for western North Pacific Bryde's whales (Bando and Kato, 2017; SC/67a/Rep01; SC/67a/Rep07).*	**To be completed by 2019**
Recommendations to the Scientific Committee on process (Item 11)				
(40)	The Panel recommends that the Scientific Committee considers: (a) including a guideline either relating to the minimum time after completion of a programme that a final review can take place or establishing a small review group to determine whether the materials available are for a review Workshop; (b) adopt guidelines for an integrated final report by the proponents. (c) to consider a mechanism for proponents to provide a short biennial update on progress with recommendations. (d) develop a mechanism to allow for the completion of expert panel reviews if a Panel states that its review is incomplete until further information/analyses is provided.	Some of these matters are under consideration by the Scientific Committee - see Item 26.3 in IWC (2017). **The Panel reiterates recommendations 40a, 40c and 40d. See Item 3.3.5 and 5.1 for 2017 Panel's full comments.**	Proponent's representatives are fully involved in the intersessional work carried out by the Intersessional Correspondence Group on 'Annex P'.	**Still in progress**

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Appendix 1

PAST OR EXPECTED EXPERT ('ANNEX P') WORKSHOPS TO REVIEW NEW, ONGOING OR COMPLETED SPECIAL PERMIT PROGRAMMES

Table 1

Past or expected Expert ('Annex P') Workshops to review new, ongoing or completed special permit programmes.

Subject	Status	Proposed dates	References
JARPN II (ongoing programme)	Completed in 2009	N/A	IWC (2010a; 2010b)
Icelandic (final review)	Completed in 2012	N/A	IWC (2014a)
JARPA II (ongoing programme)	Completed in 2014	N/A	IWC (2015)
JARPN II (ongoing programme)	Completed in 2016	N/A	IWC (2014b)
NEWREP-A	Completed in 2015	N/A	IWC (2016)
NEWREP-NP	Completed in 2017	N/A	SC/67a/Rep01.
NEWREP.-A mid-term review	Expected in 2021		
NEWREP.-NP mid-term review	Expected in 2023		

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