# Marine Mammal Welfare Workshop 2025 – MMWWS 2025

24 March 2025, Fram Centre, Tromsø, Norway
Room Kompasset, 8:00 – 18:00

# Document **08**: Overview of Workshops (WS), Expert Groups (EG) and Seminars dealing with hunting methods and welfare issues organised by the NAMMCO Committee on Hunting Methods – Review of Terms of Reference, Results and Recommendations, as reporting to the Council of NAMMCO

Geneviève Desportes, NAMMCO Secretariat

## Contents

## 1. BACKGROUND

At its inaugural meeting (10-11 September 1992), the Council agreed that the question of hunting methods was a matter of relevance to NAMMCO on all levels – scientific, management and information. It was agreed to establish an ad hoc Committee chaired by Amalie Jessen, Greenland, with representatives of each member of the Council. The Committee will:

- review hunting methods as required by the members of the Council
- include consideration of measures necessary to ensure the safety of those directly involved in hunting.

*(NAMMCO 1992. Report of the Inaugural meeting of the Council of NAMMCO, page 3: Hunting Methods, available here]*

Council 4 (February 1994) decided that the ad hoc Committee on Hunting Methods should continue as a permanent Working Group (WG) and would report directly to the Council. The role of the WG would be to provide advice on hunting methods for those species of marine mammals relevant to NAMMCO member Countries upon request from the Council, individual member countries, WG members or non-member governments.

*(NAMMCO 1994. Report of the Fourth Meeting of the Council, page 11: Hunting Methods, available here).*

The Working Group become a permanent committee, the Committee on Hunting Methods at Council 8 (September 1998).

The small Committee (up to two committee members for each party) continued to collect information on hunting methods in NAMMCO member Countries. As a way of widening its expertise, the Committee organised expert group (EG) meetings, workshops (WS) and seminars on different issues it had to examine, where external experts and hunters were invited to participate. The reports of these meetings can be found here.

## 2. CHRONOLOGICAL LIST AND TORS OF WS AND EG ORGANISED BY THE CHM

### 1999 - NAMMCO WS ON HUNTING METHODS, 9–11 FEBRUARY 1999, NUUK, GREENLAND

(i) to review existing marine mammal hunting methods in member countries, including technical developments with respect to equipment and methods, with the view to providing a technical evaluation of different hunting methods (fin and minke whaling; hunting of small whales; seal and walrus hunting);

(ii) to examine possibilities for technical innovation and further enhancement of efficiency and safety of hunting methods, with a view to providing recommendations for improvements, where relevant.

The report can be found here.

### 2001 - NAMMCO WS ON MARINE MAMMALS: WEAPONS, AMMUNITION AND BALLISTICS, 13–15 NOVEMBER 2001, SANDEFJORD, NORWAY

(i) increase the understanding of weapon types, ammunition and ballistics for hunters, administrators and other personnel, and

(ii) develop a minimum set of requirements pertaining to weapons and ammunition types with regard to different species.

In order to achieve this the WS would address topics such as:

- weapon types and ammunition in combination with terminal ballistics
- the impact of weapon types and ammunition on different marine mammal species
- safety for the hunters with respect to weapons use.

The report can be found here.

### 2004 - NAMMCO WS ON HUNTING METHODS FOR SEALS AND WALRUS, 7–9 SEPTEMBER 2004, NORTH ATLANTIC HOUSE COPENHAGEN, DENMARK

(i) review existing seal and walrus hunting methods known

(ii) evaluate methods used in seal and walrus hunting in relation to killing efficiency and struck and loss rates

(iii) examine possibilities for technical innovation and further enhancement of efficiency and safety of hunting methods, with a view to providing recommendations for improvement, where relevant, and,

(iv) if possible, determine minimum requirements for safe and efficient killing of different seal species and walrus, considering variations in hunting methods.

The report can be found here.

## 2006 - NAMMCO WS TO ADDRESS PROBLEMS OF "STRUCK AND LOST" IN SEAL, WALRUS AND WHALE HUNTING, COPENHAGEN, DENMARK 14–16 NOVEMBER 2006.

(i) review hunting methods for seal, walrus and whale with respect to the problem of "struck and lost" (S&L)
(ii) identify possible studies of S&L to be undertaken in cooperation between researchers and hunters, in order to achieve accurate and reliable estimates of S&L
(iii) identify the reasons why some hunts have a high or low S&L rate
(iv) make recommendations on how to reduce S&L, in consideration of hunting techniques, equipment modifications, season, locality and reduction of animal suffering.

The report can be found here.

## 2009 - NAMMCO EG MEETING ON BEST PRACTICES IN THE HUNTING AND KILLING OF SEALS, 24 – 26 FEBRUARY 2009, COPENHAGEN, DENMARK

(i) The work should build upon the knowledge and experiences already gathered in previous workshops organised by the Committee on Hunting Methods and possible new developments emerging since the last WS held in 2006.
(ii) The work should be undertaken in a focussed group of specially invited experts with experience in seal hunting practices both from NAMMCO member countries as well as from other sealing nations and communities.
(iii) The EG will critically assess different seal hunting methods within their contexts, addressing such questions as:
    a. The use of specific hunting methods and equipment in particular settings
    b. Training requirements for hunters
    c. Control and monitoring of hunting methods
    d. Research needs to improve the basis for further assessment
(iv) The EG will develop recommendations on best practices based on state of the art in sealing today and identify where and how specific improvements can be made.
(v) As background information for the work of the EG, the Secretariat, in cooperation with the Committee on Hunting Methods, will prepare a collation of relevant information and recommendations on seal hunting methods from previous NAMMCO WSs and other relevant and up-to-date sources of information on sealing practices.

The report can be found here.

## 2010 - NAMMCO EG MEETING ON ASSESSMENT OF LARGE WHALE KILLING DATA, 17–18 FEBRUARY 2010, COPENHAGEN, DENMARK

(i) Organise an EG in February/March 2010 to
   a. undertake a review and evaluate the whale killing data submitted to NAMMCO by Japan in 2009,
   b. undertake a review and evaluate the data and information on recent and ongoing research on improvements and technical innovations in hunting methods and gears used for the hunting of large whales in NAMMCO countries.

The report can be found here.

## 2011 - NAMMCO EG MEETING TO ASSESS THE HUNTING METHODS FOR SMALL CETACEANS, 15–17 NOVEMBER 2011, COPENHAGEN, DENMARK

1. Review and assess current hunting and killing methods for small cetaceans
2. Review and assess information on recent and ongoing research on improvements and technical innovations in hunting methods and gear used for hunting of small cetaceans
3. Review and assess time to death (TTD) data on the killing of small cetaceans
4. Give recommendations with respect to possible improvements.

The report can be found here.

## 2015 - NAMMCO EG MEETING ON ASSESSING TTD DATA FROM LARGE WHALE HUNTS, 4-6 NOVEMBER 2015, COPENHAGEN, DENMARK

(i) undertake a review and evaluate the whale killing data submitted to NAMMCO by member countries and associated hunting nations,
(ii) undertake a review and evaluate the data and information on recent and ongoing research on improvements and technical innovations in hunting methods and gears used for the hunting of large whales.

The report can be found here.

## 2016 - NAMMCO SEMINAR ON PROCESSING AND ANALYSING OF TTD DATA, UNIVERSITY OF OSLO, NORWAY, 7 FEBRUARY 2016.

One day seminar on the statistical analyses and presentation of time to death (TTD) data

Two protocols were produced in preparation of this seminar:

a) A protocol for the collection of TTD data in whale hunts with deck mounted harpoon gun. It can be found here.
b) A protocol for the statistical analyses of TTD data in whaling operations was produced. It can be found here.

# 3. REPORTS OF THE EVENTS TO THE COUNCIL AND COMMENTS FROM THE COUNCIL

The following pages provides the summary report of the event to the Council, and the Council comments.

## 1999 NAMMCO WORKSHOP ON HUNTING METHODS

**Report of the WS on Hunting Methods to Council 9**

The WS on Hunting Methods, was held in Nuuk, Greenland, from 9 to 11 February 1999. The Wand chaired by Pr. Knud Nielsen. The WS had the following terms of reference:

- to review existing marine mammal hunting methods in member countries, including technical developments with respect to equipment and methods, with the view to providing a technical evaluation of different methods of hunting (fin and minke whaling; hunting of small whales; seal and walrus hunting);
- to examine possibilities for technical innovation and further enhancement of efficiency and safety in hunting methods, with a view to providing recommendations for improvements where relevant.

Due to weather conditions the Icelandic delegation unfortunately was prevented from participating in the WS.

The WS had organised the discussion on hunting methods and hunting regulations by region and marine mammal species. The WS began by discussing the existing and recent improvements to pilot whale hunting methods in the Faroe Islands. The Chairman pointed out that a new knife and a new improved hook were being developed. One of the problems involved in utilising the new equipment, in particular the new hook, was the high cost to the hunters.

A number of small cetaceans are hunted in Greenland and the knowledge of hunting these animals is passed on from generation to generation. The hunters combine traditional knowledge, gleaned from direct observation and participation, with the restrictions of current regulations. These regulations are primarily concerned with efficiency of the equipment and with the catch reporting system.

In reference to the Norwegian minke whale hunt, Norway has since 1984 continued to develop a more efficient penthrite grenade. A study is underway to find the best method of determining the exact moment a whale loses consciousness or dies.

Greenland had recently initiated a renovation program of all the harpoon canons used in minke and fin whale hunting. He noted that Greenlandic minke and fin whale hunters found the penthrite harpoon grenades to be expensive and destructive to the meat. Minke whales are also hunted with rifles in Greenland, and the hunters must follow strict regulations on the minimum number of skiffs involved in each team of hunters, and on the other types of equipment required for this type of hunt. Norway had expressed scepticism about this type of hunting, but Greenland explained that the economic conditions in the isolated villages that engage in this type of hunting precludes the adoption of other techniques at present.

The participants at the WS from Japan and Russia outlined the various hunting methods used in marine mammal hunting by their countries.

In Greenland seals and walrus continue to have cultural and dietary importance. The method of seal hunting varies with species and season, but in each case the hunters are always seeking to improve their methods.

In reference to Norwegian sealing, it was reported that all sealers must pass a marksmanship test and a general sealing course prior to boarding the vessel. Studies have been undertaken on the efficiency of the various seal killing methods.

## Recommendations from the Workshop

These recommendations outline areas for improvements to hunting methods used in the different NAMMCO member countries and for specific species.

**1. Faroe Islands: Hunting of long-finned pilot whale (*Globicephala melas*)**

The WS noted with satisfaction that Faroe Islands has accomplished a number of improvements in the pilot whale hunt. These include a gentler driving of the whales, prohibition against the use of the spear, and the use of a new blunt hook for securing the animals. In addition, other efforts such as educational programs in the schools on how to hunt whales are under way. The WS notes, however, that the pointed hook is still in use and recommends that further effort be made to replace this with the new blunt hook for securing the animals.

**2. Faroe Islands: Killing of stranded northern bottlenose whale (*Hyperoodon ampullatus*)**

Stranded bottlenose whales are killed in the same way as pilot whales. Questions were raised over whether this is an adequate method of killing such a large animal, and it was recommended that rifles with adequate ammunition be used for killing stranded whales of this species.

**3. Greenland: Hunting of small cetaceans**

a) In Greenland hunters use full metal jacket, pointed bullets to kill harpooned small whales (beluga, *Delphinapterus leucas* and narwhal, *Monodon monoceros*). Investigations have shown that when a pointed bullet meets bone (such as cranium), it tends to tip or ricochet, while a full metal jacket, blunt-nosed bullet penetrates bone better. The WS, therefore, recommends that Greenland initiates studies in cooperation with the hunters, testing both pointed and blunt bullets on whale carcasses to determine the best ammunition for use in the hunt.

b) It was further recommended that Greenland develop objective descriptions of hunting methods, equipment and how efficient these are in small cetacean hunting, considering regional variations.

c) Greenlandic hunters informed the WS that work had been started on the development of a new handheld harpoon that can improve the efficiency of beluga, narwhal, walrus (*Odobenus rosmarus*) and seal hunting. The WS views this as a positive initiative and recommends that Greenland continue to support this project.

## 4. Baleen whale hunting

a) A Norwegian hunter has taken the initiative to develop a new whale harpoon that can be adjusted for each individual harpoon canon. This is a notable initiative that can contribute to better marksmanship and thereby to more efficient killing. The WS recommends that Norway continues to support this project.

b) During the WS there were several expressions of concern that Greenland hunts minke whales using rifles and handheld harpoons as the only weapons. An in-depth discussion revealed that there is significant disagreement in this area, and it was agreed to note the discord. Some delegates felt that animals should always be killed as quickly and painlessly as possible, and doubted if this was achievable using only rifles and handheld harpoons. It was also asserted that this hunting method is relatively new (introduced in the 1950s), and if it was to continue, there was a need for adjustments and improvements based on accumulated experience. Also, the Greenlandic Home Rule Government wishes to limit the rifle hunt as much as possible.

The Greenlandic rifle hunt of minke whales has several times received significant criticism. The WS finds that this type of hunting can negatively influence the attitudes towards all Greenlandic hunting. The WS recommends that this hunting method be subject to a critical analysis and an objective description of methods and equipment, with the goal of determining necessary adjustments.

c) The WS recommends that Greenland continue to work towards the goal of using the harpoon grenade in all hunts for baleen whales. It is, however, a source of concern that the penthrite harpoon grenade is so costly in Greenland that many hunters cannot afford to use it. The WS recommends that Greenland initiate an enquiry into the reasons for the price policies and work towards a price change.

d) Greenland has carried out a number of improvements on weapons and equipment used in whale hunting with the harpoon canon. In addition, the hunting regulations for large whales have been developed and improved. The WS notes with approval that Greenland has made these improvements and recommends that the work will continue in the future.

e) It was emphasised that the hunters were not able to buy the ammunition determined by experts to be the most efficient for killing whales, because it was not available in Greenland. The WS finds it questionable that market considerations have higher priority than professional judgement and justification and recommends that Greenland investigate the situation.

### Conclusion from the Workshop

The WS notes with approval that the Greenlandic Parliament has decided to formulate an animal protection law, and in this manner create an authoritative body that can introduce the element of animal protection in hunting regulations.

In conclusion the WS agreed that the meeting had been valuable, in professional terms, and that it was desirable to plan a similar meeting in the future, but with a focus on particular hunting methods.

## Comments and Conclusion from Council 9

The Council noted with satisfaction the report from the Committee on Hunting Methods, and in particular the Report from the WS on Hunting Methods. The Faroe Islands expressed its full support for the suggestions from the Committee, and Norway and Iceland commended the Committee for its valuable work. Greenland noted that many of the recommendations pertained to Greenland and that these were accepted and would be acted upon in a timely fashion.

The Council endorsed the Recommendations from the WS on Hunting Methods.

The Council noted the valuable contributions of the hunters to the WS and stressed the importance of ensuring the involvement of the hunters in future meetings.

The Chair reported that the Committee in considering plans for future work, agreed that it was evident from the WS on Hunting Methods in Nuuk in 1999, that basic knowledge and understanding of weapon-types, ammunition and ballistics is lacking.

The Council endorsed the Committee's intentions to pursue this topic further with the goal of increasing the understanding of ammunition types and ballistics for the hunters, administrators and other personnel.

The Council thanked the Chairman for his report and commended the work of the Committee in organising the WS, which had been a constructive contribution to co-operation through NAMMCO on hunting methods.

## 2001 NAMMCO WS ON MARINE MAMMALS: WEAPONS, AMMUNITION AND BALLISTICS

**Report of the WS on Marine Mammals: Weaponry, Ammunition and Ballistics to Council 11**

The WS on Marine Mammals: Weaponry, Ammunition and Ballistics was held in Sandefjord, Norway from 12 – 15 November 2001, and chaired by Pr. Knus Nielsen. The WS had the following terms of reference:

- to increase the understanding of weapon types, ammunition and ballistics for hunters, administrators and other personnel, and
- to develop a minimum set of requirements pertaining to weapons and ammunition types with regard to different species.

In order to achieve this the WS addressed the following topics:

- weapon types and ammunition in combination with terminal ballistics
- the impact of weapon types and ammunition on different marine mammal species
- safety for hunters with respect to weapons use.

Some of the WS presentations focussed on ballistics, such as internal and external ballistics, terminal ballistics in terms of rifle ammunition and the effect of calibre, weight and form of the projectile, the effect on the animal, and the effects of heavy calibre rifle and the penthrite grenade on minke whales.

Other presentations discussed the anatomical features of different species of marine mammals and hunting conditions, in relation to weapons and ammunition. Technical aspects of weapons were discussed in terms of sights and sighting implements, maintenance, inspection and overhaul of weapons and other hunting equipment. The last section focussed on safety aspects and animal welfare concerns.

### Recommendations and Conclusions from the Workshop

1. The target groups for the WS were hunters, administrators and scientists. The WS strongly emphasised the usefulness of the hunters' knowledge and experience for the conclusions drawn at the meeting. The WS recommends that the hunters' knowledge and experience are utilised in future workshops.

2. The WS acknowledged the work on upgrading, maintenance and standardisation of the harpoon canons and other whale hunting equipment in Greenland in the past years, and of the continued follow-up efforts, including the establishment of a permanent control system. This work has resulted in considerable improvements in personnel safety and has also increased the efficiency in the killing of fin- and minke whales. The WS acknowledged the major economic costs that are associated with this work.

3. The WS referred to the follow-up work of the Faroe Islands with respect to shooting tests of different weapons and ammunition types on dead pilot whales. This information was very useful and can be utilised in standardising methods for similar studies on other species. The WS recommended that NAMMCO encourage the member countries to undertake more controlled and standardised studies on other species, and if necessary during ordinary

hunting activities. The WS advised the NAMMCO Committee on Hunting Methods to develop guidelines for such studies and to make recommendations for target species.

4. The presentations and discussions under the Weapons and Ammunitions' theme indicated a great variation, between the member countries, with respect to the requirements for weapons and ammunitions used in hunting adult seals. The WS regarded it as beneficial to investigate the possibilities for harmonising the weapons and ammunition types for each species, with due considerations to the variations in hunting conditions in the NAMMCO member countries. In this regard it would be important to utilise the experience held by the hunters, and the WS urged that necessary studies be undertaken in order to support the harmonisation scientifically.

5. At the previous WS on hunting methods in Nuuk in 1999, it was noted that the ammunition determined by experts to be the most efficient, was not always available in the stores. This remains a problem in several of the NAMMCO member countries. The WS repeated that it is questionable that market considerations still have higher priority than scientific and professional judgement and considerations.

6. Results from Norwegian studies on rifles used as secondary weapons in the minke whale hunt were presented at the WS. These results showed that full metal jacket, round nosed ammunition from calibre 9.3 mm and larger, was very efficient for killing minke whales with a shot to the brain. The WS recommended that when weapons are replaced this is taken into consideration.

7. The WS referred to the "Report of the NAMMCO WS on Hunting Methods, February 1999" and recommended that the recommendations from that WS not yet considered must be followed up.

8. The WS acknowledged that the introduction of the new whale grenade has resulted in greater security for the hunters and has also increased the whale killing efficiency. The WS further emphasised the importance of including both the hunters' safety and the animal welfare aspects in official hunting regulations, including those pertaining to hunting methods.

## Comments and Conclusion from Council 11

The Council endorsed the Recommendations from the WS on Weapons, Ammunition and Ballistics. These recommendations which are a part of the WS Report, outline how the member countries can proceed in order to standardise and harmonise requirements for weapons and ammunition, and recommend that hunters' knowledge and experience are utilised in these developments.

In addition, it was recommended that the recommendations from the WS in Hunting Methods in 1999, which had not yet been considered, should be followed up.

The Council expressed its appreciation for the WS Report and noted that it had been useful for hunters and managers alike. The Council further noted the valuable contribution of the hunters to the WS.

## 2004 NAMMCO WS ON HUNTING METHODS FOR SEALS AND WALRUS

**Report from the WS on Hunting Methods for Seals and Walrus, to Council 14**

Egil Øen, Norway, presented the report of the WS on Hunting Methods for Seals and Walrus which was held in Copenhagen 7 – 9 September 2004. The terms of reference for the WS were:

- To review existing seal and walrus hunting methods known.
- To evaluate methods used in seal and walrus hunting in relation to killing efficiency and struck and loss rates.
- To examine possibilities for technical innovation and further enhancement of efficiency and safety of hunting methods, with a view to providing recommendations for improvement, where relevant, and
- If possible, determine minimum requirements for safe and efficient killing of walrus and different seal species, considering variations in hunting methods.

In summary, seal and walrus hunting are conducted in widely differing environments and under variable regulatory regimes. The equipment used is often restricted by the regulatory framework but is also adapted to the local conditions. Hunters from different areas have much to learn from one another, and should be open to new ideas, equipment and techniques, and willing to change their hunting methods if better methods are available. Hunters from different areas need to cooperate with one another to preserve their way of life. Hunters should have reason to be proud of what they do, and this requires that they be well educated and use the best available equipment and techniques.

The following themes had been suggested for integration into the recommendations from the WS:

- Hunters should aim for full utilisation of their catch;
- Hunters should acknowledge the importance of conservation and consider themselves as conservationists;
- Hunters do not agree that the results of some studies that show very high struck and loss rates for seal and walrus hunts can be applied to all hunts. Further research on struck and loss rates is required.
- Hunters need to find practical and effective measures to reduce struck and loss rates in some hunts;
- There is a need for more effective hunter training in some areas;
- There is a need for more research on the effectiveness of various rifles and bullet

types for killing seals and walrus.

### Recommendations from the Workshop

The WS recommendations were based on the presentations and the discussions at the WS, discussed one by one, revised if necessary, and adopted by consensus. These recommendations are intended for implementation by management authorities, hunters and researchers. In each case the hunts to which the recommendation most applies are identified.

### a) Hunter training

The WS recognised the continuing importance of hunter training for the improvement of hunter safety, reducing unnecessary suffering to animals, minimising struck and lost animals, maximising utilisation of the harvest, and equipment selection, manufacture and maintenance. Hunter training should be a priority for all hunts.

• The WS recommended training for inexperienced hunters in particular and that such training should be a continuous process for all hunters in general.

• The WS recommended that information is provided to hunters on new and improved equipment that is presently available.

### b) Struck and Lost Estimates

WS presentations and discussions demonstrated a lack of accurate and reliable estimates of "struck and lost" (S/L) for seal and walrus hunts. The WS recognised that reliable estimates of S/L are urgently required to allow better conservation and management and enable us to target hunts where S/L can be reduced.

It was also recognised that reducing S/L benefits hunters because of potential higher catches, less unnecessary suffering to animals and a better public image. Struck and loss estimates are a priority for open water seal and walrus hunts.

- The WS recommended that studies of S/L should be done in cooperation between researchers and hunters.
- The WS recommended the methods, techniques and equipment to reduce S/L should be developed and applied at the local level to ensure that these are appropriate to local conditions.

### c) Minimise Animal Suffering

- The WS recommended that the hunters should make every effort to reduce unnecessary suffering by hunted animals, by minimising killing times and avoiding letting injured animals escape. Such efforts should have priority for all hunts.

### d) Technical Innovation

The WS noted a lack of technical innovation in developing new equipment and hunting techniques to improve hunting efficiency and reduce "struck and lost".

- The WS recommended that development and research be undertaken in this area. Open water hunting for large seals and walrus was identified as a priority area.

### e) Calibre and Bullets

The WS recognised that there is a need to establish minimum requirements for firearms and ammunition for seal and walrus hunts. It was further recognised that specific recommendations on selection of calibre and bullet types for different species and hunts are difficult to make because little information is available. These observations and recommendations apply to all hunts.

- The WS therefore recommended that objective studies on terminal ballistics of various calibre and bullet types in seal and walrus hunting are carried out.
- It was recommended that these studies be done in cooperation with the hunters.
- There is a need to consider what types of firearms and ammunition are presently available in remote communities and the WS urged the stores to make available the ammunition determined to be appropriate for the various hunts.

### f) Full Utilisation

The WS agreed that the fullest possible utilisation benefits hunters because of more returns from the harvest, preservation of traditional skills and a better public image. This applies to all hunts. The WS recommended the following:

- That all hunting should occur within safe conservation limits.
- That all hunts should work towards the fullest possible utilisation of harvested animals.
- That new uses and markets for seal and walrus products should be pursued.

### g) Hunter Safety

The WS recognised that the safety of the hunters should be a priority in all hunts and recommended the following:

- That the safety of the hunters must be considered in any regulatory measures or technical innovations to equipment and techniques.
- That special attention be given to hearing loss due to noise and the need for ear protection, bullet ricochet endangering people and property and protective gear for extreme cold and harsh conditions.

## Comments and Conclusions from Council 14

The Council endorsed the recommendations and expressed its appreciation for the WS Report.

## 2006 NAMMCO WS TO ADDRESS PROBLEMS OF "STRUCK AND LOST" IN SEAL, WALRUS AND WHALE HUNTING

**Report of the WS to address problems of struck and lost in seal, walrus and whale hunting to Council 16**

The WS addressing problems of struck and lost (S&L) in seal, walrus and whale hunting was held in Copenhagen 14 – 16 November 2006 and chaired by Egil Ole Øen (Norway) and co-chaired by Glenn Williams (Canada).

The WS attracted 50 hunters, managers, scientists, NGOs and others from 11 different countries.

The goal of the WS was to improve catch relative to effort, to reduce animal suffering and improve public image, and to formulate recommendations on methods, techniques and equipment to reduce struck and loss that are applicable at the local level. The WS was structured into plenary sessions and four working group sessions on seals, small whales, large whales and walrus.

The WS recognised that a reduction of suffering by the hunted animals, by minimizing killing times, must be balanced by consideration of the safety of the hunter, and the risk of losing the animal.

A total of 22 recommendations were adopted by consensus of both a general and species specific nature. The recommendations may be classified into three main categories:

**Hunter's training** – an issue of great importance that pertains to all hunts. Improved hunters' training has been a recommendation in all the four NAMMCO workshops.

**Techniques and equipment** – the WS identified a particular need for technological developments and innovations and attention was drawn to recommendations 2.1.2, 2.2.2, 2.3.2 and 2.4.3. In some of today's hunts in the sea technical innovations are needed and wanted so that one may secure the animal by harpooning it before killing it. Both Japan and Norway noted that such equipment – notably air driven - possibly existed but that it had not yet been explored in these particular situations.

**Monitoring** – the present information on S&L is outdated or inadequate for several species and areas. New monitoring programmes appropriate for local conditions are needed and hunters should be involved in the process of developing such programmes.

With respect to monitoring attention was drawn to recommendation 2.4.4 which gives a good example of what is involved.

### Recommendations from the Workshop

**1. GENERAL RECOMMENDATIONS**

These recommendations are for implementation by management authorities, hunters and researchers.

**1.1 Minimize animal suffering**

The WS recommended that the hunters should make every effort to reduce unnecessary suffering by hunted animals, by minimizing killing times to the extent that is feasible. However, this must be balanced by consideration of the safety of the hunter, and the risk of losing the animal.

### 1.2 Monitoring

The WS noted that the present information on struck and lost is outdated or inadequate for several species and areas, and that accurate estimation of struck and lost is important for effective management and essential to improve hunting practices.

The WS recommended that new monitoring programmes that are appropriate for local conditions should be developed that could produce accurate information that will be accepted by hunters and managers. Such monitoring programmes should be developed in full cooperation between hunters, managers and researchers.

### 1.3 Proper training of hunters

The WS recommended that hunters should be trained in both the theoretical and practical aspects of hunting, and that training materials and programmes should be appropriate to local conditions.

### 1.4 Hunting equipment

The WS recommended that hunters should always carry weapons and equipment appropriate to the target species and local hunting conditions, and that the equipment should be properly maintained and renewed when necessary.

### 1.5 Cooperative management

The WS recommended that the hunters should be involved in the marine mammal management process, including the development of regulations pertaining to hunting.

The WS furthermore recommended that the design, development and testing of new weapons and hunting equipment should be done in cooperation with hunters.

### 1.6 Sharing of technology and knowledge

The WS recommended that there should be open exchange and sharing of information about new weapons, equipment and hunting techniques, and that this should be done on both the national and international levels.

## 2. SPECIES-SPECIFIC RECOMMENDATIONS

### 2.1 SEALS

#### 2.1.1 Hunter training

- Develop suitable training materials for each area and hunt. These could use various media, *e.g*. audiovisual presentations on DVD or broadcast locally; written materials, and internet sites.
- In areas where hunting is practiced, courses in hunting should be available in the school curriculum. This is already the practice in some areas, *e.g*. Finland. A comprehensive and advanced hunting education programme is under development in Greenland. In Norway it is mandatory to undertake a training course set up by the authorities before going hunting.

#### 2.1.2 Techniques and equipment

- The type of equipment that is suitable depends on the area, species, season and local environment. Descriptions of suitable equipment for each situation should be developed by local authorities and made available to hunters and educational institutions.
- Hunters should always have suitable equipment, in good working order, readily available when hunting.
- In situations when seals usually sink after death, it may be advisable to use small-calibre weapons and shoot to injure, not to kill. The injured seal can then be secured using a hook or harpoon, and then killed. This technique is effective in reducing struck and lost but does likely result in greater animal suffering.

### 2.1.3 Regulatory measures

- In some areas it may be advisable to stipulate the minimum equipment that must be at hand when hunting. This is already done in most areas.
- In some areas, seasonal closures could be used to forbid hunting in seasons when seals usually sink after death. Such closures are used in Norway and Finland, but may not be suitable in areas where hunters must take seals year-round.

### 2.1.4 Monitoring

Independent observers and governmental inspectors have been effective in monitoring hunts for harp and hooded seals in Canada and Norway. However, it is not possible to use independent observers to monitor all seal hunts. The following alternatives were recommended:

- Self-reporting systems such as *Pinniarneq* in Greenland could possibly be modified to provide information on struck and lost;
- In other areas, community-based monitoring using post-hunt interviews, as used in Chukotka, may be effective;
- A programme using "index" hunters, trained and contracted to provide information on their hunting activities, which is later extrapolated to the entire hunt, may be effective in some situations.

## 2.2 LARGE WHALES

### 2.2.1 Hunters training

- To encourage training, in practice and in theory with: experienced hunters, experts on weapons and experts on anatomy;
- To produce educational material, including anatomical charts designed for whaling;
- In order to learn and improve, feedback to whalers should be improved, including feedback on: successful kills, problematic kills, cases of struck and lost and their causes.

### 2.2.2 Techniques and equipment

- To ensure that adequate equipment for securing and killing is well maintained, functioning and at hand;
- Time to death should be as short as possible, once the whale has been effectively secured;
- In order to prevent whales sinking when using harpoon cannon, it is recommended to:
    1) Cause instantaneous death
    2) Keep the back-up rifle at hand
    3) Keep harpoon and attachment points well maintained
    4) Use forerunners of adequate strength
    5) Replace forerunners at regular intervals
    6) Keep a back-up forerunner ready
    7) Use the air pump to inflate the whale where legally feasible
    8) Use grappling irons to secure the carcase.
- To improve the Norwegian penthrite grenade used for hunting fin whales in Iceland and in Greenland, in order to increase the rates of instantaneous death or unconsciousness.[1]
- To facilitate access to good weather forecasting for whalers working from small boats;
- To avoid killing the whale before it has been secured sufficiently. This is especially true when using small boats to hunt whales that may sink.

[1] The workshop did not discuss the Japanese Fin whale hunt

- To develop a gun to deploy harpoons attached to floats. This would shorten the time needed to secure whales that may sink when hunting from boats without a harpoon cannon.

### 2.2.3 Regulatory measures

- To strengthen international cooperation in order to facilitate: a) access to information and technology and b) purchase and transport of equipment, including weapons and explosives;
- Development and implementation of ways to reduce struck and lost should be done in close collaboration with the whalers.

### 2.2.4 Monitoring

- Reporting of the causes of struck and lost is needed to provide feedback to whalers.

## 2.3 SMALL WHALES

### 2.3.1 Hunter training

- Training is paramount – it should be community based and species specific. Local experienced hunters who are familiar with local environment should be employed to train.
- Traditional knowledge should be taught in high schools.
- Ways have to be found to counteract the negative effects of diminishing quotas and hunting restrictions on the acquisition of hunter skills in future generations.

### 2.3.2 Techniques and equipment

- Using more efficient equipment still does not necessarily diminish struck and lost. Thus a combination of suitable equipment and training is needed in the use of rifles and appropriate ammunition.
- Methods of improving access to long-range forecasting of weather conditions need to be found as weather is a very important factor in affecting struck and lost.
- Develop a weapon that could improve the range of strike, e.g. an air gun that could be modified to incorporate firing of a harpoon head. This could improve the firing / strike range and the securing of the whale.
- In hunting communities, suitable ammunition designed for marine mammals should be made more readily available.
- Use of high velocity rifles can result in hearing loss and steps should be taken to minimise this problem and disseminate technical information for user safety.

### 2.3.3 Regulatory measures

- The users (hunters) should be involved in decision-making processes concerning the hunt such as the planning of hunting quotas and in the areas of operation. User knowledge should be used in management in conjunction with science.
- Establishing formal meetings with local government officials on all aspects of hunting - equipment, safety, training, etc. where reduction of struck and lost can also be discussed. These meetings could establish local hunting rules and regulations, the required equipment, etc. that would help to mitigate struck and lost.

### 2.3.4 Monitoring

- All parties (hunters, administrators, managers, biologists) shall get together to find a way forward on the matter of recording and reporting stuck and lost. One route could be to establish local sub-committees to work out an acceptable and appropriate monitoring system in hunting areas.

## 2.4 WALRUS

### 2.4.1 Hunter training

- Walrus hunters should be properly trained and their training should be appropriate for the local environment. Such training can occur through traditional methods, formal schooling and other media such as video and the internet. It was specifically emphasized that inexperienced hunters should accompany experienced hunters on hunts.

### 2.4.2 Hunting techniques

- When hunting walrus on ice floes, the hunter should approach as closely as possible before shooting. The hunter should shoot animals in the centre of the group first so that killed animals won't be pushed into the water by the others.
- In open water hunts, it is best to harpoon before shooting, but this is not always feasible. It may be necessary to shoot the walrus in the body and lungs to disable it so that it can be harpooned, and then shoot it lethally. This will reduce the incidence of struck and lost and the chance of the walrus attacking the hunter.
- Hunters should obtain the best available forecasts before setting out, only initiate hunting if the weather conditions are right, and abandon hunting if the weather deteriorates.

### 2.4.3 Hunting equipment

- Hunting equipment is often specific to particular regions and seasons, and is adapted to local conditions. Local authorities should compile descriptions of equipment suitable for each area and make these available to hunters and teachers.
- Hunters should ensure that proper equipment is available and well maintained.
- Technological innovation could reduce the incidence of struck and lost in some hunts. A harpoon gun that would be effective at a range of 10-15 m would be particularly effective in walrus hunting.

### 2.4.4 Monitoring

- The importance of monitoring must be explained to hunters so that they can "buy in" to a monitoring programme.
- A monitoring system should provide feedback to hunters so that they can improve their hunting techniques.
- Community-based monitoring, based on a combination of hunt observation and post-hunt interviews, has been effective in Chukotka and could be adapted to other areas.
- A system based on "index hunters" may be effective in some areas.

## Comments and Conclusion from Council 16

Greenland thanked the WS organisers for a very comprehensive report and recommendations. Greenland asked if was feasible to catch large baleen whales, such as humpback whales using the same penthrite grenade that is nowadays used for fin whales, or if it will be recommended to modify this weapon. Norway stated that the fin whale grenade should be suitable for humpback whales, and explained that there is work in progress towards an improved penthrite grenade to be used for catching fin whales in Iceland. This improved grenade would be suitable for fin whales in Greenland and for other large species such as humpback whales.

The Council commended the Committee on Hunting Methods and the extended planning committee for its successful work and endorsed all the WS recommendations.

## 2009 NAMMCO EG MEETING ON BEST PRACTICES IN THE HUNTING AND KILLING OF SEALS

**Report of the EG on Best Practices in Hunting and Killing of Seals to Council 18**

The EG meeting on Best Practices in Hunting and killing of Seal, chaired by Egil Ole Øen, was held 24 – 26 February 2009 in Copenhagen.

The Council had at its last meeting tasked the Committee on Hunting Methods with organising an EG to investigate state of the art in sealing today and possibly develop a set of recommendations to the NAMMCO member countries on best practices in killing of seals in the region.

The Committee had identified a small group of qualified persons (14 experts from eight countries) all of whom were invited in a personal capacity. The scope of work was delimited to seal hunting today in the North Atlantic including the Baltic Sea, excluding walrus hunting. Moreover, the issues of control and monitoring would not be discussed as these fell outside the competence of the EG.

No stakeholders or NGOs were invited since focus was on the scientific and technical aspects of the killing process and not on the politics of sealing i.e. whether seals should be killed or not.

Many recommendations were agreed upon, and all were arrived at by consensus. The EG concluded that there are no known killing methods that can guarantee a 100% instantaneous stun and kill of animals, and even in the slaughterhouses the efficiency percentage is probably more like 95%. The environment or opportunity sometimes decides the mode of weapon employed in killing seals. The EG therefore avoided too strong recommendations on the choice of killing weapon.

Firearms are the most commonly used tool and there exists a large variety of caliber and ammunition. Further studies on new ammunition to determine their capacity in relation to killing seals were recommended. It was concluded that to shoot or use the hakapik or club on seals in the water may increase the risk of "Struck and Lost", it should therefore only be deployed if the first killing method fails. The EG also concluded that the hakapik is known to be an effective tool to stun and/or kill young seals and recommended more factual information on the relationship between the force delivered in relation to the damage produced and the relative solidity of the skull. With respect to netting and trapping of seals it was noted that this was an important and widely used form of subsistence hunting in areas where there are no alternatives during periods of the year. However, the EG could not assess cause of death or extent of suffering experienced by seals due to insufficient existing data on entanglement of seals.

The EG discussed different processes of bleeding out seals and its significance in relation to the criteria of death, and it concluded that bleeding out is a precautionary measure to ensure death in all animals. In the large-scale seal hunts in Canada and Norway a three-step process for killing is prescribed by legislation. Both hunts have a combination of shooting and hitting with firearms and hakapik/club, and the EG recognized that value of a 3-step killing process in large-scale seal hunts. Finally, the EG emphasized the fundamental importance of information, education and training for hunters and inspectors to ensure efficient killing.

The observer from the Russian Federation welcomed the report. It was an important contribution to the availability of accurate information about the methods of seal killing and would hopefully help better inform public opinion on sealing.

The report had been distributed to all usual contacts as well as relevant EU authorities.

## Recommendations from the Expert Group

*Firearms*

Firearms and ammunitions used should have the capacity to achieve the intended effect.

Noting that new types of ammunition have been developed for hunting, the EG recommends further studies on the use of ammunition for hunting seals of different species and age groups in order to determine their capacity to achieve the intended effect.

*Hakapik and club*

When using the blunt projection of the hakapik the hunter's relative position to the animal is less important than a stable platform.

When using the spike of the hakapik it is recommended that the hunter is positioned behind the seal in order to achieve maximum effect. The intended effect of the curved spike is to penetrate and damage the deep parts of the brain (including the brainstem) in order to achieve irreversible damage to these vital areas.

The use of the hakapik and clubs on seals in water should only occur when the primary tool has not rendered the animal unconscious.

Different types of hakapiks and clubs are used and known to be effective tools to stun young seals. Factual information is required to explain the effectiveness of hakapiks and clubs as stunning tools, through evaluation of the force delivered in relation to the damage produced and the relative solidity of the skull, which may vary among species.

*Netting and trapping*

The EG further noted that the limited data that exist on entanglement of seals do not allow assessment of the extent of suffering experienced by the seals or the cause of death. Factual information is required to explain the process of dying under these conditions.

*Bleeding out*

The EG recognizes the value of determining the duration (average and range) of bleeding in seals when axillary (brachial) blood vessels on both sides are cut, which represents the bleeding method currently and commonly used. This information should be available for different species as differences may exist. Other bleeding methods (e.g. carotid arteries and jugular veins) could also be investigated.

*Combination of methods used for stunning and killing of seals*

When using the hakapik as primary tool, the young seal shall first be struck with the blunt part of the hakapik (step 1), then immediately after be struck with the spike of the hakapik (step 2) so that it penetrates deeply into the brain before the seal is bled (step 3). When the firearm is used as primary tool the seal is shot (step 1) and immediately reshot, if necessary, then struck in the brain with the spike of the hakapik as soon as possible (step 2) and then bled (step 3).

The EG recognises the value of a three-step killing process in large scale seal hunts.

*Training and education*

The EG wishes to emphasis the fundamental importance of information, education and training for seal hunters and inspectors in order to carry out the hunt in an appropriate manner with respect to animal welfare. Important elements of such education could include: animal behaviour, anatomy, physiology, ballistics, ethics, legislation, handling of carcass, etc.

## Conclusions from Council 18

The Council commended and endorsed the report and its conclusions.

## 2010 NAMMCO EG MEETING ON ASSESSMENT OF LARGE WHALE KILLING DATA

**Report of the EG on evaluation of large whale killing data to Council 19**

At the 18th Annual Meeting in September 2009, NAMMCO tasked the Committee on Hunting Methods to organise an EG to assess whale killing data with the following terms of reference:

> *The NAMMCO Council requests the Committee on Hunting Methods to organise an EG in February/March 2010 to undertake a review and evaluate the whale killing data submitted to NAMMCO by Japan in 2009, as well as data and information on recent and ongoing research on improvements and technical innovations in hunting methods and gears used for the hunting of large whales in NAMMCO countries.*

The aim of the EG was to assess the present whale killing data and give recommendations with respect to possible improvements. The EG was chaired by Egil Ole Øen. Other participants included the other members of the Committee on Hunting Methods and other appointed international qualified persons with extended experience and knowledge in general and/or marine mammal-specific biology, physiology, anatomy, pathology and statistics; a total of 16 experts.

Japan had submitted 3 reports with killing time results. One report addressed killing times in the dolphin fisheries, but this was not considered although the EG noted that the report showed considerable improvements. Consideration of small cetacean time to death must wait until other experts are available in the future. In addition to the data from Japan, Greenland, Iceland and Norway had been asked to present data and information from their hunts of large whales.

The EG had dealt with the killing methods in use in different countries and compared them, and also the education in different countries. Data on killing time for minke whales were presented from Greenland, Iceland, Japan and Norway. Data on killing time for fin whale were presented by Greenland, Iceland and Japan. Japan also presented data on killing time for sperm whale and Bryde's whale, and Greenland presented data on killing method for bowhead whale.

The EG had decided that only the minke whale hunt could be compared among countries. With respect to minke whales, the EG noted that whilst there were local adaptations, in Norway, Iceland and Greenland, generally boats with a harpoon canon of 50-60mm calibre and the Norwegian explosive grenade were employed. In this grenade, the triggering fuse was set at a depth of 65cm depth in the body. The whale was recommended to be shot from the side into the thoracic region wherever possible as the grenade is best suited from this position. If death was not immediate, a rifle was used with a bullet to the brain. The period of Norwegian data was 1981 – 2004. In the Japanese coastal minke whale hunt 50mm harpoon guns are used with a Japanese grenade that detonates at the depth decided by a time delaying device.

In Japan, offshore minke whaling employed 75 mm harpoon with grenade, and 55% whales die instantaneously. There had been improvements over the past years; misfires of grenades were now less with improvement in technology. The coastal operations had also improved due to the use of increased penthrite charges.

The EG noted differences in instantaneous death rate (IDR) between countries. In the Japanese hunt this was considered due mainly to differences in the angle of hit which was

from behind. The EG stated that equipment, target area, shock waves and angle of shot were all critical in achieving instantaneous death. The EG noted that generally it was difficult to compare data from different hunts, because the methods of data collection were not uniform. It was evident that the collection of more data is necessary before one may analyse the reasons for the observed differences with respect to killing efficiency. It was stressed that it was important to collect time to death (TTD). The EG had the general opinion that information on IDR for all hunts is probably biased low and TTD is biased high.

Overall, education and safety were considered very important – both theoretically and as practical training. An exchange of experiences between hunters in different countries was considered valuable.

Conclusions from the EG had been agreed by consensus.

### Recommendation from the Expert Group

A main recommendation was that a handbook for hunters should be developed within NAMMCO, based on a hunters' bowhead guide in Alaska.

A small group should be set up to develop monitoring guidelines on whale killing data.

**1. Norway**

***Minke whale***

Data have not been sampled in the last 8 years. The EG (EG) recommended a sampling of Time to Death (TTD) in the same way as was done in previous years so that the data are comparable – either on all boats or in a random sample of boats.

**2. Iceland**

***Minke whale***

The EG recommended that in the future, Iceland reports for minke whales whether the whales are killed instantaneously and if not, the TTD.

***Fin whale***

The EG recommended that in the coming season, data of killing efficiency - TTD and Instantaneous Death Rate (IDR) should be collected and analysed with covariates (estimated distance and angle of harpoon cannon shot, hit region and detonation area) for the sake of improving hunting methods.

It was noted that a development programme for the fin whale hunt has started in Iceland. In 2010 the second prototype of a new penthrite grenade designed for the fin whale hunt with 90 mm harpoon guns will be tested. The EG acknowledged the work and encouraged continuation and completion of this work.

The EG furthermore encouraged the specialist examination of organs and tissues to better understand how the whales die.

The EG recommended an examination of the potential use of acoustic monitoring of grenade detonation in order to enhance human safety during flensing. **3**

**3. Japan**

***Minke whale research hunts***

The EG acknowledged the improvements taken place in recent years in the Japanese minke whale hunts and in particular in the coastal hunt.

The EG recommended logistic regression analysis on IDR from Japanese minke whale catches, both coastal and offshore, to try to identify the reasons for the differences between Japanese and Norwegian IDR, and to use Cox's regression methods on TTD for whales not killed instantaneously, to study the efficiency both of the harpoon method itself on these whales and the efficiency of the secondary killing methods.

***Other species – Dolphin***

The EG welcomed the information on hunting methods from Japanese dolphin fisheries which clearly shows considerable improvements over the recent years. Because of limited expertise in this EG and the need for detailed discussions it was recommended to organize a dedicated working group on the taking of small cetaceans with pertinent experts invited.

## 4. Greenland

***Minke whale***

*Harpoon hunt*

In Greenland and Iceland, TTD is estimated by the hunters, but they have no necropsy reports to confirm TTD. In addition, the current IWC criteria used tend to overestimate TTD.

The EG recommended Greenland to present the data and analyses in a statistically more informative way than is being done now.

It was furthermore recommended the organization of a practical training course for gunners. There should, as stated by the hunters, be a debriefing at the end of the season in order to exchange information and experiences from the season.

*Rifle hunt*

There is a risk of a longer TTD and higher "struck and lost" in the rifle hunt than in the grenade harpoon hunt. The Greenlandic hunters stated that there is a clear difference in efficiency of killing between different geographical regions in Greenland.

The EG recommended that experienced hunters should meet with less experienced hunters to exchange information. It is especially important to focus on where to aim the first shot and the aiming of the shot that kills the whale after the floats have been attached.

More data are needed with reference to the body position where the whale is hit and TTD. Norwegian anatomical figures of the position of the brain of minke whales can be used for training purposes and be handed out to the hunters.

***Fin whale***

The EG acknowledged the improvement of TTD in recent years in Greenland. This improvement is probably the result of increased hunter experience.

***Bowhead whale***

The EG recommended that shooting trials are set up to study the trajectory of the harpoon through the water and on this basis give advice on how to approach and where to aim at the whale.

***Fin whale and bowhead***

The EG agreed with Greenland's recommendation to increase the current penthrite charge for the fin and bowhead hunts and also to investigate a potential increase in the propellant charge.

***Fin, humpback and bowhead***

The EG recommended that the same modified penthrite grenade be used for the three large species – in fin, humpback and bowhead whale hunts.

It was furthermore recommended that hunters be trained to measure and report on strike location, detonation location and distance between the two.

***Assessment and comparison of different hunts***

*Minke Whale - Processing of data:*

The EG recommended collecting TTD for whales that do not die instantaneously. The purpose is to analyse the reasons for differences among different hunts in order to improve efficiency.

Information on IDR for all hunts is probably biased low and TTD is biased high and these biases are probably greatest for the Greenlandic hunt. This especially concern hunts where the TTD are estimated by the hunters and are not corrected by *post-mortem* examinations.

***Education and training***

Regular training and exchanging of information is very important to achieve more efficient hunts and to improve animal welfare.

The EG recommended that NAMMCO develop a handbook for hunters giving relevant information *inter alia* on weapons, killing techniques and animal welfare.

The EG emphasized the importance of combining theoretical education with physical meetings in order to exchange information and experiences, including sampling and recording of data.

***Monitoring***

Monitoring serves at least three important purposes:

- Ensures that the hunt is carried out according to laws and regulations;
- Provides information relevant for the management of the stocks;
- Provides information on killing efficiency and animal welfare.

The EG recommended standardizing the TTD criteria used across hunts. It was acknowledged that the hunters are doing the monitoring in addition to many other responsibilities – therefore a balance will have to be achieved between hunting activities and monitoring /collecting information.

The EG recommended that a small group be formed to prioritise the needed monitoring information.

## Comments and Conclusion from the Council

Greenland expressed appreciation to the Committee on Hunting Methods for its work and that of the EG. Their advice was good and sound and should be followed up by management and the hunters themselves. It was commented that there will always be good advice and reliable evaluation from NAMMCO on improvement in hunting methods in NAMMCO countries, as other organisations do not agree internally on whaling.

Japan expressed appreciation for the work of the EG, and agreed to take on board its recommendations. Regarding the dolphin hunt, Japan hoped to learn more from the Faroese hunt. Generally, Japan hoped to follow up all recommendations from the EG. Cooperation with NAMMCO was greatly valued, and Japan plan to continue to submit whale killing data to NAMMCO.

KNAPK was pleased that their suggestions and advice have been heard in the EG. With reference to bowhead whaling, they are also hoping for more target practice and advice on this matter. Appreciation was expressed for all the efforts of the EG.

Canada expressed interest in the shooting trials reported for bowhead whales in the report of the EG, as this has relevance to the Canadian bowhead hunt.

All members of the Council expressed their appreciation for the work of the Hunting Committee and its Chair, as well as for the work of the EG.

The Council welcomed the provision by Japan of information on improvements in methods used in dolphin fisheries in Japan to the EG on whale killing data for large whales. As the EG focussed only on large whales, the Committee on Hunting Methods had recommended to the Council that there be convened a dedicated expert working group on the hunting of small cetaceans.

The Council welcomed this recommendation and supported it in principle. However, it was agreed to request the Hunting Methods Committee to further define the proposal with respect to the specific aims and scope of such an expert working group and provide a more detailed proposal for the consideration of the Council. In particular, the Council noted the importance of ensuring that updated information on hunting methods used in small cetacean catches, as well as interested expertise in relevant countries was available as a sufficient basis for convening such an expert working group in 2011.

Council agreed in principle on the production of a hunters' manual. The budget implications need to be evaluated after the Hunting Committee editorial body has done its work, [the Council agreed] to consider the budget next year.

## 2011 NAMMCO EG MEETING TO ASSESS THE HUNTING METHODS FOR SMALL CETACEANS

**Report of the EG on Assessment of Hunting Methods in Small Cetaceans to Council 21**

The EG met in November 2011 and the meeting was initiated by a request from Japan. Japan delivered a paper on small whale killing and requested a review. Council endorsed the EG on small whale killing and provided Terms of Reference. The meeting started with presentations on anatomy and ballistics as a background before discussions proceeded with the data on time to death (TTD). Different hunts and methods in participating countries were compared and assessed.

Faroes – killing methods were reviewed for the drive hunt of pilot whales and dolphins. Methods have changed very little over the years. The whale is secured with an iron whaling hook or a ball-pointed blowhole hook. The whaling knife (in Faroese "grindaknívur") is used to kill the animals .. Trials have been carried out with a new spinal lance to kill the animals and the TTD has been reduced significantly.

As an update, the Faroe Islands informed that they are now producing a manual for using the new spinal lance. The spinal lance will be approved as a killing tool.

Japan – killing methods were reviewed for the dolphin drive fisheries. Up until 2009, TTD was up to 5 min; however, the spinal lance used recently produced TTD similar to the Faroes. The Japanese spinal lance is similar to that used in the Faroese pilot whale drive fishery. However, the lance should not be used rocky beaches but preferably on sand. The results now show an improvement in TTD and although the spinal lance is similar to the Faroese variety it is not as efficient and there has been a recommendation to modify it. Bloodletting has been stopped during the kill by using plugs to prevent blood leaching into the seawater and turning it red, for aesthetic reasons. However, this process may delay death (and is not good for the meat quality).

Japan expressed gratitude to NAMMCO for organising this EG meeting and would like to continue to participate in such groups in the future and to submit data to NAMMCO for review.

Greenland – firstly, the use of rifles in open water from small boats were discussed for porpoise. Small calibre rifles are used. Both white-sided and white-beaked dolphins are hunted in a similar manner to porpoise by using higher calibre rifles. High calibre rifles with full metal jacket ammunition are used for pilot and killer whales. Regulations on hunting equipment and methods should be made, "struck and loss" rates and data on TTD should be collected. Small motorboats are used in open water for narwhal and belugas when full metal jacket high calibre rifles are employed. Floats are used in the capture. Kayak harpoon hunting is conducted near the ice edge. Safety measures require the cooperation of at least two hunters. The whale is secured by harpoon before shooting. Technological improvements have been made in the form of a metal (iron) harpoon which makes the harpoon heavier and results in better penetration into the animal.

Greenland reported as an update, that there had been discussion on "struck and loss" rates during the recent JCNB meeting in Iqaluit when recommendations were made.

Canada (Nunavut) – the hunt focused on narwhal and belugas. The data on TTD were supplied by Nunavut Tungavik Incorporated and not by the Canadian government. Three different types of conditions were reported – open water form using small boats, shooting from the ice edge, and hunting along cracks in the ice. The target area of hit and the animal reaction were described. Floats and harpoon strike (usually one) are used during the kill to facilitate carcase recovery. The TTD is 2-4 min. as in Greenland, the harpoon rod is now metal.

There was a session on hunting and training of hunters. Greenland commented that training in hunting methods is crucial and the work done so far is of great interest, and recommendations are increasing. Greenland proposes that at the next meeting of the Committee on Hunting Methods, there is a discussion on detailed short- and long-term goals and actions. The "struck and loss" issues are very important and require cooperation with hunters and the Committee on Hunting Methods. It was debated whether a new workshop is needed now.

## Conclusion and recommendation form the Expert Group

**General comments**

NAMMCO's focus is on ensuring that hunters make every effort to reduce unnecessary suffering by hunted animals, by minimizing killing times to the extent feasible. We recognize that this goal must be balanced by considerations of the safety of the hunter, and the risk of losing the animal.

The EG acknowledges the significant advances that have been made in achieving the goals of hunting efficiency thus reducing TTD and S&L, and that this is largely due to the growing cooperation and trust among managers, scientists and especially the hunters nationally and internationally. In this context the group is impressed by the adaptability of the hunters and their willingness to effect changes.

It is inherently difficult to compare hunting efficiencies from one method or country to another. The EG recognises that technology and methodology differ from species to species, region to region, and country to country. The goal is not to unify methods and techniques but to ensure that, by open dialogue that transfers information, each hunt is conducted within the circumstances that define its methodology in a manner that maximizes hunter safety, and reduces TTD and S&L, while achieving the intended goal.

**Specific comments and recommendations**

The EG expressed its appreciation and congratulated the hunting communities with the progress made to improve the animal welfare aspects of the drive hunts for small cetaceans.

***Drive hunt - Faroe Islands***

The EG noted that the introduction of the spinal lance has entailed significant improvements in the TTD for the Faroese pilot whale hunt. The EG also noted the extensive advances that had been made in the development of the lance.

The EG recommends:

- An illustrated manual is developed to document the technique, gear and bays certified for drive hunts. A manual could add credibility to the science behind the improvements, facilitate uniform practice among bays and also assist in exporting the knowledge to other hunting communities.
- The spinal lance has proven efficient in reducing the TTD and reducing the number of cuts, and therefore the standardized lance should be made mandatory for use in the Faroese drive hunt.
- Adopting this lance as a standard should not preclude further improvements of the lance.
- Any damages from the use of the newly designed blunt tipped hook should be further explored.
- TTD should be measured from the first use of the blunt hook.

***Drive hunt - Japan***

The EG noted that a spinal lance has been introduced in the Taiji drive hunt and is expected to have improved the efficiency of the hunt in relation to TTD. The EG recommends that this effect be documented with an appropriate sample size for the involved species.

The EG noted the difference between the Faroese and Japanese spinal lance and blowhole hook and recommends Japan to adapt the design of the Faroese spinal lance and perhaps the blowhole hook.

Finally, the EG recommends a study to document the effects of plugging the bleeding wound on the efficacy of killing and the quality of the meat product.

***Hunting of pilot whales, dolphins and porpoises - Greenland***

The EG recommends that regulations on equipment and hunting methods are developed for harbour porpoises, white-sided and white-beaked dolphins, pilot whales and killer whales and that efficiency, struck and lost rate and TTD are documented for the involved species. It is recommended that data are gathered in a standardized manner making comparison between hunts and development over time possible.

***Hunting of beluga and narwhal - Greenland***

The EG appreciates Greenland's effort to improve the data collection on struck and lost and to initiate data collection on TTD. It is recommended that data are gathered in a standardized manner making comparison between hunts and development over time possible.

***Netting - Greenland***

The EG noted that netting of beluga and narwhal is prohibited in most areas in Greenland, but is allowed in East Greenland and one location in North West Greenland. This method is used when there is no other available option. The EG noted that netting is likely to cause stress for the animals associated with the capture and the prolonged time to death and recommends that every attempt should be made to develop alternative catching methods.

***Hunting of beluga and narwhal - Canada***

The EG noted the information on hunting provided by the Inuit hunters of Nunavut. The EG encourages management agencies to engage with NAMMCO in its commitment to

- Continue to improve standards of hunting methods;
- Training of hunters;
- Assuring the funding of programmes to document TTD.

It is recommended that data on TTD and struck and lost are gathered in a standardized manner making comparison between hunts and development over time possible.

***Hunter training***

The EG recommended that hunters should be trained in both the theoretical and practical aspects of hunting, and that training materials and programmes should be appropriate to local conditions.

The EG recommends the development of a training manual for hunters, to include such topics as hunters' safety, anatomy of the relevant species with emphasis on target sites likely to minimise TTD and S/L, required equipment, such as weapons, ammunition and secondary equipment, approaches to efficient utilisation of carcasses, and other topics to be identified. The EG recommends a small working group be identified to explore the feasibility of developing such a manual, fully identify its components and develop a plan of human and other resources needed to produce it.

## Comments from Council 21

Council noted the recommendations and recognitions made in the EG meeting report and endorsed all recommendations for improvement on killing methods. These included developing a manual for the Faroese pilot whale hunt and developing a training manual for hunters.

## 2015 NAMMCO EG MEETING ON ASSESSING TTD DATA FROM LARGE WHALE HUNTS

**Report of the EG on assessing Time to Death (TTD to Council 24**

The meeting, held 4 – 6 November 2015 in Copenhagen, was chaired by Dr Christina Lockyer. The EG was composed of 21 experts in fields related to the issue of killing mammals.

Council, at NAMMCO 23 (February 2015) had tasked the Committee on Hunting Methods to convene a second EG meeting on TTD data from large whale hunts with the following terms of reference:

- *To undertake a review and evaluate*
    - *the whale killing data submitted to NAMMCO by member countries and associated hunting nations,*
    - *as well as data and information on recent and ongoing research on improvements and technical innovations in hunting methods and gears used for the hunting of large whales.*

TTD data and other relevant information on hunting methods were presented from Greenland, Iceland, Norway, Japan, USA (Alaska and Makah hunts) and Canada. TTD, Survival time (ST) and the Instantaneous death rate (IDR) were the parameters used to measure and quantify killing efficiency. The standardised collection and analysis of these parameters, together with relevant covariates, made it possible to compare killing practices and monitor the effects of new developments, changes in hunting practices and training of hunters.

The "**Norwegian method**" of collecting and analysing TTD, recommended by the first EG meeting in 2010, had been used both in Norway and Iceland. Results from the Norwegian minke whale hunt indicated an increase in IDR of 65% in the period 1981 to 2012, from 17% to 82%. The average TTD had been reduced from 11.5 min to 1 min. The angle of the shot relative to the animal's long axis influenced the TTD significantly. Shots directed at the thorax from the recommended side position of about 45°-135° relative to the animal's long axis resulted in 92% instant kills.

**Iceland** had collected TTD data from the minke whale hunts in 2014 and 2015. Although the weapons used in Iceland are identical to the ones used in Norway, the IDR was 69%, thus lower than the 82% registered in the Norwegian hunt. The EG was unable to draw any firm conclusions regarding this discrepancy in killing efficiency due to the very limited set of data. Much effort has been dedicated to improving hunting efficiency in the Icelandic fin whale hunt through modifications of the penthrite grenade. The resulting 84% IDR was the best of all presented hunts.

**Japan** presented TTD data for all their whaling operations. IDR continues to be substantially lower than in comparable hunts (Norway, Iceland), where the penthrite grenade is used as the primary weapon. The EG reiterated its advice from 2010 that the use of sonar (affecting the whale behaviour) and the chase with high-speed boats (resulting in shot angle well below 45°) likely prevent achieving a high IDR. The EG also recommended that Japan develops and uses a more effective back-up weapon than the lance as secondary method in the coastal whaling.

The **Greenlandic** IDR for the harpoon grenade minke hunt had improved to around 50%. The IDR and TTD were still less than in the Norwegian hunt and it was suggested to make an analysis of strike locations, which may explain the discrepancy. The EG expressed concerns

from an animal welfare point of view that the rifle hunt seemed to be increasing and Greenland was encouraged to evaluate and analyse the hunting sequences and efficiency in this hunt. An increased penthrite charge had resulted in a higher IDR in the fin whale hunt but not in the humpback whale hunt, likely because of poor shooting angles. In general, the importance of correct shooting angle, strike and detonation location was emphasised.

In **Alaska**, struck and lost had been drastically reduced from about 50% to less than 10%, due to the introduction of the penthrite grenade in the darting gun and the training programmes organised by AEWC. The EG encouraged Alaska to collect TTD and IDR data from the bowhead hunt and present the results at the next EG meeting to allow comparison of bowhead hunt effectiveness with other nations.

**Canada** presented detailed observations of five bowhead hunts conducted in different communities in 2010-2014. The EG agreed that the long TTD observed could be substantially reduced through further training of hunters, exchange of information and sharing of experience with other bowhead-hunting nations. The Canadian hunting method deviate considerably from the successful and efficient Alaskan method and Canada was encouraged to adopt this technique.

The **Makah Tribe** presented a very thorough and efficient training program. The EG pointed out that using traditional methods like harpooning first and then shooting is problematic both from an animal welfare point and from the point of view of hunters' safety.

The meeting was successful, with in-depth and informed discussions, and resulted in specific conclusions and recommendations agreed by consensus. In addition, the meeting also resulted in two protocols, one on collection of TTD and one on analysing TTD.

## Conclusions and Recommendations from the Expert Group

### 1. Norway

The EG acknowledges the completion of data gathering that has been done since 2010 and also the improvement in the quality of the hunt over the past few decades. The EG recommends that Norway repeat monitoring of the hunt with regard to TTD and IDR at 10-year intervals unless important issues arise that require more frequent monitoring.

### 2. Iceland

***Minke whale***

The EG acknowledges the work that has been done since 2010. The EG encourages Iceland to try again to gather data on TTD and IDR and increase the sample size in order to obtain more robust information. A sample size of 25-30 animals should be adequate to obtain statistically reliable data for some types of comparisons.

There has been no training course arranged since 2003. A new course for the hunters should be arranged.

***Fin whale***

Recommendations from 2010 are fully completed and the EG acknowledges this. The EG recommends that Iceland repeat monitoring of the hunt with regard to TTD and IDR at 10-year intervals unless important issues arise that require more frequent monitoring.

## 3. Greenland

***Minke whale* - Harpoon cannon hunt**

There has been an improvement of the grenade hunt of minke whales. The EG acknowledges this, and also the low struck and lost rate. The IDR is lower, and the TTD greater than in Norway, and the aim should be to improve the hunt efficiency. The recommendations from 2010 to present the data and analysis in a statistically more informative way will be fulfilled in the near future. Analysis of strike location should be informative of why Greenlandic hunts have lower IDR than Norwegian hunts and the EG recommends that the result of this analysis be presented to hunters in future trainings.

It was furthermore recommended to organise a practical training course for gunners. There should, as stated by the hunters, be a debriefing at the end of the season in order to exchange information and experiences from the season.

***Minke whale - Rifle hunt***

Data show that there is a longer TTD and higher struck and lost rate in the rifle hunt than in the harpoon hunt.

The EG learned that the proportion of minke whales hunted in the collective hunt has been increasing in recent years as compared to the number of whales hunted with deck-mounted harpoon cannon. Noting that rifle hunts are increasing, the EG encourages Greenland to evaluate the current sequence of the use of rifle and harpoon to catch the animals and also the efficiency of the harpoon in this sequence. It also encourages review of other types of harpoons.

The Greenlandic hunters stated that there is a clear difference in efficiency of killing between different geographical regions in Greenland. The EG reiterates the recommendations that experienced hunters should meet with less experienced hunters to exchange information.

The EG acknowledges that Greenland has gathered data pertaining to the body position where the whale is hit and TTD, and looks forward to analysis and interpretation of these data to be made available.

***Fin whale***

The EG acknowledges Greenland for the change in the charge of the grenade that has resulted in a higher IDR for the fin whale hunt. The IDR is lower and the TTD greater than in the Icelandic fin whale hunt and the aim should be to improve the efficiency bearing in mind the differences in equipment used.

Data are needed with reference to the body position where the whale is hit in relation to TTD, and the EG looks forward to analysis and interpretation of these data to be made available.

***Bowhead***

The EG acknowledges that shooting trials to study the trajectory of the harpoon through the water have been performed.

Data are needed with reference to the body position where the whale is hit in relation to TTD, and the EG looks forward to analysis and interpretation of these data to be made available.

***Fin, humpback and bowhead***

The EG recommends that hunters be trained to measure and report on strike location, detonation location and distance between the two in order to evaluate the efficiency of the hunts.

## 4. Japan

The use of sonar during the hunt has effects on the behaviour of whales. It also appears to be counterproductive in relation to TTD since the animal will need to be chased and will be shot at too narrow an angle from behind. These two factors have important implications in terms of animal welfare since they are bound to increase TTD and decrease IDR.

***Minke whale***

The EG acknowledges the work that has been done since 2010 in relation to statistical analysis of the data, in particular the number of parameters that have been considered.

Based on survival analysis it is clear that the lance is not as effective for the coastal hunt as the rifle used in the offshore hunt. The EG recommends that Japan develops and uses a more effective back up weapon for the coastal hunt.

The EG notes that the 2010 recommendations included a study of the efficiency of the backup (secondary) killing methods but that this does not appear to have been addressed.

Acknowledging that a rifle shot through the brain kills an animal instantaneously and faster than bleeding out caused by the use of the lance, the actual efficiency of the lance as a killing method should be evaluated.

## 5. Alaska

The EG encourages the Alaska Eskimo Whaling Commission (AEWC) to collect and present TTD and IDR data on their hunts at the next EG meeting to allow comparison of bowhead hunt effectiveness with other nations. The EG thanks AEWC for the training material presented on the darting gun. The EG would appreciate a future presentation on other aspects of training in the AEWC hunt.

## 6. Canada

The EG acknowledges the effort that has been made in recent years to gather data on the bowhead whale hunt by Canadian Inuit. Observations of the hunt have been few but detailed and have offered a welcomed veterinary aspect. The EG encourages continuation of these observations.

The EG noted long TTD values in the hunts observed. It believes that these values could be substantially reduced through further training of hunters, including exchange of information with other bowhead-hunting nations in order to benefit from their expertise and experience with other hunting techniques.

The EG encourages research on the efficiency of the lance (anguvigaq) as a backup weapon to kill bowhead whales.

## 7. Makah

The EG thanked the Makah Tribe for sharing their whale training programme and description of their planned hunt methodology.

The EG noted that the whale training programme educates Makah whalers on the general biology of gray whales, aspects of gray whale behaviour relevant to a hunt, gray whale anatomy, and hunt safety. One strength of the training programme is that it helps hunters learn key landmarks to locate the brain of gray whales.

The EG endorsed the training programme noting that with the portion of the training programme presented to the EG, and the other planned training activities, future Makah whale hunts should be safe and efficient.

The EG encourages the Makah to benefit from the expertise and experience from other hunts.

## 8. General

Accepting that struck and lost is an inevitable part of all whaling operations the EG recommends that there be a review of the underlying reasons for struck and lost with the aim of decreasing it.

The EG recommends that the data be analysed by the statistical methods recommended in 2010. These analyses should include analysis of the efficiency of the backup (secondary) killing methods.

**Monitoring**

The EG recommends that all hunts be monitored with regard to TTD and IDR at 10-year intervals unless other important issues arises that require more frequent monitoring.

The EG recommends a workshop to look into alternative, and if possible, more economical methods for collecting standard TTD data that may also facilitate more frequent collection of data.

**Education and training**

The EG emphasizes the importance of the angle of the shot relative to the animal's long axis in the harpoon cannon hunts. The recommended angle, based on the Norwegian data, is from 45 to 135 degrees relative to the animal's long axis and aiming the shot at the thorax. This information should be considered in training programmes for gunners.

Regular training and exchange of information is very important to achieve more efficient hunts and to improve animal welfare.

The EG emphasizes the importance of combining theoretical information with actual meetings in order to exchange information and experiences, including sampling and recording of data.

### Comments from the Council

Council thanked the Committee on Hunting Methods for organising the second EG meeting on TTD for large whales and expressed great appreciation of the work of the EG. The specific

conclusions and recommendations deriving from the EG meeting was dealt with under the next agenda item.

Japan noted that it had submitted data and information on whale killing methods to NAMMCO since 2009. Japanese scientists participated in the EG meeting in November 2015, where they submitted TTD data and received various constructive comments. Japan expressed its appreciation on this collaboration on evaluating killing data and wished to pursue it to further improve killing methods for cetaceans.

Iceland questioned why Japan was using a lance as secondary weapon in the minke coastal whaling. In Europe the alternative was a 2nd grenade, which was a more efficient killing method. The Japanese delegates informed the meeting that they would convey this question to their colleagues dealing with killing methods.

Norway reiterated the point of the Committee that shooting the whale while chasing them at high speed resulted in too narrow shooting angles and consequently lower IDR. They recommended Japan to modify its way of approaching the whales so IDR rates could be improved.

Norway also reiterated the point of the Committee that Canada should consider using the hunting methods developed in Alaska in order to reduce TTD, which presently were of over half an hour in the Canadian hunt.

The Faroe Islands thanked all those involved in this Expert Meeting and for the reporting of the results. It noted that improving hunting and killing technics was a focus area for NAMMCO, and all should make every effort to improve them.