Report of the Scientific Committee

Bled, Slovenia, 7-19 June 2016

Annex E: Report of the Standing Working Group on Aboriginal Subsistence Whaling Procedures

**This report is presented as it was at SC/66b.
There may be further editorial changes (e.g. updated references, tables, figures)
made before publication.**

International Whaling Commission

Bled, Slovenia, 2016

Annex E

Report of the Standing Working Group on Aboriginal Subsistence Whaling Procedures

Members: Donovan (Convenor), Allison, Bell, Brandão, Brownell, Butterworth, Cipriano, Cooke, Craig, Currey, De Moor, Diallo, Fortuna, Givens, Gunnlaugsson, Haug, Hielscher, Holm, Hrabkovsky, Iñíguez, Jaramillo-Legorreta, Jimenez, Johnson, Kato, Kitakado, Lang, Litovka, Lundquist, Moronuki, Pablo, Palka, Punt, Reeves, R., Reeves, S., Ritter, Rodriguez-Fonseca, Rose, Ryeng, Santos, Scordino, Simmonds, Smith, Stimmelmayr, Suydam, Thomas, Vikingsson, Vlckova, Wade, Witting, Woo Kim, Yasunaga, Yoshida, Zerbini, Zharikov, Zimmermann

1 INTRODUCTORY ITEMS

1.1 Convenor's opening remarks

Donovan welcomed the participants and outlined the objectives for the SWG this year. He noted that the primary tasks were to continue to work on the development of *Strike Limit Algorithms (SLA*s) for the Greenland hunts, consideration of the Aboriginal Whaling Scheme (AWS) and the provision of annual catch advice. He reminded the SWG that the next block of subsistence catch/strike limits would be considered at the 2018 Commission Meeting.

1.2 Election of Chair

Donovan was elected chair.

1.3 Appointment of rapporteurs

Givens, Witting, and Punt acted as rapporteurs, with assistance from the Chair.

1.4 Adoption of agenda

The adopted agenda is given as Appendix 1.

1.5 Documents available

The primary document was SC/66b/Rep06.

2. DEVELOPMENT OF AN *SLA* FOR THE GREENLANDIC FIN WHALE HUNT

2.1 Review of discussions at the intersessional workshop (SC/66b/Rep03)

Donovan summarised the relevant sections of the report of the Workshop held at the Greenland Representation, Copenhagen, from 14-17 December 2015 (SC/66b/Rep03, item 2).

Last year, the Committee (IWC, 2016c, p.21) had concurred with the view of the SWG (Standing Working Group) on the AWMP (IWC, 2016c) that, from a conservation perspective, it was acceptable to try to develop an *SLA* for the hunt of fin whales off West Greenland by assuming that the animals off West Greenland comprised a single population represented by the abundance estimates from that area. This assumption was recognised to be:

(a) conservative from a conservation perspective, as the alternative that these whales belonged to a larger more widely distributed stock would mean that strikes off West Greenland would have a lesser impact on the abundance of that stock; but also

(b) conceptually simpler and thus would potentially allow the more rapid development of an *SLA*.

In following this approach, the AWMP SWG had recognised that this assumption would make achieving need satisfaction more difficult than if multi-stock hypotheses (*cf* the RMP *Implementation Simulation Trials*) were incorporated. However, based on the initial results presented to the 2015 Scientific Committee meeting (IWC, 2016c, p.21), it was noted that while further work was needed with *SLA* development, it seemed likely that it would be possible to develop an *SLA* for fin whales off West Greenland that met the Commission's conservation and need objectives.

The Workshop received candidate *SLA*s from two developers. Broadly one class of variants (see SC/D15/AWMP/GEN4) involved a growth rate fraction of a lower percentile of an abundance measure, with a protection level, a 'snap-to-need' feature and a trend modifier. The other class (see SC/D15/AWMP/GEN5) involved application of a multiplier (a function of the observed trend of the abundance indices and its standard error) to the weighted-average of the abundance estimates and a 'snap-to-need' feature. The variants were based upon various tunings related to conservation performance and need satisfaction.

The Workshop confirmed that the trials structure (*Evaluation* and *Robustness Trials,* see Tables 1 and 2) developed during the February 2015 AWMP Intersessional Workshop was adequate for selecting *SLA*s (IWC, 2016a). The 2015 meeting

of the Scientific Committee (IWC, 2016c, p.20) had agreed that the conditioning of the trials had been achieved satisfactorily.

The Workshop **agreed** that it would evaluate candidate *SLA*s following a similar approach to that used for the selection of the *SLA*s for West Greenland humpback and bowhead whales (IWC, 2015; 2016). Attention focussed on three candidates:

(1) *SLA* B (denoted as *SLA* 7 in SC/D15/AWMP/GEN/5);

(2) *SLA* L1 (denoted as d05g1 in SC/D15/AWMP/GEN/4); and

(3) *SLA* L2 (a modification of *SLA* d05g1 in SC/D15/AWMP/GEN/4 with parameter *r* set to 0.0135).

In addition, it examined the results for: the *Interim SLA* agreed by the Committee and Commission in 2008 (IWC, 2009, p.16) for use for up to two quota blocks; catch=zero; and catch=need.

All three of candidate *SLA*s had equivalent conservation performance on the *Evaluation* trials with $MSYR_{1+}$=1%, but *SLA* L1 outperformed *SLA*s B and L2 in terms of need satisfaction (SC/66b/Rep03, table 3). Therefore, the Workshop preferred *SLA* L1. The performances of all three *SLA*s was acceptable for the *Robustness Trials.*

In conclusion, subject to final code checking, the Workshop recommended *SLA* L1 as the best approach amongst those considered for providing long-term management advice for the hunt of fin whales off West Greenland.

The Workshop thanked the developers, Witting, Brandão and Butterworth for their extremely hard work during this process, as well as Punt who developed the control program.

The SWG **thanked** the Intersessional Workshop for the good progress made, noting its recommendation regarding an *SLA* for the Greenlandic fin whale hunt.

2.2 New information

Subsequent to the Workshop, Brandão noted that final checking of the files used to conduct the trials had identified two errors: (a) the CV for the 2005 abundance estimate was assumed to be 0.4 rather than the actual value of 0.44, and (b) the first future year with an abundance estimate was incorrectly set. She also noted that the trials were run with a CV for future surveys of 0.35 whereas the actual CV for recent estimates of abundance is close to 0.45. The SWG therefore requested that Brandão and Allison re-run the trials using actual CV for the 2005 abundance estimate, the correct first year with a survey and testing two different CVs for future abundance estimates (0.35 and 0.45).

2.3 Implications of new information

The values for the performance metrics changed by an unexpectedly large amount when the changes noted under Item 2.2 were made. In the limited time available at the meeting, Allison and Brandão examined the consequences of making the changes one at a time. This showed that the change to the 2005 CV was the primary driver of change in the values of the performance metrics. The Workshop **agreed** that this issue clearly required careful further examination.

2.4 Conclusions and recommendations

The SWG **agreed** that the reasons for the sensitivity to what should have been relatively small changes to the specifications of the trials need to be understood before it was possible to recommend an *SLA*. It therefore **agreed** that no recommendation be made at this meeting. Rather, the proposed intersessional workshop on the development of *SLA*s for the Greenland hunts (see Item 7) should consider as part of its agenda: (a) the reasons for the sensitivity of the values for the performance metrics to small changes to the specifications of the trials; (b) in the light of this, determine whether any changes need to be made with respect to the choice of an *SLA*. It was also agreed to change the future survey frequency of fin whale trials to 5, 10 and 15 years instead of 6, 12, and 18 to be consistent with the trial specifications for other *SLA*s and the ASW discussions on periods between surveys (see Item 4). The intention is that the Committee will be in a position to recommend a final *SLA* in 2017.

3. DEVELOPMENT OF AN *SLA* FOR THE GREENLANDIC COMMON MINKE WHALE HUNTS

The development of an *SLA* for the common minke whale hunts off West and East Greenland is the most complex of those required for Greenland. It has been agreed that the basis of the development approach should be the RMP operating models for the entire North Atlantic. Stock structure issues were examined in 2014 by a joint AWMP/RMP Workshop (IWC, 2015a) that resulted in four stock structure hypotheses and a number of associated mixing matrices (see Figs 2, 3 and IWC (2016d). An initial RMP trial structure was developed in 2014 (IWC, 2015b). At a Workshop in January 2015 (IWC, 2016b) and the subsequent annual Scientific Committee meeting (IWC, 2016c), the focus was on conditioning the trials. Although satisfactory conditioning was achieved for many trials, some difficulties remained.

3.1 Review of discussions at the intersessional workshop (SC/66b/Rep04)

An intersessional AWMP Workshop recognised that considerable progress had been made in resolving issues related to conditioning; however, several major issues remained. In particular, the operating model generated abundance estimates for the WG subarea that were far more variable than the actual survey estimates, while the variability generated for other

subareas (e.g. CG) was notably less. The Workshop suggested modifications to the specifications of the trials to address this issue and developed a Workplan to assist the spring 2016 RMP workshop (SC/66b/Rep04).

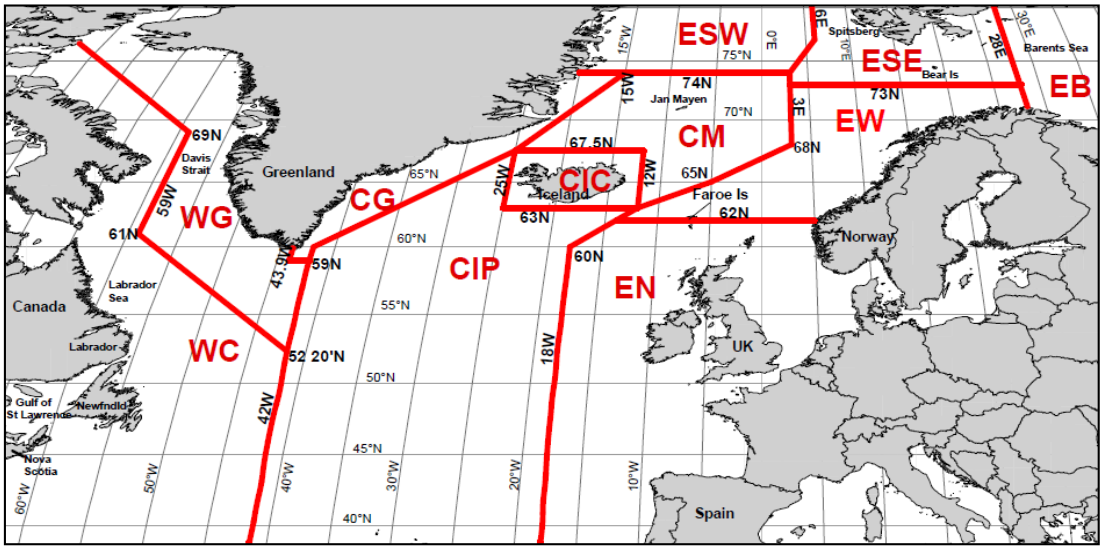

Fig. 1. Sub-areas for North Atlantic common minke whales used in the RMP *implementation Review*

3.2 Progress with the RMP work on North Atlantic common minke whales including that in SC/66b/Rep04

The SWG was informed that the *Implementation Review* of common minke whales in the North Atlantic was not able to be completed this year due to some technical issues that required further investigation. It reaffirmed the value of this *Implementation Review* to its work and **agreed** that it a useful strategy would be for there to be a two-day intersessional RMP workshop immediately preceding the proposed intersessional workshop on the development of *SLA*s for the Greenland hunts (see Item 8). Given overlaps in personnel this would not only assist scientifically in the development process but also save the Committee money. After consultation with the sub-committee on the RMP, it was agreed that a single budget request on behalf of both groups.

3.3 Development of initial trial structure

The SWG **agreed** that it was premature to discuss this until the proposed intersessional workshop (see Item 8).

3.4 Workplan to ensure intersessional progress

The SWG **agreed** that it was essential to hold an intersessional workshop to further progress on *SLA* development and that this should be preceded by an RMP workshop (see Item 3.2).

4. ABORIGINAL WHALING SCHEME (AWS) WITH FOCUS ON B-C-B BOWHEAD WHALES

The Scientific Committee initially recommended (and has subsequently repeated that recommendation) the scientific aspects of an Aboriginal Whaling Scheme (AWS) in 2003, but this has still not been adopted by the Commission (IWC, 2003 and subsequent years). Since that time, the Committee has developed several additional *Strike Limit Algorithms*, established its Data Availability Agreement (IWC, 2004), considered additional issues such as survey intervals, and developed greater experience with all aspects of the AWMP.

In 2015, the Committee recognised that a key step in developing an AWS proposal broadly acceptable to member countries, hunters and scientists was investigating the performance of an 'interim allowance' strategy for provisionally allocating strikes when an agreed population abundance estimate is overdue (IWC, 2016). The SWG finished its evaluation of the interim allowance strategy (based upon the Bering-Chukchi-Beaufort Seas bowhead whale case) at the present meeting (Item 4.1 below). At the present meeting, the SWG also began its consideration of the remaining components of the proposed AWS (see Item 4.2). The SWG **reiterated** that the Commission has agreed that the AWS is intended to be a generic and overarching policy that, as far as possible, applies equally to all aboriginal hunting regimes managed by the IWC.

4.1 Review of discussions at the intersessional workshop (SC/66b/Rep03)

A variety of factors beyond the control of the hunters may prevent the completion of a successful whale population abundance estimate. These include bad weather, unsafe ice conditions, lack of funding, and unresolved political or legal issues. For example, in the case of Bering-Chukchi-Beaufort Seas (BCB) bowhead whales, data suggest that over the past decade ice conditions have degraded in the spring, especially during the latter portion of the survey season (Druckenmiller *et al.*, 2012; Suydam *et al.,* 2013). The survey is highly dependent on ice and weather conditions: since 1977 there have been 21 survey attempts with a success rate of 57%. In the case of Eastern North Pacific gray whales, Russia has little

opportunity to conduct comprehensive research on animals whose primary migratory corridor and breeding and calving areas lie near the shore of North American countries.

While recognising such concerns, the SWG has noted that uncurtailed aboriginal whaling quotas cannot be continued indefinitely in the long-term absence of data. Successful management requires quota calculations to be based on periodic new data. Thus, in 2003, the Committee proposed provisions relating to survey intervals (IWC, 2003, pp.161-6). Among these was a provision that a new abundance survey should be completed every 10 years.

A key component of the Committee's 2003 proposal addressed what should be done in the unlikely event that exceptional unforeseen circumstances delay obtaining an agreed abundance estimate beyond 10 years. A third quota block begun in these circumstances was termed a 'grace period', and it was proposed that a flexible 50% strike reduction ('phase-out') would be imposed for that block. An updated strike limit for the 3rd block would be determined from the *SLA* if a new survey estimate was obtained during the block. The ASW proposal was not accepted by the Commission primarily due to a lack of support for this provision.

In 2015, a new approach was investigated for Bering-Chukchi-Beaufort Seas (B-C-B) bowheads which replaced the phase-out with an 'interim allowance', namely a grace period strike limit equal to the limit produced by the *Bowhead SLA*, without reduction, for a single block. This approach was tested using the same general framework as was used to test the *Bowhead SLA* in 2003, to determine whether it meets the conservation and need satisfaction goals of the Commission. The testing approach is specified in IWC (2016a, pp.190-193; 2016b, pp. 473-483) and the results are summarised in IWC (2017a).

The SWG reviewed these results and **agreed** that a survey interval of 10 years with an interim allowance policy for a provisional quota, if necessary, for a third block, would acceptably meet the conservation and management goals of the Commission. Specifications are given in Rep03.

When a new agreed abundance estimate is obtained during a grace period, two possible actions are (1) wait until the end of the grace period and use the new estimate when the next block quota is calculated, or (2) use the new estimate immediately to set a new quota for the remainder of the current block. For Bering-Chukchi-Beaufort Seas bowheads, the SWG chose to perform simulation testing only for the first option. The implications of this are discussed below.

A conservation concern might arise when the most recent survey is too 'optimistic' and the fact that the next survey is overdue leads to continued hunting beyond 10 years with a quota that is too high (since the *SLA* will have no new abundance estimate to consider to adjust the catch). The SWG's testing approach bracketed this case. Specifically, the trials examined extended the delay until the end of the third block, forcing the *SLA* to contend with the excessive hunt for the longest possible time. Second, a concern about need satisfaction arises when the most recent survey is too pessimistic and the fact that the next survey is overdue leads to continued hunting beyond 10 years with a quota that is too low. The worst case would be that the low quota extends for the entire length of the grace period. Again, this is the case tested by the SWG, and it brackets less problematic cases. Thirdly, the tested interim allowance survey frequency was as much as 15 years for effectively all *Evaluation* and *Robustness Trials*. The original *SLA* testing used 5 and 10 years. The untested interim allowance survey frequency would be between these.

Examining results from both these bracketing cases and all trials, the SWG concluded that performance of the interim allowance strategy was acceptable. Therefore, it **agreed** to recommend that approach. Further, the Committee agreed that either immediate updating SLA calculations or waiting until the grace period expires are both acceptable. In the case of immediate updating, the number of strikes taken thus far during the grace period should be subtracted from the updated quota, with the remainder being the strike limit for the rest of the grace period (e.g. see Appendix X).

As yet, these conclusions pertain to the B-C-B bowhead case; the interim allowance strategy remains to be tested for aboriginal hunting on other species and stocks.

4.2 Consideration of any work since the workshop

A draft document presented by Givens, based on the 2003 Committee recommendations, was used by the SWG to focus discussions on other aspects of an AWS.

The first such issue was 'carryover'. In setting harvest limits for subsistence hunts, the Commission, for many years, has employed the convention of carryover to allow a certain number of previously allocated, but unused, strikes to be added to the current allowed strike limit. This recognises the variability of outcomes in subsistence harvests and provides flexibility to adjust hunting accordingly. It reflects the fact that harsh environmental conditions can lead to failed or reduced harvest levels. In the years following a reduced harvest, communities seek to regain lost food supply through increased hunting effort.

The concept of carryover is a beneficial management tool but is not a means of increasing the nominal quota on a consistent basis. Any exceedances allowed by carryover are not intended to continue unabated or indefinitely.

The SWG recognised that the concept of carryover (i.e. year-to-year flexibility) is relevant to within blocks and between blocks.

In response to a Commission request, the Committee presented the Commission in 2000 with an illustration regarding block quotas and carryover because the Committee needed guidance as it sought to develop an Aboriginal Whaling Management Procedure (AWMP). The Commission considered the Committee's presentation and agreed (IWC, 2001, p.20):

> …that blocks of five years with an inter-annual variation of fifty percent were satisfactory in terms of allowing for the likely variability in hunting conditions. It therefore agreed that these values are appropriate for use in trials. It was recognised that this does not commit the Commission to these values in any final aboriginal whaling management procedure.

The Committee had also agreed that the same 50% allowance could be carried over between the last year of one block and the first year of the next. The rationale for this limitation has not changed: from a scientific perspective, SLAs are robust with respect to carryover provisions[1].

The SWG intends to review and provide advice on carryover provisions before the 2018 Commission meeting, and ideally in 2017. In the meantime, the Committee continues to endorse the 50% carryover principle. For example, with the annual strike limits currently allowed in the Schedule, for Bering-Chukchi-Beaufort Seas bowhead whales the Committee recommends that year-to-year carryover of up to 33 strikes (50% of 67, rounded down) should be allowed; and for humpback whales taken by the Bequians of St. Vincent and The Grenadines, the annual carryover would be 2 strikes (50% of one sixth of the block limit of 24).

The SWG observed that there are several potential objectives when recommending AWS carryover provisions. The primary concern is to provide a recommendation with the greatest scientific justification and effectiveness for meeting management objectives. However, it is also important to provide advice that is consistent with the Commission's needs (e.g. using language previously adopted by the Commission, to the extent this is possible) whilst producing advice applicable to all hunts. The SWG noted that the carryover provisions in the present Schedule are expressed in several different ways. To the extent possible, the SWG suggests that carryover provisions should be simple to express and administer, all else being equal. In its future discussions the SWG noted take into account the need to provide a suitable balance amongst these objectives. To facilitate discussion next year, Annex X describes potential principles and approaches for dealing with carryover within an AWS.

The other aspects of the AWS discussed by the SWG included: *Implementation Reviews*, guidelines for surveys, and guidelines for data/sample collection. Annex X describes provisions recommended by the SWG. Generally, these reflect the Scientific Committee's 2003 recommendations. One improvement pertains to the availability of data with reference the Committee's 2004 *Data Availability Agreement*, and the SWG's new recommendation reflects the DAA *Procedure A*.

4.3 Conclusions and recommendations

The SWG emphasises that AWS provisions are one of the last major remaining components of a comprehensive indigenous whaling management framework first requested by the Commission in 1994 and developed with an enormous expenditure of scientific effort and resources over the last two decades. The Commission has agreed that the AWS is a key component of this framework. Accordingly, in consultation with the Commission and its ASW sub-committee, as well as hunters and other stakeholders, the SWG intends to develop a full set of recommendations (taking into account the potential principles and approaches given in Appendix X) for the scientific components and aspects of an AWS before the 2018 Commission meeting when new aboriginal whaling quotas are due to be established. Ideally work will be completed during the 2017 Scientific Committee meeting.

5. ANNUAL REVIEW OF MANAGEMENT ADVICE[2]

The SWG noted that the Commission had reached agreement on strike limits for Greenland at the 2014 Annual Meeting (IWC, 2015a), and the SWG based its management advice on the same need requests considered last year. In providing this advice, the SWG noted that the Commission had endorsed the *Humpback SLA* in 2014 (IWC, 2015a), and the *WG-Bowhead SLA* had been recommended by the Committee last year (IWC, 2016). In addition, the Commission had approved the interim safe approach (based on the lower 5th percentile for the most recent estimate of abundance) for providing advice for the Greenland hunts developed by the Committee in 2008 (IWC, 2009, p.16). It had been agreed that that this interim approach should be considered appropriate for two blocks, i.e. up to the 2018 Annual Meeting. The SWG emphasised that the results of the full simulation exercise being undertaken as part of the development process for *SLA*s for the Greenland humpback and bowhead whales reconfirmed the Committee's original advice with respect to the *Interim SLA*.

On a general note, Allison reported that the IWC has recently received individual catch data for Greenland for the 2010 to 2014 seasons. Allison has been collaborating with Nette Levermann to facilitate transfer and validation of these data and the SWG expressed its thanks for the work Levermann has done in this regard.

[1]In 2012, the Committee agreed that there were no significant conservation implications of switching to 6-year blocks (IWC 2013, p. 22-23).
[2]Note that this section only includes the hunts for which this SWG provides annual advice; advice with respect to Bering-Chukchi-Beaufort Seas bowhead whale and eastern North Pacific gray whale hunts can be found in Annex F.

5.1 Common minke whales off West Greenland

5.1.1 New information (including catch data)

In the 2015 season, 130 common minke whales were landed in West Greenland and three were struck and lost. Of the landed whales, there were 101 females, 26 males and three of unknown sex. Genetic samples were obtained from 95 of these common minke whales in 2015 and the SWG was pleased to note that samples from the West Greenland hunt are included in ongoing genetic analyses of common minke whales in the North Atlantic. The SWG **encouraged** the continued collection of samples and the collaborative approach to analyses as witnessed during the joint AWM/RMP workshop in 2014 (IWC, 2015). In particular, it noted the importance of comparative analyses with Canadian samples.

5.1.2 Management advice

In 2009, the Committee was able to provide management advice for this stock for the first time. This year, using the agreed interim approach and the agreed abundance estimate of 16,100 (CV=0.43) for 2007, the SWG **advised** that an annual strike limit of 164 will not harm the stock.

5.2 Common minke whales off East Greenland

5.2.1 New information (including catch data)

In the 2015 season, 6 common minke whales were landed in East Greenland, and none were struck and lost. All of the landed whales were females. The SWG was pleased to note that samples were obtained from all the landed whales, and that samples from the East Greenland hunt are included in ongoing genetic analyses of common minke whales in the North Atlantic. The SWG **encouraged** the continued collection of samples and collaborative studies (see Item 5.1.1).

5.2.2 Management advice

Catches of minke whales off East Greenland are believed to come from the large Central stock of minke whales. The most recent strike limit of 12 represents a very small proportion of the Central stock (see Table 1). The SWG **repeats** its advice of last year that the strike limit of 12 will not harm the stock.

5.3 Fin whales off West Greenland

5.3.1 New information (including catch data)

A total of 10 fin whales (eight females and two males) were landed, and two were struck and lost, off West Greenland during 2015. The SWG was pleased to note that genetic samples were obtained from eight of these, and that the genetic samples of fin whales off West Greenland are analysed together with the genetic samples from the hunt in Iceland. It **encouraged** the continued collection of samples and collaborative work on analyses.

5.3.2 Management advice

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

5.4 Humpback whales off West Greenland

5.4.1 New information (including catch data)

A total of six (two males and four females) humpback whales were landed, and none were struck and lost, in West Greenland during 2015. The SWG was pleased to learn that genetic samples were obtained from all the landed whales and that Greenland was contributing fluke photographs to the North Atlantic catalogue, both from captured whales and other field studies. The SWG again **emphasised** the importance of collecting genetic samples and photographs of the flukes from these whales.

The SWG noted also that 10 humpback whales were observed entangled in fishing gear in West Greenland in 2015, which is considerably more than usual. Of these, one drowned, four were permitted to be killed, and five were of unknown status.

The SWG noted that bycaught whales had been included in the scenarios for the development of the *Humpback SLA.* If high levels continued, then this would need to be taken into account in any *Implementation Review.* It noted the IWC efforts with respect to disentanglement and prevention and **welcomes** the news that the Greenland authorities have committed to IWC disentanglement training that will occur at the end of June 2016.

5.4.2 Management advice

Based on the *Humpback SLA* that was agreed by the Commission in 2014, the SWG **agreed** that an annual strike limit of 10 whales will not harm the stock.

5.5 Bowhead whales off West Greenland

5.5.1 New information (including catch data)

One female bowhead whale was taken in West Greenland in 2015, and a genetic sample was obtained. The SWG **welcomed** the provision of detailed information from Canada on their hunt: one 14m female was taken in Repulse Bay in September 2015 and one animal was struck-and-lost near Hall Beach in the same month.

The SWG was pleased to receive a fully corrected line transect estimate for 2013 of 6,446 (CV: 26%) for all the major summering areas of the population in East Canada, excluding Foxe Basin, Repulse Bay and Lancaster Sound (Doniol-Valcroze *et al*., 2015). This estimate is good agreement with a new mark-recapture estimate of 7,660 (95% CI: 4,500-11,100) from genetic samples in Canada and West Greenland over the period 2008 to 2012 (Frasier et al., 2015).

The SWG recalled that it had agreed that the mark-recapture estimate of 1,274 (CV=0.12) provided the best estimate of abundance for the number of whales visiting West Greenland (IWC, 2015b).

The SWG noted that in recent years, Greenland has undertaken a large scale biopsy sampling programme that has produced valuable information on abundance and stock structure. It **recommended** continuation of this programme and **encouraged** continued collaboration with Canada on genetic and other work related to stock structure and abundance. It **agreed** that a Canadian scientist involved in the estimation of abundance should be invited to the next Annual Meeting with a view to endorsing the new abundance estimates.

The SWG noted that the *WG-Bowhead SLA* had been developed on the conservative assumption that the number of animals estimated off West Greenland represented the total abundance of animals in West Greenland-Eastern Canada.

5.5.2 Management advice

Based on the agreed 2012 estimate of abundance (1,274 CV=0.12), and using the agreed *WG-Bowhead SLA*, the SWG repeated its **advice** that an annual strike limit of two whales will not harm the stock.

5.6 Humpback whales off St Vincent and The Grenadines

5.6.1 New information (including catch data)

The Committee was informed last year that one male humpback whale, 35.8ft long, was caught on 4 April 2015 and that skin and/or blubber samples were collected from this whale that will be analysed in collaboration with the USA. No information has been received this year.

The SWG **strongly encourages** continued tissue sampling and collection of fluke photographs where possible from this region. Data should be shared with the appropriate databases and catalogues for the North Atlantic. It would welcome participation of a scientist from St Vincent and The Grenadines at next year's meeting.

5.6.2 Management advice

The SWG has agreed that the animals found off St Vincent and The Grenadines are part of the large West Indies breeding population (the last agreed abundance estimate was for 1992/93-11,570 95%CI 10,290-13,390). The Commission adopted a total block catch limit of 24 for the period 2013-18 for Bequians of St Vincent and The Grenadines. The SWG **repeated** its advice that this block catch limit will not harm the stock. However, it expressed concern that there is no officially agreed abundance estimate from the more recent MONAH programme that took place in 2004 and 2005. The recent NOAA status review (Bettridge *et al.,* 2015) discusses the programme and provides an estimate of 12,312 (95%CI 8,688 – 15,954) for 2004/5 but references this as 'NMFS, unpublished data'. The SWG **requests** that NOAA provides a paper to the next meeting that will allow it to properly review this abundance estimate and, if appropriate, adopt it as an estimate suitable for providing management advice.

6. UPDATE LIST OF ACCEPTED ABUNDANCE ESTIMATES

The table of agreed abundance estimates is provided as Table 2.

7. WORKPLAN AND PRIORITISED BUDGET REQUESTS

The SWG agreed to the two-year workplan provided in Table 3.

The SWG **stressed** that it would only be able to complete this workplan if funding was provided for:

(1) a joint workshop with RMP in the 2016/2017 period to complete the North Atlantic common minke whale RMP *Implementation Review* (the first two days) and an AWMP workshop with a focus on developing *SLA*s for the Greenland hunts (common minke and fin whales) and work on the AWS;

(2) an AWMP workshop in 2017/18 to complete the work on an *SLA* for the Greenlandic common minke whale hunts and ASW (if not completed in 2016/17); and

(3) maintenance of the AWMP Developer's Fund.

It appointed one intersessional steering group with terms of reference to plan for the intersessional workshop and provide guidance to developers. Members of the group are: Donovan (chair); Allison, Butterworth, Brandão, Givens, Punt, Witting.

Table 2

Summary of survey abundance estimates by species and area. Relative indices of abundance for use in the trials are given in IWC (2015b, Annex D).

Area	Year	Corr*	Estimate and approx. 95% CI and CV	IWC reference	Original reference
Common minke whale					
West Greenland	2007	A+P	16,610 (7,170-38,400) (CV: 0.43)	IWC (2010); IWC (2014b)	Heide-Jørgensen *et al*. (2010b)
West Greenland	2005	A+P	10,790 (3,400-34,300) (CV: 0.59)	IWC (2008)	Heide-Jørgensen *et al.* (2008)
West Greenland	1993	A	8,370 (3,600-19,440) (CV: 0.43)	IWC (1995)	Larsen (1995)
Fin whale					
West Greenland	2007		4,360 (1,810-10,530) (CV: 0.45)	IWC (2009)	Heide-Jørgensen *et al.* (2010a)
West Greenland	2005	P	3,230 (1,360-7,650) (CV: 0.44)	IWC (2008)	Heide-Jørgensen *et al.* (2008)
West Greenland	1988	A	1,100 (554-2,180) (CV:0.35)	IWC (1993)	IWC (1993)
Humpback whale					
West Greenland	2007	A+P	4,090 (1,620-10,324); (CV: 0.50) MRDS	IWC (2009); IWC (2014b)	Heide-Jørgensen *et al.* (2012); Heide-Jørgensen and Laidre (2013)
West Greenland	2007*	A+P	2,700 (1,402-5,215) (CV: 0.34) strip census	IWC (2009); IWC (2014b)	Heide-Jørgensen *et al.* (2012); Heide-Jørgensen and Laidre (2013)
Bowhead whale					
Prince Regent Inlet	2002	A+P	6,340 (3,119-12,906) (CV: 0.36)	IWC (2009)	IWC (2009)
Foxe Basin/Hudson Bay	2003	A+P	1,525 (333-6,990) (CV: 0.78)	IWC (2009)	IWC (2009)
West Greenland[1]	2007	A+P	1,229 (489-3,090) (CV: 0.47)	IWC (2008)	Heide-Jørgensen *et al.* (2007)
Isabella Bay	2009	A+P?	1,105 (515-2,370) (CV: 0.39)	IWC (2014a)	Hansen *et al.* (2012)
West Greenland	2012	A+P	744 (357-1,461) (CV: 0.34)	IWC (2015b)	Rekdal *et al.* (2015)
B-C-B bowhead whale					
	1978		4,765 (CV: 0.305)		Zeh and Punt (2005)
	1980		3,885 (CV: 0.343)		Zeh and Punt (2005)
	1981		4,467 (CV: 0.273)		Zeh and Punt (2005)
	1982		7,395 (CV: 0.281)		Zeh and Punt (2005)
	1983		6,573 (CV: 0.345)		Zeh and Punt (2005)
	1985		5,762 (CV: 0.253)		Zeh and Punt (2005)
	1986		8,917 (CV: 0.215)		Zeh and Punt (2005)
	1987		5,298 (CV: 0.327)		Zeh and Punt (2005)
	1988		6,928 (CV: 0.12)		Zeh and Punt (2005)
	1993		8,167 (CV: 0.071)		Zeh and Punt (2005)
	2001		10,545 (CV: 0.128)		Zeh and Punt (2005)
	2004		12,631 (CV: 0.244)		Koski *et al.* (2010)
	2011		16,892 (CV: 0.058)		Givens *et al.* (2013)
ENP gray whale					
	1968		13,426 (CV: 0.094)		Laake *et al.* (2012)
	1969		14,548 (CV: 0.08)		Laake *et al.* (2012)
	1970		14,553 (CV: 0.083)		Laake *et al.* (2012)
	1971		12,771 (CV: 0.081)		Laake *et al.* (2012)
	1972		11,079 (CV: 0.092)		Laake *et al.* (2012)
	1973		17,365 (CV: 0.079)		Laake *et al.* (2012)
	1974		17,375 (CV: 0.082)		Laake *et al.* (2012)
	1975		15,290 (CV: 0.084)		Laake *et al.* (2012)
	1976		17,564 (CV: 0.086)		Laake *et al.* (2012)
	1977		18,377 (CV: 0.08)		Laake *et al.* (2012)
	1978		19,538 (CV: 0.088)		Laake *et al.* (2012)
	1979		15,384 (CV: 0.08)		Laake *et al.* (2012)
	1980		19,763 (CV: 0.083)		Laake *et al.* (2012)
	1985		23,499 (CV: 0.089)		Laake *et al.* (2012)
	1986		22,921 (CV: 0.081)		Laake *et al.* (2012)
	1988		26,916 (CV: 0.058)		Laake *et al.* (2012)
	1993		15,762 (CV: 0.067)		Laake *et al.* (2012)
	1994		20,103 (CV: 0.055)		Laake *et al.* (2012)
	1996		20,944 (CV: 0.061)		Laake *et al.* (2012)
	1998		21,135 (CV: 0.068)		Laake *et al.* (2012)
	2001		16,369 (CV: 0.061)		Laake *et al.* (2012)
	2002		16,033 (CV: 0.069)		Laake *et al.* (2012)
	2007		19,126 (CV: 0.071)		Laake *et al.* (2012)
	2007		20,750 (18,860-23,320) (CV: 0.06)		Durban *et al.* (in press)
	2008		17,820 (16,150-19,920) (CV: 0.054)		Durban *et al.* (in press)
	2010		21,210 (19,420-23,250) (CV: 0.046)		Durban *et al.* (in press)
	2011		20,990 (19,230-22,900) (CV: 0.044)		Durban *et al.* (in press)

*Indicates whether the estimate has been corrected for availability bias (A) and/or perception bias (P).

[1]The mark-recapture abundance estimate of 1,274 (CV=0.12; 95% CI: 967-1,581) constitutes the best available estimate of abundance for the number of bowhead whales visiting West Greenland - Rekdal *et al.* (2015); for a discussion as to why this estimate is not suitable for use within the present trial structure see IWC (2015b, Item 3.1).

Table 3

Two-year workplan for the SWG on the AWMP. It is emphasised that progress on the second year is dependent on that in year 1.

Intersessional	2017 Annual Meeting	Intersessional	2018 Annual Meeting
Progress work on *Fin whale SLA* (workshop)	Recommend *SLA*		
Progress work on minke whale *SLA* (workshop)	Review progress and if possible recommend	Continue work (workshop)	Recommend *SLA*
Progress work on AWS (workshop)	Develop text to recommend to Commission	Continue work if needed	Present final text to Commission
	Prepare for BCB bowhead *Implementation Review*		Complete BCB Bowhead *Implementation Review*
	Annual provision of management of advice		Annual provision of management of advice

8. ADOPTION OF REPORT

The report was adopted at 2115 on 15 June 2016.

Appendix 1

AGENDA

1. INTRODUCTORY ITEMS
    - 1.1 Convenor's opening remarks
    - 1.2 Election of Chair
    - 1.3 Appointment of rapporteurs
    - 1.4 Adoption of agenda
    - 1.5 Documents available
2. DEVELOPMENT OF AN *SLA* FOR THE GREENLANDIC FIN WHALE HUNT
    - 2.1 Review of discussions at the intersessional workshop (SC/66b/Rep03)
    - 2.2 New information
    - 2.3 Implications of new information
    - 2.4 Conclusions and recommendations
3. DEVELOPMENT OF AN *SLA* FOR THE GREENLANDIC COMMON MINKE WHALE HUNTS
    - 3.1 Review of discussions at the intersessional workshop (SC/66b/Rep04)
    - 3.2 Progress with the RMP work on North Atlantic common minke whales including that in SC/66b/Rep04
    - 3.3 New information
    - 3.4 Development of initial trial structure
    - 3.5 Work plan to ensure intersessional progress
4. ABORIGINAL WHALING SCHEME (AWS) WITH FOCUS ON B-C-B BOWHEAD WHALES
    - 4.1 Review of discussions at the intersessional workshop (SC/66b/Rep03)
    - 4.2 Consideration of any work since the workshop

4.3 Conclusions and recommendations

4.6 Work plan

5 ANNUAL REVIEW OF MANAGEMENT ADVICE

5.1. Common minke whales off West Greenland

5.1.1 New information (including catch data)

5.1.2 Management advice

5.2. Common minke whales off East Greenland

5.2.1 New information (including catch data)

5.2.2 Management advice

5.3. Fin whales off West Greenland

5.3.1 New information (including catch data)

5.3.2 Management advice

5.4. Humpback whales off West Greenland

5.4.1 New information (including catch data)

5.4.2 Management advice

5.5. Bowhead whales off West Greenland

5.5.1 New information (including catch data)

5.1.2 Management advice

5.6. Humpback whales off St Vincent and The Grendines

5.6.1 New information (including catch data)

5.6.2 Management advice

6. UPDATE LIST OF ACCEPTED ABUNDANCE ESTIMATES

7. WORK PLAN AND PRIORITISED BUDGET REQUESTS

8. ADOPTION OF REPORT

Appendix 2

SOME IDEAS ON DRAFT PRINCIPLES AND SCIENTIFIC PROVISIONS OF A POTENTIAL ABORIGINAL WHALING SCHEME (AWS)

1. CARRYOVER

1.1 Concepts and principles

The use of carryover enables the Commission to better tailor its management practices to the reality of subsistence hunting by addressing the fact that harsh environmental conditions can lead to failed or reduced harvest levels. In the years following a reduced harvest, communities can try to regain lost food supply. From a local management perspective, carryover reduces competitive pressure on subsistence harvests as the number of strikes taken approaches the nominal quota. This reduction in pressure may promote increased care and efficiency in the harvest. Carryover can also be useful for flexibly reallocating a block quota amongst several hunting villages.

The concept of carryover is a beneficial management tool that can be shown not affect conservation status. However, it is also important to note that it is not intended as a means of increasing the nominal quota on a consistent basis, only as a means of flexibly accommodating variation around the nominal quota. Any exceedances allowed by carryover are not intended to continue indefinitely.

Whatever manner the Commission chooses to express carryover provisions, from the SWG perspective it is useful to make a conceptual distinction between the accumulation and expenditure of carryover strikes. A tally of unused strikes may be thought of as accumulating in a 'carryover bank' which tracks the total. From this total, some strikes may be used in a year to augment the nominal quota. This can be termed 'carryover usage'. In what follows, references to the 'bank'

are only to conceptualise the accumulation of carryover; the actual regulation of strikes, including carryover, is a matter for the Commission.

For conservation purposes, there is a (loose) linkage between carryover usage and stock status. When a stock is considered to be at greater risk, the expenditure of carryover strikes may need to be reduced. This linkage can be loose because whale lifetimes are long and population dynamics are slow; nothing too risky can happen too quickly. This is particularly the case given the risk-averse nature of agreed *SLA*s and the use of *Implementation Reviews* that take into account actual catches/strikes.

Furthermore, unlimited strikes could not persist in the carryover bank indefinitely without potentially endangering conservation objectives if the usage of these strikes was to be unregulated. For example, if the status of the whale stock were to change deteriorate seriously, it is possible that too many saved strikes might be used over too long a period, even though these were previously unused and reserved. Generally, confidence that a carryover strike may still be safely used should generally decrease as the period that it has been reserved lengthens.

In light of these principles, an AWS carryover provision might include limits on either the carryover bank or usage or both. The SWG also reaffirms its general principle that 50% inter-annual variation in strike limits due to carryover will not significantly reduce the conservation performance of an agreed *SLA*, and that carryover rules of this magnitude do not require further testing.

1.2 Progress toward an AWS carryover provision

The SWG continues to work on this issue and so the text below is largely tentative and provided to facilitate discussion next year.

1.2.1 Timing

At present, whether unused strikes can be tallied annually or on a block basis depends on the nature of the Schedule wording adopted for each aboriginal hunting quota. When an AWS is first adopted, the number (and potentially dates) of unused strikes initially in the 'bank' will need to be determined. The SWG will develop a method for initialising the carryover bank tally after it determines the nature of its carryover provisions as discussed in Sections 1.2.2 and 1.2.3.

1.2.2 Limits on the accumulation of carryover strikes

Carryover strikes cannot be accumulated without limit, nor saved indefinitely.

One option is to limit the number of strikes in the bank that may be carried over into the first year of a new block. Although this could be an 'arbitrary' cap set by the Commission, it seems preferable for the limit to be expressed as a proportion of the strike limit for the next block. This would allow more carryover when stock status is good and less when it is poor. The same proportionality would be applied to each stock managed with a *SLA*. Note that this limits the number of accumulated strikes carried forward; a further provision would limit how many of these could be used in any single year. Yet another provision would concern year-to-year carryover within a block.

Capping the number of strikes that may be carried over from one block to the next reduces the indefinite persistence of unused carryover strikes, essentially assigning to all strikes above that cap an expiration date equal to the end of the block. An alternative approach is to assign each carryover strike an explicit expiration date. If the strike is not used by that date, it is removed from the bank. For example, a 12-year strike duration might be chosen because it equals the length of two 6-year quota blocks. The same duration could be used for all stocks managed by a *SLA*.

Regardless of how carryover is accumulated, used, and/or expired—and particularly if the concept of expiring carryover strikes is adopted—the initial contents of the carryover bank would need to be established. In the future, the Scientific Committee could track the carryover bank using the annual hunting reports it ordinarily receives from member countries.

1.2.3 Limits on the usage of carryover strikes

Not all strikes in the carryover bank may be available for use in a single year. The Commission might choose to impose such a limit with Schedule language resembling the boldfaced clause below:

> *For the years 2019-2024 inclusive, the number of whales struck shall not exceed [block limit] with no more than [annual limit] struck in any single year, except that [provision for carryover accumulation]* **and the number of such carried forward strikes used in any single year shall not exceed UL**

where UL is a (annual) carryover usage limit and the hypothetical italicised wording is purely to place this clause in context. Actual Schedule wording would replace UL with a number. Reflecting the Committee's agreement that 50% annual strike variation is scientifically acceptable, the Committee would probably recommend that UL equals 50% of one sixth of the block strike limit. The same 50% factor would be used for each stock managed with a *SLA*.

1.2.4 Provision of advice to the Commission

While committed to formulating its advice using precise, technical, and potentially complex scientific reasoning, the SWG recognises that it is important to convey its advice to the Commission in language that is simple and represents minimal deviation from what the Commission has typically written in the Schedule.

If the approach develops follows the approach described in Section 1.2.1 with a 12-year expiration as in Section 1.2.2 and a usage limit corresponding to 50% interannual variation as in Section 1.2.3. When providing advice to the Commission on a new block quota, one approach might be for the Committee to use these carryover provisions to augment (boldface) its conventional advice (italic) as follows, for the BCB bowhead example:

> *The Committee reiterates that the Bowhead Whale SLA continues to be the most appropriate way for the Committee to provide management advice for this population. The Committee advises that based upon the Bowhead SLA a six-year block limit of 402 strikes will not harm the stock.* **In addition, based upon the provisions of the AWS, an additional CO carryover strikes should be permitted during the block, provided that no more than 100 strikes altogether are used in any single year.**

Here, CO is a number that the Scientific Committee would calculate based on its carryover tallies. The number 100 is calculated by the Committee as 150% of one sixth of 402, reflecting the Committee's agreement that 50% annual variation should be allowed. For another stock, the Committee would change the numbers 402, CO, and 100 analogously.

2. SURVEY INTERVALS AND THE INTERIM ALLOWANCE

A variety of factors beyond the control of the hunters may prevent the completion of a successful whale population abundance estimate. These include bad weather, unsafe ice conditions, lack of funding, and unresolved political or legal issues. While recognising such concerns, the Committee has noted that uncurtailed aboriginal whaling quotas cannot be continued indefinitely in the long-term absence of data.

An AWS must address what should be done in the unlikely event that exceptional unforeseen circumstances delay obtaining an agreed abundance estimate beyond 10 years. A third quota block begun in these circumstances is termed a 'grace period'. The SWG recommends that a provisional 'interim allowance' quota be established for the grace period. Specifically, the grace period strike limit should equal the limit produced by the agreed *SLA*, without reduction, for a single block.

The SWG reiterates its recommendation that surveys should be conducted no less frequently than every 10 years. There will, of course, be a delay between when the survey is conducted and the resulting abundance estimate is agreed by the Committee, and because surveys, estimates and quota blocks need not be synchronised. For the sake of counting years in this situation, a survey is not considered to have occurred until the resulting abundance estimate is agreed. At that point, the 10-year time window is deemed to have begun in the year during which the survey was conducted. Then, ideally, the next survey would be conducted and the estimate approved within 10 years of the previous survey. However, one can envisage other scenarios. For example, the next survey might have occurred eight years after the previous one, but the corresponding abundance estimate not agreed until 13 years after the previous survey was conducted ('the 13th year'). In this case, a survey would be considered overdue during the 11th and 12th years. If the start of a new block occurred during that time, the grace period would be triggered (see below). Otherwise, when the abundance estimate is agreed in the 13th year after the last survey was conducted, the fact that the survey actually took place eight years after the last agreed estimate would reset the clock so that the next deadline would be the 18th year, and a grace period would have been averted.

In 2003 and in IWC (2006b), the Committee envisioned that, during the grace period block, a new strike limit would be established immediately when a new abundance estimate was agreed, rather than waiting until the end of the grace period block. As discussed under Item 4.1 of this report, the SWG agreed that for BCB bowheads this immediate updating was an acceptable approach, and that refraining from updating *SLA* calculations until the grace period expires is another acceptable approach. In the case of immediate updating, the number of strikes taken thus far during the grace period should be subtracted from the updated quota, with the remainder being the strike limit for the rest of the grace period. Carryover is not affected.

The SWG emphasises that the interim allowance approach is intended to be applied only in the unlikely event that exceptional unforeseen circumstances had delayed obtaining an agreed abundance estimate beyond the end of the second quota block. It should not be interpreted as a routine approach for extending quotas for a third block without a concerted effort to obtain a successful survey prior to that time. Furthermore, the Committee would not recommend two consecutive interim allowances.

The SWG agreed that however unlikely, it is important to consider the remote possibility that no acceptable abundance estimate is obtained by the end of the third block. In this worst-case scenario it is not appropriate simply to invoke an SLA based on a feedback procedure if that feedback is not forthcoming after such a long period. Given good faith efforts to obtain an abundance estimate, such a situation would probably have arisen from profound and unexpected environmental change (e.g. related to climate or a disaster such as a massive oil spill). Under such circumstances, an immediate *Implementation Review* would probably have been initiated, irrespective of the timing of (un)successful surveys and quota blocks. The SWG stresses that as soon as it becomes apparent that there is a likelihood that an

abundance estimate may not become available in time, researchers should immediately begin to develop alternative approaches to obtaining abundance estimates (or at least indices of abundance) that do not depend on the problematic conditions. Nevertheless, if no abundance estimate is available the year before the end of the grace period, the Committee should immediately initiate an *Implementation Review*. The default advice of the Committee in the absence of positive alternative evidence would be that the Commission should exercise great caution when agreeing any further strike limits. The level of caution will depend on the specifics of the situation.

The original intention of the 'grace period' approach was that a common approach should be used for all hunts. However, it has thus far only been tested for BCB bowhead whales. The SWG agreed that similar analyses should be conducted for the other aboriginal whaling cases (when such trials have not already been conducted), with the goal of recommending similar AWS rules (meeting the Commission's management objectives) where possible for other stocks.

Some potential examples are given in Adjunct 1 provided by Givens but not yet reviewed.

The text from here onwards is largely that developed in 2003 with some small updates.

3. *IMPLEMENTATION REVIEWS*

As in the RMP, the concept of an *Implementation Review* is central to the functioning of the AWMP. Under normal circumstances, an *Implementation Review* will be carried out regularly, about every six years.

3.1 Regular *Implementation Reviews*

The SWG notes that *Implementation Reviews* will normally contain at least the following elements: (1) a review of information required for the *SLA* (i.e. catch data, abundance estimates); and (2) a review of information (e.g. biological and genetic data) to ascertain if the present situation is as expected and within tested parameter space. Thus the review may result in the need to examine new trials, although this would not ordinarily be expected. In order to account for the need for further action (e.g., before agreeing an abundance estimate or running new trials), the SWG **agrees** that *Implementation Reviews* ordinarily should be initiated the year before advice on a new block limit is expected. It is not anticipated that every such review will entail a large amount of work. This will of course depend on a number of factors, largely dependent on the level of information available.

3.2 Unscheduled *Implementation Reviews*

The SWG views unscheduled (i.e., early) *Implementation Reviews* as a safety feature if new information arrives that causes concern. It is recognised that calling such a review does not necessarily mean revising the Committee's advice to the Commission, although it may do so. The SWG does not believe it appropriate to try to compile a formal list of what factors might 'trigger' such an early review (by its very concept it implies unexpected/unpredictable factors). The following list is provided to give examples of some possible factors.

(1) Major mortality events (e.g., suggested by large numbers of stranded animals).

(2) Major changes in whale habitat (e.g., the occurrence of natural or anthropogenic disasters or changes, such as an oil spill or dramatic change in sea-ice).

(3) Major ecological changes resulting in major long-term changes in habitat or biological parameters.

(4) A dramatically lower abundance estimate (although the *SLA* has been tested, the SWG would review the potential causes of unexpected very low estimates).

(5) Information from the harvest and hunters (this might include very poor harvest results, reports of low abundance despite good conditions, reports of large numbers of unhealthy animals).

(6) Changes in biological parameters that may result in changes to management advice (e.g. reproduction, survivorship).

(7) If there are periods when need is not being satisfied, significant positive information that might narrow the plausibility range and allow an increase in block limits.

4. GUIDELINES FOR SURVEYS, OVERSIGHT AND DATA AVAILABILITY

The SWG reaffirms the general principles for surveys developed in 2001 (IWC, 2002, p. 26) regarding: survey/census methodology and design; Committee oversight; and data analysis. Provisions about data availability are updated here to reflect the Committee's *Data Availability Agreement* (IWC, 2004).

4.1 Survey/census methodology and design

Plans for undertaking a survey/census should be submitted to the Scientific Committee in advance of their being carried out, although prior approval by the Committee is not a requirement. This should normally be at the Annual Meeting before the survey/census is carried out. Sufficient detail should be provided to allow the Committee to review the field and estimation methodology. Considerably more detail would be expected if novel methods are planned.

4.2 Committee oversight

Should it desire, the Scientific Committee may nominate one of its members to observe the survey/census to assess the scientific integrity of the process. This would be more important if novel methods were being used.

4.3 Data analysis and availability

The SWG believes that it is appropriate that all data to be used in the estimation of abundance be made available to the Scientific Committee suitably in advance of the Annual Meeting at which an estimate is to be presented. Regarding the provision of data, the SWG refers to its *Data Availability Agreement* (IWC, 2004), noting that data used in the AWMP are governed by *Procedure A*. If new estimation methods are used in the data analysis, the Committee may require that computer programs (including documentation to allow such programs to be validated) shall be provided to the Secretariat for eventual validation by them.

4.4 Estimates to use in the *SLA*

The most recent estimate(s) accepted by the Committee for any year(s) should be incorporated in the *SLA* calculations. If there is more than one accepted estimate for a given year and the Committee agrees that the estimates are based on sufficiently independent data, then both estimates should be incorporated in the *SLA* calculations. If a revised estimate is obtained for a particular year, then the old one should be replaced before the next block strike limit is recommended. The use of a new abundance estimate agreed during a grace period is covered in Section 2.

5. GUIDELINES FOR DATA/SAMPLE COLLECTION

The SWG **recommends** that data from each harvested animal should be collected and made available to the IWC. The following information should normally be provided for each harvest or individual whale as appropriate: species; number of animals; sex; season; position of catch (to the nearest village); length of catch (to 0.1m). It further requested that information/samples on reproductive status and samples for genetic studies be collected where possible. It also noted the value of additional studies to the *Implementation Review* process, such as the use of photo-identification data for estimating survivorship, estimation of calf production, and assessment of anthropogenic injuries. The value of traditional knowledge is also noted, and the SWG **agrees** that any such information will be valuable when conducting *Implementation Reviews*.

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Adjunct 1

Examples of survey intervals and grace periods

Geof H. Givens

Tables 1 and 2 illustrate several scenarios about how strike limits might evolve with varying survey intervals and grace periods. In these tables, it is assumed for simplicity that the *SLA* would output a six-year block strike limit (SL) each time. For the sake of simplicity, carryover is ignored in these tables.

Five different scenarios (A-E) are shown in Tables 1 and 2. These tables cover more than four quota blocks (boxes), with surveys (Surv), agreed abundance estimates (Est) and the establishment of block strike limits (SL) scheduled by year (Yr), The 'Clock' counts the number of years remaining before a survey will thereafter be overdue. Thus, when the clock set by the most recent estimate is negative, a survey is overdue and when a grace period quota is required an interim allowance strike limit (IASL) is set.

Scenario A in Table 1 illustrates a situation with regular 8-year survey intervals and estimates two years later. Each strike limit is set using a timely survey; no surveys are overdue and no grace periods are required. Note that in year 13, a block strike limit is set using the survey from year 4. Although the more recent survey (year 12) has occurred, the corresponding abundance estimate has not yet been computed. Scenario B represents an unproblematic case with 10-year survey intervals.

Scenarios C and D (Table 2) illustrate cases where the grace period is invoked in year 13. In Scenario C, immediate revision of the interim allowance strike limit (IASL) is assumed and an updated strike limit (USL) is computed. Scenario D presents the same schedule of surveys and estimates, but when the grace period is invoked, the IASL is retained for the entire block, with the year 12 survey first being used in year 19.

Scenario E (Table 2) illustrates that it is possible that surveys could be more than 10 years apart (in this case, 13 years) without triggering the grace period.

Table 1

Survey frequency illustrations, scenarios A and B. These cover more than four quota blocks (boxes), with surveys (Surv), agreed abundance estimates (Est) and the establishment of block strike limits (SL) scheduled by year (Yr), The 'Clock' counts the number of years remaining before a survey will thereafter be overdue. See the text for a detailed discussion.

Yr	A	Clock		B	Clock	
1	SL			SL		
2						
3						
4	Surv	10				
5		9				
6	Est	8		Surv	10	
7	SL	7		Est/SL	9	
8		6			8	
9		5			7	
10		4			6	
11		3			5	
12	Surv	2	10		4	
13	SL	1	9	SL	3	
14	Est	0	8		2	
15			7		1	
16			6	Surv	0	10
17			5	Est	-1	9
18			4			8
19	SL		3	SL		7
20	Surv	10	2			6
21		9	1			5
22	Est	8	0			4
23		7				3
24		6				2
25	SL	5		SL		1
26		4		Surv	10	0

Table 2

Survey frequency illustrations, scenarios C, D, and E. These cover more than four quota blocks (boxes), with surveys (Surv), agreed abundance estimates (Est) and the establishment of block strike limits (SL) scheduled by year (Yr), The 'Clock' counts the number of years remaining before a survey will thereafter be overdue. An interim allowance (IASL) is shown in scenarios C and D, with an updated strike limit (USL) in year 15 for scenario C. See the text for a detailed discussion.

Yr	C	Clock		D	Clock		E	Clock	
1	SL			SL			SL		
2	Surv	10		Surv	10				
3		9			9				
4		8			8		Surv	10	
5	Est	7		Est	7			9	
6		6			6		Est	8	
7	SL	5		SL	5		SL	7	
8		4			4			6	
9		3			3			5	
10		2			2			4	
11		1			1			3	
12	Surv	0	10	Surv	0	10		2	
13	IASL	-1	9	IASL	-1	9	SL	1	
14		-2	8		-2	8		0	
15	Est/USL	-3	7	Est	-3	7		-1	
16			6			6		-2	
17			5			5	Surv	-3	10
18			4			4	Est	-4	9
19	SL		3	SL		3	SL		8
20	Surv	10	2	Surv	10	2			7
21		9	1		9	1			6
22	Est	8	0	Est	8	0			5
23		7			7				4
24		6			6				3
25	SL	5		SL	5		SL		2
26		4			4				1