

SC/J17/ForInfo02

Extracts from SC Report on JARPN II [uncorrected page proof]

International Whaling Commission



INTERNATIONAL
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workshops. Whale and environmental data collected from this survey are available for the national (Japan) and international scientific community following established protocols. A summary of the data and samples collected and guidelines for research collaboration and access to the data is available on the web³⁰. Details of the survey methods and results are presented in SC/66b/SP07, SC/66b/IA05 and SC/66b/EM03.

SC/66b/SP07 reports the results of biological sampling described above. It also reports the results of the sighting surveys and photo-ID and biopsy sampling of large whales by the sighting sampling vessels (SSVs). Two SSVs and one research base were engaged in the survey for 65 days. A total of 335 primary sightings (915 individuals) of Antarctic minke whales was made. Three blue whales, 9 humpback whales and one killer whale were photo-identified and seven biopsy samples were collected (blue (1), humpback (5) and killer whale (1)).

Attention: SC

In discussion, given comments in previous Expert Panel reports about the value of such information, the Committee requests that in the cruise reports prepared by the proponents, they should identify cases where predetermined tracklines could not be followed and explain the rationale behind any changes; this will assist with the review process in the future (see Item 26.3).

It was also noted that although total fat weight may be the most appropriate measure of body condition, this had only been measured in 5 out of 333 whales. The authors responded that the number of whales that had been weighed was limited by logistic considerations. They noted that blubber samples were taken from all individuals with the intention of investigating the fat content in blubber as an alternative indicator of body condition. Unfortunately, it will not be possible to compare fat content in blubber with historical samples from JARPA/JARPA II because these samples were lost as a result of the tsunami in 2011.

18.1.3 Conclusions and recommendations

The Committee refers to the full consideration of the NEWREP-A proposal that occurred in 2015, including the conclusions and recommendations of the Expert Panel (IWC, 2016d) and the subsequent discussion, conclusions and recommendations within the Committee (IWC, 2016i, p.71-78). The Committee **notes** that these remain valid and this year the focus has been on reviewing the progress made by the proponents with respect to the recommendations made. These are summarised in Table 23.

Some members commented that although the work required to fulfil the Committee's recommendations from last year is still in progress, these tasks remain incomplete and the results thus far have not demonstrated that the NEWREP-A programme requires lethal sampling to achieve its stated objectives. They noted that the Expert Panel had also advised that a short (e.g. 2-3 year) gap in the existing series to complete the recommended further analyses would not have serious consequences for monitoring change. Therefore, in their view, continuation of lethal sampling in the 2016/17 season has not been justified.

Other members 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.

In response to the above comments, Japan stated that after the 2015 Scientific Committee meeting, the proponents had conducted additional analyses indicated by the Scientific Committee. They had assessed that all items pointed out by the Scientific Committee to be conducted prior to the start of NEWREP-A had been completed at a reasonable level, and had decided to implement NEWREP-A. They believe that the current results already demonstrate the utility of age data to improve the performance of *CLA*. While implementing NEWREP-A, the Proponents stated that they will report on further progress on the additional work following the steps specified by the Advisory Group (see Annex T4), which in their opinion go beyond the original scope of Recommendation 1, in view of the use of the collected data in the Committee's future work.

18.2 Final review of JARPN II

The Scientific Committee noted that the JARPN II Special Permit programme was conducted from 2000 to 2016. The Expert Panel and Scientific Committee's review of this programme under Annex P in 2016 was primarily limited to data collected from 2000 to 2013, while preliminary data and analysis from 2014 and 2015 have been provided. The Scientific Committee recalled its recommendations and agreement (IWC, 2016i, p.78) that states:

'The Committee recommends [...] that the JARPN II review by the Panel and Committee should focus on [...] a final review of the programme in accordance with the revised Annex P.'

'The Committee also agrees that the data for the period up to 2016 shall be available for the review of any new North Pacific proposal submitted by Japan for review in 2017.'

Attention: SC

The Committee agrees that the review of a new North Pacific proposal will also include the review of JARPN II with the inclusion of those data (2014 to 2016) that have become available since the final review of JARPN II in SC/66b/Rep06. The review will also assess progress against recommendations made in SC/66b/Rep06.

18.2.1 Presentation of Expert Panel report (SC/66b/Rep06)

For the JARPN II final review, the selection of the expert panel (hereafter 'the Panel'), chaired by Fortuna, took into account membership of the mid-term review in 2009 for consistency and experience. In addition to the Chair, Head of Science and one member of the SSG, the Panel included three regular members of the Committee, three former members who have not attended for some years, and five non-members of the Committee; one member participated by correspondence only. Expertise in all areas of the research programme was available. The review by the Panel was guided by Terms of Reference for final reviews of Special Permit research proposals developed by the Scientific Committee (referred to as 'Annex P': IWC, 2016{).

The remainder of Item 18.2.1 (including Item 18.2.1.1) is a summary of the main aspects of the Panel's report by its Chair, Fortuna. It is not intended to replace the need to consider the full report (SC/66b/Rep06).

The Panel received a total of 55 primary papers, 37 'for information' papers, 1 observer statement and a response by the proponents to that statement. An important component of the review was to examine progress made by the proponents with response to the recommendations of the 2009 Expert Panel (see Annex D in SC/66b/Rep06).

³⁰<http://www.icrwhale.org/NEWREP-AProtocol.html>.

Item	Summary	Purpose	Suggested timeframe	Needs new samples/data? Effort type	Proponents comments on progress (see SC/66b/SP09)	Committee comments on progress
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 see no real need to implement this recommendation, and request the IWC SC to provide convincing reasons as to why addressing this recommendation is necessary for NEWREP-A. The proponents make this comment in the light of the Expert Panel agreement that the conclusion that catches of the order of 333 every 2 nd year will not harm the stocks is very likely robust to the analytical method applied.	<p>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 SC/66b/SP10 in beta-binomial model.</p> <ul style="list-style-type: none"> • 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 SC/66b/SP10. <p>The Committee notes the rationale for the additional work provided in the Panel report and agrees with that position.</p>
7.2 (28)	Improve mechanisms for cooperative research.	E	Within 3 months	No, logistical	Already in progress. The proponents have already posted a formal protocol for outside scientists to express interest, on the website of the ICR (in English): http://www.icrwhale.org/NEWREP-A/Protocol.html .	The Committee noted the protocol placed upon the ICR website.
8.2 (29)	Provide information on programme management, personnel and logistic resources.	E	Throughout programme	No, logistical	Already in progress. Relevant information is provided to the IWC SC in an annual progress reports in response to the SC's comments and suggestions (see Appendix 1).	SC/66b/SP09, Appendix 1 contains a progress report on management, personnel and logistic resources.

¹Also link to biopsy feasibility study (Item 3.1.3.1). E-mail communication with Dr. S. Jarman, Australia, dated 15 December 2015.

²This method is being used in a master thesis study titled: 'Feasibility study of Antarctic minke whale aging based on DNA methylation by direct sequencing method' by Risa Shimizu (Azabu University, Kanagawa Prefecture).

³ICR-Riken Genesis Co. research collaboration under ICR Contract No. ICR-78-4, May 2016.

⁴ICR-Japan Chemical Analysis Center. Research contract No. 27P10, March 2016.

⁵ICR-Hokkaido University research collaboration under ICR Contract No. ICR-76-47, April 2016.

*As described in the sub-section 4.4 of SC/66b/SP10, the proponents believe that the response required for recommendation 1 has been provided. Building upon this, the proponents are aware that, for the purpose of justifying the adoption by the Committee of a modified *CLA* 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.

The primary objective of the Expert Panel Workshop for this final review was to review the scientific aspects of the JARPN II programme in the light of the stated programme objectives. In particular, the Panel was to:

- (1) assess the extent of the programme's scientific output;
- (2) assess the degree to which the programme coordinated its activities with related research projects;
- (3) evaluate other contributions to important research and information needs outside the original set of objectives; and
- (4) evaluate how well the objectives of the research were met, and the extent to which results have led to demonstrated improvements in the conservation and management of whales and/or other marine living resources.

The Panel noted that this 'final' review was somewhat unusual in that the field component of the JARPN II programme was not expected to finish until 2016 (SC/66b/Rep06, p.3). The Panel's general comments and recommendations on: (a) timing; (b) the nature of final reports; (c) the work being undertaken from 2014-16 to compare lethal and non-lethal techniques; and (d) ways to improve consideration of progress with recommendations are given under Item 11.1 of SC/66b/Rep06. Moreover, Annex G of SC/66b/Rep06 contains some suggestions for potential guidelines for an integrated final report from a special permit programme.

With respect to JARPN II's scientific output, the Panel noted that the programme thus far had results in 31 peer-reviewed papers related to the programmes primary objectives and 30 arising from ancillary studies that contributed to research not related to the primary objectives. It had also produced a large number of IWC papers that had contributed to Scientific Committee work on the RMP and in-depth assessments. The Panel strongly encouraged the submissions of further analyses to peer-reviewed journals.

The Panel welcomed much improved collaboration with other research projects compared to 2009 (most of which was within Japan). It encouraged additional collaboration with respect to any future analyses of the data.

In terms of evaluating the extent to which the results met the objectives of the programme and have improved conservation and management, the Panel considered this in two stages. The first was to examine how well they had met sub-objectives developed by the proponents after 2009 that had been finalised in 2014. The Panel's views are summarised in Table 10 of SC/66b/Rep06. The second stage was to review how well the proponents had met their three main objectives (noting the timing issue raised under Item 11.1 of SC/66b/Rep06) and to consider how the work had contributed to conservation and management. The Panels views are given below (apart from with respect to the sperm whale component which it agreed had produced little of scientific value).

18.2.1.1 EXPERT PANEL CONCLUSIONS WITH RESPECT TO ANNEX P

Before considering the specific items of the review outlined in Annex P, the Panel drew attention to a number of important general matters that affected its review (SC/66b/Rep06, Item 11.1).

TIMING

The Panel (SC/66b/Rep06, item 11.1.1) commented that as the closing of the JARPN II programme reflected a political decision related to the Government of Japan's response to the International Court of Justice decision regarding JARPA

II, rather than a scientific evaluation that the JARPN II programme had attained its objectives or sub-objectives. In fact, this 'final review' of JARPN II is occurring before the formal completion of the programme in 2016, although the sample sizes and priorities for the period 2014-16 were revised by the Government of Japan (Fisheries Agency of Japan, 2016).

Annex P envisions final reviews taking place within three years of the finish of a programme to reflect the fact that sufficient time needs to be given to the proponents to develop a comprehensive and integrated final report. It is clear from the discussion and recommendations that despite the hard work of the scientists, resulting in a large number of working papers, that the analyses would have benefitted from considerably more time. Similarly, more time would have enabled the scientists to produce an integrated final report. The Panel **recommended** that the Scientific Committee considers including a guideline in Annex P 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 presented for a final review are in a sufficient state for a workshop to take place (this may also be worth considering for new and periodic reviews).

In addition, the fact that: (a) the programme was completed early for political rather than scientific reasons; and (b) there were no formal intermediate targets by timeline, meant that it was difficult for the Panel to properly assess the results of the programme against the original objectives.

THE NATURE OF 'FINAL REPORTS'

Annex P does not provide guidelines for the scope and structure of final reports. However, the Panel's experience in undertaking this review shows that formal guidance is necessary. The Panel **recommended** that Annex P should be revised to include such guidelines and offers the following comments to assist in that process.

The Panel's task was made considerably more difficult because the methods, analyses and conclusions were found within a very large number of documents of varying levels of completeness and quality. The Panel also noted that some documents (e.g., Fisheries Agency of Japan, 2016, and part of section 4.3 of Tamura *et al.*, 2016a) included information or discussion beyond the Terms of Reference for this final scientific review. Although the proponents produced a good brief overall summary document (Tamura *et al.*, 2016a), it contained insufficient detail to allow a proper review and details of sampling design, strategy, field protocols, analytical methods and conclusions. For this, the Panel members had not only to examine over 90 working papers and documents, but also references to other unpublished sources (e.g. IWC papers) over the JARPN II period. This lack of integration, at least by objective, appears to be a function of the timing of the review (see item 11.1.1, SC/66b/Rep06) but it is not an efficient way to work and can make it rather difficult for the Panel (and especially members from outside the IWC system) to conduct a thorough review. A suggested outline for an integrated final report (and associated materials) was provided as Annex G of SC/66b/Rep06.

LETHAL AND NON-LETHAL TECHNIQUES

Under item 11.1.3 of SC/66b/Rep06, the Panel commented that although formally outside the scope of this review whose focus is on the period up to 2013, Japan has modified and reprioritised the JARPN II programme until it is officially completed in 2016 (see item 3.4 in SC/66b/Rep06). One aspect of this, related to the addition of an

objective to compare lethal and non-lethal techniques, was in line with the recommendation from the 2009. This topic is central to many issues raised in Annex P for reviews of new and ongoing permits and the difficulties in addressing the issue have been raised by all of the expert Panels thus far. In this light, the Panel **highlighted** the second part of the recommendation given under item 3.4.2.2 of SC/66b/Rep06 that the proponents provide a single document to the 2016 Annual Meeting that 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.

REVIEW OF PROGRESS OF RECOMMENDATIONS

One important component of this review was an examination of the response of proponents to the recommendations of the 2009 review. In addition, the Panel also notes that the 2009 Panel had stated that given the extra work it had requested of the proponents on certain key matters (including with respect to assessing the effects of catches on some of the stocks) it had not been able to complete its review. The 2009 Panel had requested the Scientific Committee to consider 'the most appropriate way that this review is completed'.

The Panel **recognised** that the Scientific Committee has agreed that it is not necessary to review in detail the results of ongoing permits every year. However, it believes that the regular and final reviews (and potentially reviews of new permit proposals) would be facilitated by a short (just a paragraph or two) biennial update by proponents as to progress with each of the recommendations after their initial response in the Annual Meeting following the review Workshop; this should also benefit the proponents' work.

The Panel **recommended** that the Scientific Committee should consider a mechanism (e.g. revision to Annex P) to provide for such a brief annual review of progress with recommendations. It also **reiterated** the request of the 2009 Panel that the Scientific Committee develops 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.

ASSESSMENT OF THE PROGRAMME'S SCIENTIFIC OUTPUT GIVEN THE STATED OBJECTIVES AND LENGTH OF THE PROGRAMME

The Panel referred to its earlier comments regarding the timing of the final review and the reasons for the timing of the close of the programme; this also affects to some extent its ability to assess the programme's scientific output given the stated objectives and length of the programme (item 11.2, SC/66b/Rep06). It was clear from the review that: (a) considerable scientific work has been undertaken and that the output has been accepted in peer-reviewed journals and has influenced the work of the IWC Scientific Committee; but also that (b) a much greater emphasis should have been put on improved analyses and modelling - that would increase considerably the value of the scientific output of the existing data collected. The Panel therefore strongly **encouraged** the proponents to follow the recommendations provided in its report and submit further work to peer-reviewed scientific journals.

CONSIDERATION OF THE LEVEL OF CO-ORDINATION WITH OTHER RELEVANT RESEARCH PROJECTS

The Panel **welcomed** the much-improved collaboration with other research projects compared to that in 2009 (item 11.2, SC/66b/Rep06). It **noted** that most of that co-operation occurred within Japanese institutes (academic and governmental). This is perhaps not surprising for the coastal components which are within Japanese waters but

it encourages additional co-operation with scientists from other research projects that address similar issues but for other regions with respect to any further analyses that are to be undertaken.

EVALUATION OF HOW WELL THE MOST RECENT STATED SUB-OBJECTIVES HAVE BEEN MET AND THE EXTENT TO WHICH THE RESULTS HAVE IMPROVED CONSERVATION AND MANAGEMENT

The Panels' view of how well the recently developed sub-objectives have been met is given in Table 10 in SC/66b/Rep06. The overall Panel evaluation of the work presented against the original objectives, and comments on the extent to which the work has contributed to conservation and management is provided in the text below (item 11.3.2, SC/66b/Rep06) by objective.

OBJECTIVE 1: FEEDING ECOLOGY AND ECOSYSTEM STUDIES

The ultimate goal of this objective was to provide multispecies management advice. As noted by the 2009 Panel, this was an extremely ambitious task and one likely to take many years. The level of field and laboratory work has been impressive and the examination of uncertainty with respect to the prey consumption and prey preferences has been greatly improved since 2009 although analytical improvements can still be made. However, the question of the effects of sampling design (see item 3.4.2 in SC/66b/Rep06) requires further consideration and, primarily as a result of a lack of allocated resources (despite the 2009 Panel recommendation), the modelling work remains preliminary.

Even allowing for the complexity of the issue, there are examples of Minimum Realistic Models/Models of Intermediate Complexity for Ecosystem Assessment (MRM/MICE models) that can be parameterised by fitting to data which are used to provide input to tactical assessment models and there are better developed food web and extended single species models; with additional resources, progress could (and should) have been made in the development of intermediate model types. The Panel **concluded** that at this stage of development, the modelling results are not suitable for addressing strategic management questions. Ecosystem models such as Ecopath with Ecosim, Atlantis, and other large complex models which are difficult to parameterise by fitting to data are not suitable for tactical management anywhere in the world at present and probably far into the future. Single species models with predation and multispecies (MICE) models could be used to provide tactical advice in the future. At present, at least, the results have not led to improved conservation and management of cetaceans or of other marine living resources or the ecosystem.

OBJECTIVE 2: MONITORING ENVIRONMENTAL POLLUTANTS IN CETACEANS AND THE MARINE ECOSYSTEM

This objective related to monitoring pollutants in the environment and cetaceans including: (a) pattern of accumulation in cetaceans; (b) bioaccumulation through the food chain; and (c) the relationship between pollutants and cetacean health. The Panel **noted** that the achievement of this objective was hampered considerably by the loss of samples as a result of the tsunami. It also acknowledges the efforts made to follow the recommendations of the 2009 Panel. The level of field and laboratory work has been good and understanding of chemical pollutants and cetaceans off Japan has been greatly improved. However, the Panel **concluded** that only partial progress has been made towards addressing the objectives and more effort needs to be put on improved analyses and interpretation of results. This is especially true in terms of the relationship of pollutants

and cetacean health, which is most relevant to improved conservation and management of cetaceans. It is not clear from the papers presented if (and if so how) the work undertaken has contributed to the conservation of other marine resources or the ecosystem.

OBJECTIVE 3: STOCK STRUCTURE OF LARGE WHALES

The broad objectives simply related to the stock structure of large whales (common minke whales, sei whales, Bryde's whales and sperm whales), although this was clarified at the 2009 Panel Workshop to be primarily related to developing or narrowing the number of hypotheses to be considered by the IWC Scientific Committee in its work related to the RMP and in-depth assessments. The level of field, laboratory and analytical work has been impressive, as was the effort put into responding to the 2009 Panel recommendations. The Panel did make some recommendations for improved analyses, particularly related to power and the ability to distinguish amongst weakly-differentiated populations. The Panel **concluded** that the stock structure component of JARPN II has made, and will continue to make, important contributions to the conservation and management of cetaceans by providing fundamental data and analyses for the RMP *Implementation Reviews* of common minke whales and Bryde's whales, and the in-depth assessment of sei whales.

In general, the Panel **recognised** the extensive field and laboratory components of the programme but was **concerned** that this was not matched by the analytical effort. To this end, the Panel made almost 40 recommendations for improved analyses, of which around 15 could be achieved in the short-term (see Annex E of SC/66b/Rep06).

18.2.2 Proponents response to Expert Panel report including new/revised analyses

18.2.2.1 THE PERIOD UP TO 2013

As noted earlier, the primary focus of the Panel's review was for the period up to 2013. The proponents' response to the Panel's report was provided in SC/66b/SP01. In general, the proponents' concluded that in their view the Workshop report represented a fair and balanced evaluation of the work conducted under JARPN II. They stated that the Expert Panel had welcomed the scientific contributions of JARPN/JARPN II, while at the same time, identifying areas where further work was required and provided. The proponents believed that the suggestions and recommendations, if correctly implemented, would contribute to improving the scientific contribution of JARPN II.

SC/66b/SP01 summarised the proponents' response to the recommendations in the Panel report and their views were taken into account in the development of Table 24, which is the Committee's overall evaluation of the progress with respect to each of the Panel's recommendations (see below).

18.2.2.2 THE PERIOD 2014-16

Only one of the Expert Panel's recommendations (with two components) was relevant to the period 2014-16 (Recommendation 3 in Table 24): the first part related to providing a document with a clearer rationale for the changes in sample size and the possible effect on meeting objectives, while the second related to the provision of field and analytical protocols for comparing lethal and non-lethal techniques by key parameters.

With respect to the former, the proponents' believed that they had provided sufficient information. With respect to the latter, SC/66b/SP08 reported the field and analytical protocols for the comparison of using lethal and non-lethal

techniques under the JARPN II, with preliminary application to biopsy and faecal sampling. The study was planned to be conducted in three years (2014-16) in the coastal water off Sanriku and Kushiro, and in offshore waters. The primary objectives are to determine: (1) whether a tissue and other samples can be obtained by non-lethal methods; (2) whether enough samples for statistical analysis can be obtained by non-lethal methods; (3) whether samples obtained by non-lethal methods can produce comparable scientific information to that obtained from lethal sampling method; and (4) whether the cost for obtaining the sample/producing scientific information is reasonable. Preliminary results based on data obtained in 2014 and 2015, suggested that sampling efficiency for faeces was very low, and also that the estimation based on DNA analysis are unreliable as the prey species identified by the DNA analysis of large intestine differed from the species found in the stomach contents. As for biopsy sampling, the samples could be obtained from free ranging animals although sampling efficiency differed by species. This study will be continued by using data obtained in 2016.

The Committee's discussion of this paper is found under Item 18.2.3.2.

18.2.3 Evaluation of proponent's response to recommendations of Expert Panel report

18.2.3.1 THE PERIOD UP TO 2013

In addition to the consideration of the overview provided in SC/66b/SP01, technical aspects of specific papers (either submitted to the Expert Panel meeting or produced in response to recommendations from that meeting) were discussed initially in the relevant sub-groups and are considered elsewhere in this report under the relevant agenda items related to inter alia stock structure (Item 12), abundance estimates (Items 6 and 10.12), chemical pollutants (Item 13.2) and feeding ecology/modelling (Item 14). These discussions were taken into account when the Committee developed its view of the responses of the proponents to the recommendations in the Expert Panel report that can be found in Table 24.

Discussion of the response to Recommendation 1 regarding realised versus actual sampling deand sign and the implications of this for analyses was discussed within the plenary sessions devoted to Special Permits and is summarised below.

In SC/66b/SP04, the proponents provided further information on sampling design of JARPN II in response to part of the recommendation by the Expert Panel. At the planning stage, tracklines for the offshore component were designed to cover a wide range of the survey area. However, when the actual surveys were conducted, some tracklines were cancelled or new tracklines were designed in accordance with seasonal changes of whale distribution influenced by the oceanographic structure and severe weather conditions. The samples were collected from wide longitudinal range of the research area during six year's survey periods (2002-07 and 2008-13). As a result, samples collected during JARPN II surveys should represent the distribution of each whale species in the research area at least during the respective six years' periods. Estimation of total amount of prey consumption, which is a main objective of JARPN II, was conducted in each sub-area and season (early and late). Sexual maturity composition was estimated in each sub-area and season, and total amount of prey consumption was estimated by extrapolating these data to total number of whales migrating to research area (Tamura *et al.*, 2016b). Representativeness of samples

among the whales migrating to the research area would be secured by this analytical method. At the coastal component, small-type whaling catcher boats used as sampling vessels are not suitable for bad weather conditions, as (Kishiro *et al.*, 2016) noted. All animals encountered were targeted for sampling, except cow-calf pairs. The authors consider that this will ensure the representativeness of animals migrating into the research area: sampling design did not significantly affect data analysis. It was also recognised that sea bottom topography is not uniform in the research area, especially off Kushiro. Further considerations on how to conduct more detailed analyses considering topographical features, should be made.

The Committee thanked the authors for the paper and there was considerable discussion. Suggestions were made by some members of the Committee to improve the clarity of the information presented including captions that better explain the different line-types and a more clear indication of how the sampling scheme changed over the surveys. As part of a revised paper, it was suggested that a table that:

- (a) lists each estimated parameter/quantity;
- (b) states whether it can be estimated by design-based versus model-based methods; and
- (c) notes the papers that have applied each method;

would assist with assessing the consequences of the sampling occurring at locations in addition to the intended tracklines.

The proponents noted in SC/66b/SP04 that some tracklines of the offshore component of JARPN II were cancelled, or new tracklines were designed, to cover the actual distribution of the whales predicted by the oceanographic structures at that time. In addition, some 'Special Monitoring Surveys' (SMS) were conducted in areas where the abundance of whales targeted was expected to be high. It was noted that this strategy could introduce bias compared to design-based survey strategies with fixed pre-determined tracklines. In principle, all the data could be used with a model-based estimation approach, but that approach would need to be clearly explained to allow evaluation.

In the context of a design-based analysis, the pooling of data that had been done between tracklines and subsequent SMS may not be appropriate. The Committee **notes** that:

- (a) analyses which disaggregate the data between those collected on pre-determined tracklines and those from the SMS approach are required;
- (b) if the separate results in relation to each quantity being sampled are consistent then there may be a case for pooling the data, at least in a point estimate context, although variance estimates would be more challenging; and
- (c) the impact of the trackline coverage on the precision of estimated quantities should be examined.

The evaluation of whether pooling data is appropriate will influence consideration of the sample sizes necessary to achieve the stated objectives with regards to precision.

With respect to the coastal component of JARPN II, the Committee **notes** that the sampling approach is such that there is a sampling bias with greater coverage closest to the port compared to the overall survey area. Analyses should be undertaken (e.g. design-based estimation) to make allowance for non-random sampling of the region.

There was also some discussion on the question of ageing techniques, partially in the light of the progress reported in reading earplugs presented by the proponents and discussed by the Expert Panel (see SC/66b/Rep06, item 9.1.2) where

work is underway, but largely in the context of comparison with other non-lethal techniques. For that reason, the discussion is included under Item 18.2.3.2.

The Committee's summary of its views on the proponents' response are summarised in Table 23.

18.2.3.2 THE PERIOD 2014-16

The primary discussion of this item within the Committee focussed on SC/66b/SP08 (a summary of the paper is given under Item 18.2.2.2). With respect to the authors' comments on the difficulties encountered in collecting faecal samples, it was noted that the information that can be gained from certain non-lethal and lethal techniques (e.g. stomach content data, DNA analyses of faeces and biochemical analyses of biopsy samples) are not necessarily directly comparable. Some commented that consideration of any comparison should focus on whether relevant comparable information can be obtained in terms of the objectives of the study, rather than only on whether the two methods produce the same information. The value of examining stomach contents to understand the relative species composition and age composition of the prey species was raised, as was the use of DNA methods to estimate the proportions of prey species. These issues were also discussed in the Expert Panel's report (SC/66b/Rep06).

Suggestions were also made with respect to the presentation of results from the biopsy sampling studies (e.g. time budget data including post sampling handling time for both biopsy dart samples and killed animals). The authors noted that these were preliminary results and a more detailed analysis would be presented after the 2016 season, although they cautioned that sample size thus far was low. These issues were also discussed in the Expert Panel's report (SC/66b/Rep06). Some members noted that the experiments reported in SC/66b/SP08 should allow better comparison of lethal and non-lethal means for obtaining certain data in the future and encouraged further continuation of these studies.

A related matter was the consideration of various techniques for ageing whales, including the new approach for earplugs presented at the Expert Panel Review (SC/66b/Rep06, item 9.2), which for common minke whales in the western North Pacific had increased the readability of earplugs from <10% to >40%. Discussion within the Committee focussed on the use of DNA methylation techniques from biopsy samples (e.g. for humpback whales - Polanowski *et al.* (2014). Although there has been some discussion of the relative accuracy of this approach compared to earplug readings (Kitakado, 2016a), it was noted that before reaching conclusions on relative utility, the following factors require further consideration: (a) an increase in the number of CpG sites may increase the resolution for skin to a sufficient level; (b) correlation between chronological age and methylation profile varies a great deal among different tissues, e.g. see Horvath (2013) - in addition to skin, biopsy samples typically include connective tissue and the lipid filled fat cells and these tissues should also be investigated, e.g. see Arner *et al.* (2015); (c) there is a need to better understand the 'stressors' (e.g. sunlight) that may affect the calibration of the methylation approach; (d) the question of what comprises 'error' and how to take this into account is important for whatever technique is used. It was noted that the point raised above concerning the adequacy of any technique in terms of the objectives of the study was also relevant here. In response, the proponents noted that some work using methylation techniques was being undertaken as part of the NEWREP-A programme and that in light of this discussion the number of tissue examined would be increased.

Table 23

A summary of the Committee's evaluation of progress made by the proponents in responding to the report of the Expert Panel. These are arranged by topic. The Agenda Items refer to the relevant section of the Expert Panel's report and the suggested timelines are those made by the Panel.

Sampling design and areas (Item 3.4.2.1): suggested by 2016 Annual Meeting	Progress by 2016 meeting
<p>(1) A new paper that in addition to the information on sightings, it should document, for each year and season:</p> <p>(a) the predetermined tracklines for sampling and the rationale for those lines; and</p> <p>(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.</p> <p>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.</p> <p>(2) Papers using data from the inshore component must fully address the implications of the logistical rather than scientific sampling design.</p>	<p>(1) The proponents responded in SC/66b/SP04. 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.</p> <p>Issues related to the sample representativeness and the effect of this are partially addressed.</p> <p>(2) Partially addressed in SC/66b/SP04 but further analyses required to make allowance for non-random sampling</p>
Sample size (Item 3.4.2.2): suggested by 2016 Annual Meeting	
<p>(3) A new paper should be developed that:</p> <p>(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</p> <p>(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.</p>	<p>(3a) The proponents provided some information in SC/66b/SP01. 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.</p> <p>(3b) The proponents presented the field and analytical protocols in SC/66b/SP08. Committee advice on presentation of results and analyses in a final report by is given under Item 18.2.3.2.</p>
Stock structure (Item 4.4.3): some short- and some medium-term	
<p>(4) By 2016 Annual Meeting or 2017 at latest 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.</p>	<p>(4) SC/66b/SP01 indicates this will be addressed and proposes two approaches.</p>
(5) The presence of multiple stocks within sample partitions should be assessed (employing, e.g. STRUCTURE and DAPC).	(5) In progress (see discussion in Annex I).
(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.	(6) SC/66b/DNA01 fully addresses this (see Annex N).
<p>(7) 2-3 years after the 2016 Annual Meeting 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'.</p> <p>(8) Analytical approaches should be applied that do not assume mutation-drift-migration equilibrium (Hey, 2010).</p> <p>(9) Serious consideration should be given to using genome-wide SNP genotyping approaches, such as RAD sequencing and GBS (Elishire <i>et al.</i>, 2011; Miller <i>et al.</i>, 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 <i>et al.</i>, 2014).</p> <p>(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.</p>	<p>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 Annex I.</p>
Feeding ecology and ecosystem studies – Oceanography (Item 5.4.3.1): within 2 years	
(11) Chl- <i>a</i> concentration should be examined as a potential proxy for the food environment for whales.	Used in some analyses already and discussed in SC/66b/SP01.

<p>(12) Oceanographic monitoring is required to compare with prey species distribution and abundance in the new 'decadal regime'.</p>	<p>The proponents agreed – this is long-term monitoring.</p>
<p>Feeding ecology and ecosystem studies – Distribution (Item 5.4.3.2): 2016 Annual Meeting</p>	
<p>(13) With respect to papers Murase <i>et al.</i> (2016) [SC/F16/JR07], Murase <i>et al.</i> (2014) [SC/F16/JR08], Matsuoka <i>et al.</i> (2016) [SC/F16/JR09], Sasaki <i>et al.</i> (2013) [SC/F16/JR10] and Tamura <i>et al.</i> (2016c) [SC/F16/JR16], develop revised versions that: (a) include statistical summaries on model fit (R^2 and % deviance explained) and model comparison and spatial covariate selection (e.g. AIC, GCY 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.</p>	<p>(13a) The proponents provided statistical summaries relating to model fits in papers Murase <i>et al.</i> (2016) [SC/F16/JR07], Murase <i>et al.</i> (2014) [SC/F16/JR08], Sasaki <i>et al.</i> (2013) [SC/F16/JR10] and Tamura <i>et al.</i> (2016c) [SC/F16/JR16], but not in Matsuoka <i>et al.</i> (2016) [SC/F16/JR09]. (13b, 13c) No information received.</p>
<p>Feeding ecology and ecosystem studies – Distribution (Item 5.4.3.2): 2-3 years after 2016</p>	
<p>(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.</p>	<p>(14) 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.</p>
<p>(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.</p>	<p>(15) The proponents agreed that consideration will be given to sharing photo-ID data.</p>
<p>(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).</p>	<p>(16) The proponents agreed and expect to achieve this within the timeframe.</p>
<p>(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.</p>	<p>(17) The proponents agreed and expect to achieve this within the timeframe and in line with the IWC guidelines discussed under (14) above.</p>
<p>Feeding ecology and ecosystem studies - Field and laboratory studies (Item 6.4.3):</p>	
<p>(18) By 2016 meeting or 2017 at the latest The sampling distribution for the parameters should be used in the assessment of the uncertainty associated with the estimation of consumption.</p>	<p>(18) Proponents agreed and will complete by 2017.</p>
<p>(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.</p>	<p>(19) Response provided in SC/66b/SP04 and discussed.</p>
<p>(20) 2-3 years after the 2016 Annual Meeting 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.</p>	<p>(20-23) The proponents agree.</p>
<p>(21) The studies on allometric relationships should be developed further to refine the range of suitable allometric-energy intake/consumption relationships.</p>	<p>The proponents will complete the work within the timeframe.</p>
<p>(22) The analyses of diet composition should consider the effect of seasonal changes in energy density of the various prey species.</p>	
<p>(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.</p>	<p>With respect to (23) a study has begun with Hokkaido University.</p>
<p>Feeding ecology and ecosystem studies – Ecosystem modelling (Item 7.4.3)</p>	
<p>2-3 years after the 2016 Annual Meeting</p>	
<p>(25) Generic recommendations identified by the 2009 Panel remain.</p>	<p>(25) The proponents agree.</p>
<p>(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.</p>	<p>(26) The proponents agree.</p>
<p>(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.</p>	<p>(27) The proponents agree.</p>
<p>(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).</p>	<p>(28) The proponents agree in broad terms but note the use in modelling may be limited.</p>

<p>(29) The proponents agree and will undertake analyses within the time frame but note some limitations with EE in the western North Pacific situation.</p>	<p>Within 2 years of the 2016 Annual Meeting With respect to the EwE modelling: (a) evaluate data quality for each input parameter (the 'pedigree': e.g. Gaichas <i>et al.</i> (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).</p>
<p>(30) The proponents broadly agree with all components of this recommendation but identify some difficulties with lack of data for item (e).</p>	<p>Feeding ecology and ecosystem studies – Ecosystem modelling (Item 7.4.3) Within 2-3 years of the 2016 Annual Meeting With respect to extended single-species modelling: (a) ensure that the majority of predation mortality is captured; (b) carry out additional diagnostics: (i) 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 CPUJE as an index of abundance. (d) focus the model fitting on the fishery-independent survey if CPUJE 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 <i>et al.</i> (2016b) [SC/F16/JR29] by changing the weights assigned to the data sources and fitting the model.</p>
<p>(31) Addressed in SC/66b/E07 and SC/66b/E08, although additional consultation with statisticians would be beneficial.</p>	<p>Monitoring environmental pollutants in cetaceans and marine ecosystem (Item 8.4.3) 2016 Annual Meeting or 2017 at the latest (31) To improve the statistical analyses based on clear and well-formulated hypotheses.</p>
<p>(32) The proponents elucidate some difficulties to address this recommendation due to e.g. loss of samples by tsunami ensued the 2011.</p>	<p>(32) Recalculate OC concentrations as values on a lipid weight basis, and Hg concentrations on a dry weight basis.</p>
<p>(33) Addressed in SC/66b/E07 and SC/66b/E08.</p>	<p>(33) Explore trends in pollutant concentrations using generalized additive models (GAMs) or other non-linear approaches, in addition to the linear models.</p>
<p>(34) More discussion on comparisons with previously published studies were included in SC/66b/E07 and SC/66b/E08.</p>	<p>(34) Evaluate the pollutant concentrations found in comparison with data from previous studies conducted in comparable species and available in the literature.</p>
<p>(35) The proponents agree and will undertake work.</p>	<p>Monitoring environmental pollutants in cetaceans and marine ecosystem (Item 8.4.3) 2-3 years after the 2016 Annual Meeting (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.</p>
<p>(36) The proponents agree and will undertake work.</p>	<p>(36) To include stable isotope values in the analyses to investigate the bioaccumulation process of pollutants through the food chain.</p>
<p>(37) The proponents agree but for long-term. They note no health risk from OCs or Hg thus far.</p>	<p>(37) To assess more widely the risk that these chemical pollutants present to the populations' abundance or distribution.</p>
<p>(38) The proponents agree and work is underway. Some additional discussion of ageing methods is provided under Item X.</p>	<p>Ageing (Item 9.1.2): Within 2 years of the 2016 Annual Meeting (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.</p>
<p>(39) Work is underway.</p>	<p>(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).</p>
<p>(40) These matters are considered by the Scientific Committee - see Item 26.3.</p>	<p>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.</p>

Table 24

Overview of how well the proponents have met their stated sub-objectives within the overall objectives of JARPN II.

Objective/sub-objective	Panel evaluation	Comments (references to Item numbers are to SC/66b/Rep06)
Objective 1: Feeding ecology and ecosystem studies		
Sub-objective 1.1: Investigate the oceanographic conditions that are relevant for the understanding of prey species' distribution and abundance in the research area.	Partial	Although some work has been done, additional work is needed to investigate more appropriate explanatory variables (see Item 5.4).
Sub-objective 1.2: To investigate the distribution pattern of baleen whales in the research area and the possible factors affecting such pattern.	Good	Good progress has been made with this sub-objective in what is a developing field of spatial and habitat modelling. However, more work is required to try to integrate the information from different seasons and other surveys within and outside the research area (see Item 5.4.2).
Sub-objective 1.3: To estimate abundance of baleen and sperm whales using JARPN II sighting data and standard IWC SC methodology.	Very good	Abundance estimates were presented using design-based methods. Effort now needs to be put into exploring methods for determining trends and comparison with model-based estimates.
Sub-objective 1.4: To estimate the prey consumption by baleen whales using JARPN II data and samples, and taking into account the uncertainties identified at the 2009 JARPN II review.	Good	Good progress was made with incorporating many aspects of the uncertainty identified in 2009, although some additional sources were identified (see Table 6) and improved methods to quantify the uncertainty have been recommended (see Item 6.4.2). The potential impact of sampling design requires evaluation (see Item 3.4).
Sub-objective 1.5: To evaluate the feeding impact by whales on fisheries resources using JARPN II data and samples, and information from commercial fisheries and other research sources in coastal areas.	Progress made	Some progress has been made but the problems with model development (see sub-objective 1.10 in this table) and aspects of uncertainty mean that the proponents are not able to identify the feeding impact by whales in a robust way (see Item 6.4.2).
Sub-objective 1.6: To estimate prey abundance using JARPN II data, complemented with information available from other sources.	Sufficient	This work has been achieved, at least to inform initial modelling efforts. Additional work to estimate the uncertainty of extrapolating prey abundance outside the surveyed blocks/seasons would be useful (see Item 6.4).
Sub-objective 1.7: To investigate the prey preference of whales in offshore areas, using JARPN II data and samples.	Progress made	Prey preference studies have been undertaken based upon stomach content data and prey abundance information but further work is required to address issues of seasonality, uncertainty and sample design.
Sub-objective 1.8: To investigate feeding habits of baleen and toothed whale species in the research area, and the environmental factors involved in determining such habits.	Progress made	Some work was completed on trends in prey by species and feeding differences by habitat but additional analyses are required before firm conclusions can be reached. Work began using time depth recorders but sample size is small.
Sub-objective 1.9: To investigate the yearly trend in body condition of baleen whales using JARPN II data and samples.	Partial	In addition to the need analyse to further examine power, the question of sampling design also needs to be addressed.
Sub-objective 1.10: To develop several ecosystem models, in both coastal and offshore areas, using JARPN II data and samples as input. Output of the models are likely to provide information on: (i) the ecosystem structure; (ii) effects of prey availability and consumption on the population dynamics of common minke and sei whales with consideration of levels of energy intakes; and (iii) predation impacts of common minke whale consumption of sandlance stock off Sanriku.	Progress made	Although progress has been made in some areas, insufficient resources have been allocated to this component of the programme. Although two models have been developed they are preliminary and a planned minimum realistic model is not complete. As such the modelling efforts are not suitable to provide management advice or characterize effects of prey on whale dynamics or impacts of whales on fisheries (see Item 7.4).
Objective 2: Monitoring environmental pollutants in cetaceans and the marine ecosystem		
Sub-objective 2.1: To investigate pattern of accumulation of pollutants in cetaceans and their food items.	Partial	Aspects of this issue have been addressed and the Panel recognized the difficulties caused by the loss of samples in the tsunami. However, some central aspects were not addressed or analyses were incomplete as discussed under Item 8.4.
Sub-objective 2.2: To investigate the bioaccumulation process of pollutants through the food chain.	Not achieved	This was not properly addressed and would require <i>inter alia</i> integration with stable isotope analyses (see Item 8.4).
Sub-objective 2.3: To investigate the relationship between chemical pollutants and cetacean health.	Partial	Some work was presented (e.g. regarding thyroid cancer and CYP450 induction) but there was little attempt to use comparative studies and consider possible population level effects.
Objective 3: Stock structure of large whales		
Sub-objective 3.1: Monitoring of the spatial and temporal distribution of J stock on both west and east coasts of Japan using genetics and non-genetics approaches, and all sources of samples available e.g. JARPN, JARPN II and by-catches.	Good	This work was thorough and contributed to the RMP <i>Implementation Review</i> .
Sub-objective 3.2: Using genetic and non-genetic data from JARPN and JARPNII, investigate whether or not the sub-division of the O stock into OW and OE is plausible. The genetic analysis should include those approaches mentioned in Table 1 as providing support for the existence of the OW (e.g. PCA analyses).	Good	This work was thorough and contributed to the RMP <i>Implementation Review</i> .
Sub-objective 3.3: To investigate the plausibility of: (i) stock sub-division within Sub-area 1 as proposed under Hypothesis 4; and (ii) sub-division between Sub-areas 1 and 2 as proposed under Hypotheses 2 and 3, using all genetic samples available from different sources till 2014, and different genetic markers including satellite tracking.	Partial	This work will contribute to the forthcoming RMP <i>Implementation Review</i> but additional analyses are recommended to assist in understanding the power of the results obtained and the telemetry programme, whilst showing that it is possible, has as yet only a very small sample size (2).
Sub-objective 3.4: To investigate the plausibility of a single stock of sei whale in the pelagic regions of the North Pacific ('North Pacific pelagic'), using all genetic samples available from different sources till 2014, and different genetic markers.	Partial	This work will contribute to the forthcoming in-depth assessment but additional analyses are recommended to assist in understanding the power of the results obtained, although it is recognised that past experience may show that the power is low.

18.2.4 New information from the 2015 field season

SC/66b/SP02 reported the preliminary results of the offshore (sub-areas 7, 8 and 9) cruise of the JARPN II from 11 June to 24 August 2015. Four research vessels were used: two sighting/sampling vessels (SSVs), one research base vessel and three dedicated sighting vessels (SVs). A total of 90 sei and 25 Bryde's whale were caught and biological samples were collected from each of these. In July and August, sei whales fed mainly on Japanese sardine followed by mackerels, copepods and krill in sub-areas 8 and 9. Bryde's whales fed mainly on North Pacific krill species in sub-areas 7 and 8. Two dedicated sighting surveys were carried out from 23 April to 6 June (2,660 n.miles) and 9 June to 1 August in sub-areas 7, 8 and 9 (2,726 n.miles).

SC/66b/SP03 outlined the preliminary results of the coastal component (off Kushiro) of JARPN II from 5 September to 22 October 2015. Four small-type whaling catcher boats were used and 51 common minke whales (34 males and 17 females) were caught and biological samples were obtained from all animals. Sightings data were also collected. The dominant prey species was the Japanese sardine (51.0%). Japanese anchovy, which was one of the major prey species in the previous surveys off Kushiro, was not found during the present survey. This change may reflect environmental changes, as suggested by the previous 2012-14 surveys. Attempts to collect faecal samples were unsuccessful as were attempts to obtain biopsy samples.

SC/66b/SP06 outlined the preliminary results of the coastal component (off Sanriku) of JARPN II from 10 April to 26 May 2015. Four small-type whaling catcher boats were used and 19 common minke whales (10 males and 9 females) were caught and biological samples were obtained from all animals. The dominant prey species was krill (44.4%). A prey species survey was conducted in parallel and in the same time period as the main survey. A comparison of the prey species survey with the stomach contents suggested that the distribution of the common minke whales in Sanriku region was related to sand lance distribution. A biopsy sampling trial was unsuccessful.

18.2.4 Committee conclusions and recommendations

General comments by three Committee members can be found in Annex U1 with a response by the proponents being given in Annex U2. These comments were not discussed. The Committee's conclusions with respect to the Terms of Reference relevant for final reviews in Annex P (IWC, 2016, pp.412-13) are given below.

Attention: C-A

*The Committee **agrees** with the broad conclusions reached by the Expert Panel in SC/66b/Rep06 (and see Item 18.2.1.1). With respect to the items referenced in Annex P, the Committee **concurs** with the following conclusions as summarised below.*

- (1) *With respect to the assessment of the programme's scientific output given the stated objectives and length of the programme, the Panel had noted difficulties associated with the reasons for the timing of the close of the programme but had noted that: (a) considerable scientific work has been undertaken and that the output has been accepted in peer-reviewed journals and has influenced the work of the IWC Scientific Committee; but also that (b) a much greater emphasis should have been put on improved analyses and modelling - that would increase considerably the value of the scientific output of the existing data collected. The Committee*

*therefore **encourages** the proponents to follow the recommendations provided in its report and that of the Expert Panel and submit further work to peer-reviewed scientific journals.*

- (2) *With respect to the level of co-ordination with other relevant research projects, as had the Expert Panel, the Committee **welcomes** the much-improved collaboration with other research projects compared to that in 2009. It **notes** that most of that co-operation occurred within Japanese institutes (academic and governmental). This is perhaps not surprising for the coastal components which are within Japanese waters but it encourages additional co-operation with scientists from other research projects that address similar issues but for other regions with respect to any further analyses of the existing data.*
- (3) *Finally, with respect to how the proponents had met their sub-objectives under the main objectives (see Item 18.2.1), the Committee **agrees** with the Expert Panel's views and advice as summarised in Table 23.*

19. WHALE SANCTUARIES

At last year's meeting, the Scientific Committee (SC) agreed on a process to complete the review of the South Atlantic Whale Sanctuary (SAWS) proposal and the decadal review of the Southern Ocean Sanctuary (SOS) (IWC, 2016w). This process established that the Committee would review the scientific objectives of the SAWS proposal and the SOS by the end of its 2016 annual meeting. This process also established that a joint Workshop of the SC and the Conservation Committee would be held after the SC's annual meeting to complete the reviews. The SC also agreed that external experts would be invited to attend the pre-meeting, a Workshop and the SC meeting in order to assist the SC with the reviews.

The SC completed the reviews at the present meeting. Details of the evaluation of the scientific aspects of the SAWS proposal and the SOS are given, respectively, in SC/66b/Rep08 and in Annex Q. In reviewing the SOS and the SAWS proposal, the Committee recognised that within the IWC there are different positions regarding whales and whaling (IWC, 2002b). Some member states regard whales as a natural resource that could be harvested as long as that harvest is sustainable. Others are committed to protect whales from extractive use irrespective of their stock status. These differences may invoke different interpretations of the definition of 'conservation'. Sanctuary proponents clarified that in their view Sanctuaries are based on the position of total protection of whales. In order to concentrate on scientific and technical aspects of the Sanctuaries, discussions of the SAWS proposal and the SOS were made without prejudice to the positions of the various participants and the Governments. Nothing in this report should be interpreted as changes by Governments of their basic positions. In addition, it was pointed out that a Schedule amendment can only introduce a ban on whaling as a management measure. Sanctuaries cannot address certain threats, as these will not be mitigated by a ban on whaling.

19.1 Review of the South Atlantic Sanctuary proposal

19.1.1 Report of the Workshop

The SAWS proposal was reviewed during a Workshop held in Bled, Slovenia, on 5 and 6 June 2016. The review was performed according to the Terms of Reference developed by the Scientific Committee at last year's meeting (IWC, 2016z). Details are given in SC/66b/Rep08.