SECTION 3 SCIENTIFIC COMMITTEE

3.1 REPORT OF THE 21ST SCIENTIFIC COMMITTEE MEETING

Executive summary

The 21st meeting of the Scientific Committee (SC) was held in Bergen, Norway, 3 – 6 November 2014. The SC had the T-NASS Steering Committee- Proposal for T-NASS2015 and report from the NASS2015 Joint Technical, Planning and Steering meeting (Annex 1), and a summary of the NAMMCO-Joint Commission on Narwhal & Beluga (JCNB) Catch Allocation Sub-group Meeting (SC/21/07). National Progress Reports (NPRs) were received from all member countries and observers except for the Greenlandic NPR, which was not received in time for consideration at the meeting. Other reports and documents were presented and were examined under the relevant agenda items.

COOPERATION WITH OTHER ORGANISATIONS

ASCOBANS plans to write to the EU regarding the Faroese pilot whale hunt. The SC and Secretariat did not know if this letter had been written at the time of the SC meeting. These issues are usually handled by the Ministry of Foreign Affairs.

Formally NAMMCO and ASCOBANS have an official agreement on exchange of observers. The **SC recommended** that the NAMMCO Secretariat request harbour porpoise by-catch numbers for the North Sea from ASCOBANS, when needed for future assessments/WGs.

A request for NAMMCO to join the ICES WGHARP was sent from the NAMMCO Secretariat to the ICES Secretariat in August 2014.

Role of Marine Mammals in the Ecosystem

The traditional perception of prey species preference of killer whales in the Northeast Atlantic has, to a large extent, been linked to herring. Recent Norwegian research on the ecology of killer whales in the Norwegian Sea during two summer-season ecosystem-based surveys 2006 and 2007, quantified spatial overlap between killer whales and the three most common pelagic fish species. No spatial relationships were found with herring or blue whiting. However, a significant relationship and spatial overlap with mackerel. Killer whale group size was also correlated to the size of mackerel trawl catches, indicating active group size adjustment to available prey concentrations.

In the years 2007–2011 a high priority part of the planned Joint Norwegian-Russian Research Programme on Harp Seal Ecology was to deploy satellite transmitters in the White Sea. Permits by the Russian Authorities were first given in 2012–2014, but unfortunately a lack of funding then prevented tagging. An application for funding has now been submitted to the Norwegian Research Council, and during the tagging experiment, PINRO will provide the necessary logistics required for helicopter- or boat-based live catch of seals in April–May 2015. For proper planning and budgeting in both institutes, a PINRO scientist must obtain the necessary permissions from Russian authorities before December 2014.

By-catch

In Iceland it is mandatory to report all by-catch of seabirds and marine mammals. Some reporting of marine mammals in the bottom set gill net fishery started in early 2002 covering about 5% of the cod gill net fleet and continued up to 2009 when a new electronic log-book system was implemented. No records have been received from the new system. Main sources of information are the annual cod gill net survey that is about 2% of the fleet effort in April and is distributed in line with the fleet effort by area. Recent reports have been received from the lumpsucker net fishery and the inspectors from the Directorate of Fisheries and scientists that reported by-catches and these data were compared to log-book records from the fleet to estimate the proportion of by-catch reported. The harbour porpoise is the most commonly by-caught marine mammal and according to the calculations the by-catch in gill nets has decreased since 2003, from 7,300 animals to about 1,600 animals in

2009–2013, in line with decreased cod net effort. With 400 in lumpsucker nets, the total has likely been about 2,000 animals from 2009 or 1.2–6.5% of the abundance estimate range calculated from an aerial survey. If a recent increase seen in the net survey numbers is factual and reflects an increase in the stock due to the reduced net fishery effort, then the replacement potential must be much higher than the 1.7% precautionary reference point usually used for harbour porpoise. Porpoises also occur in deep waters outside the aerial survey range where no estimates exist. By-catch of harbour seal and grey seal was estimated 705 and 140 for 2013. The aim of defined management objectives is to keep these stocks above a certain level and the stocks were around the set limit in the last counts.

In Norway the IMR receives by-catch data via the research reference fleet. There is also mandatory by-catch reporting in all fisheries, but the Directorate of Fisheries seems not to receive any reports of by-caught marine mammals. The monkfish fishery that uses gill nets is a serious issue, but the reference fleet has not yet been expanded to this fishery.

The **SC noted** that the lack of by-catch recording in the gill net fishery from the log-book system implemented in 2009 in Iceland is of great concern. A functioning by-catch recording system is of high priority. The **SC noted** that a future HPWG meeting requires information on by-catch from all areas before the assessment can continue. With this new information from Iceland, and the information from the reference fleet in Norway, the **SC recommends** convening a By-catch Working Group. This would be a technical WG that could focus on discussing the methods that are being used to collect the data and extrapolate the results, and decide if further work is required. Prior to the By-catch WG meeting, it will be important to have updated numbers from the reference fleet in Norway and to compile necessary fisheries data from management agencies, and including spatial and temporal effort for most specifically the net fisheries.

The SC **noted** that the outcomes from the By-catch Working Group should also be considered by the Coastal Seals WG. Therefore the SC **suggested** that the CSWG be postponed until 2016 and that the By-catch WG could meet just prior to the CSWG.

Environmental issues

Investigations on how ice breeding seals can adapt to habitat loss in a time of climate change have revealed that Northwest Atlantic harp seals responded to poor ice conditions differently, depending on the presence or absence of ice at the beginning of the pupping period. If no ice was present, females moved away from their traditional whelping areas to find suitable ice. If small amounts of ice were present, females gave birth even if the ice was too thin to sustain the pups, resulting in high pup mortality. There was no evidence to indicate that harp seals pupped on land even in areas where ice was absent. Young seals that drifted to shore had high levels of abandonment and mortality.

It has been known for a long time that these glacier front areas are important feeding areas for seabirds and marine mammals in Svalbard. Recent satellite tracking studies have shown that many of Svalbard's ringed seals spend the whole year in front of various glacier fronts, and white whales have been shown to spend about 55% of their time during summer and autumn at these sites. Glacier-ice pieces floating in coastal areas are also important for all seal species in the region as dry platforms during moulting and also as general resting platforms for both birds and seals. During the last decade there have been several years with a complete lack of spring sea ice in many of the fjords along the west coast of Spitsbergen. During the spring periods in these years, bearded seals have replaced their regular sea-ice platform with glacier ice, using it as a solid substrate for both birthing and nursing as well as general resting.

Three ice-associated cetacean species reside year-round in the Arctic: the narwhal, the beluga and bowhead whale. Sites of oil and gas exploration and development and routes used for commercial shipping in the Arctic are being compared with the distribution patterns of the whales, with the aim of highlighting areas of special concern for conservation. Measures that should be considered to mitigate the impacts of human activities on these Arctic whales and the aboriginal people who depend on them for subsistence are now being discussed.

SEALS AND WALRUS

Harp and Hooded Seal

Aerial surveys were carried out by PINRO in March 2013 to estimate pup production in the White Sea where

Ice conditions were corresponding to the long-term average. This yielded a total pup production number of the White Sea/Barents Sea harp seal population of 128,786 (CV=0.237).

IMR has now started experiments with Unmanned Aerial Vehicles to perform aerial photographic surveys of harp and hooded seal whelping patches on the drift ice. With some technical improvements on both aircrafts and operational equipment a new survey, will be conducted in the West Ice in 2015.

Photographic and visual aerial surveys had been conducted off Newfoundland and in the southern Gulf of St. Lawrence to determine pup production of Northwest Atlantic harp seals in 2012 and resulted in an estimated total pup production of 790,000 (SE=69,700, CV=0.088). This estimate is approximately half of the estimated number of pups born in 2008, likely due to lower reproductive rates in 2012 compared to 2008.

A population model had been used to examine changes in the size of the total Northwest Atlantic harp seal population between 1952 and 2014. Pup production declined throughout the 1960s reaching a minimum in 1971, and then increased to a maximum in 2008. The total population size in 2012 were estimated to be 7,445,000 (SE=698,000). The maximum estimated population size, N_{max}, was estimated to be 7.8 million animals in 2008. The population appears to be relatively stable, showing little change in abundance since the 2004 survey, although pup production has become highly variable among years. Data on age-specific pregnancy rates indicate that herd productivity has declined compared to the 1980s and early 1990s. The SC discussed that the carrying capacity used in the modelling might need to be reduced because it appears that there may be density dependence influenced drops in reproduction at a lower carrying capacity than is being used.

Telemetry studies on West Atlantic hooded seals have provided very detailed information on distribution and diving patterns. The important feeding areas have also been identified using two different methods.

The ICES Working Group on Harp and Hooded Seals will meet again in November 2014 in Quebec, Canada, to review the status and assess the catch potential of harp seals in the Barents Sea/White Sea and in the Northwest Atlantic and hooded seals in the Northeast Atlantic.

Ringed seal

The SC noted that the Arctic Council's working group "Conservation of Arctic Flora and Fauna" (CAFF) has a working group on ringed seals throughout the Arctic where a lot of important work is being presented, and includes suggestions for future monitoring on this species. The SC had previously suggested convening a Working Group in the next few years (2015 or later), but this year the SC noted that the CAFF group is likely a better forum; however, the SC was not sure if CAFF is planning more meetings. The SC reiterated that data on this species is sparse and a full assessment is not possible. The **SC recommends** that a future WG should await results of ongoing tagging studies in central West Greenland, and future genetics studies to elucidate information on population structure.

Grey seal

A recent study on the global population structure and demographic history of grey seals showed a high degree of genetic differentiation between regions. Highly asymmetric patterns of gene flow were inferred, with the Orkney Islands being identified as a source of emigrants to other areas of the eastern Atlantic. The Faroese grey seals are closely related to grey seals around the UK. The Baltic and eastern Atlantic regions were estimated to have diverged a little over 10,000 years ago, consistent with the last proposed isolation of the Baltic Sea.

The most recent pup production estimate of grey seals in Norway is based on data obtained in 2006–2008. The management plan for coastal seals now implemented in Norway require data used in assessments updated every 5 years. A boat-based visual survey aimed to obtain a new abundance estimate for the species in Norway started in November 2013 and continued in 2014. Some of the new estimates obtained in mid Norway were much lower than in the previous survey, and quotas were immediately reduced in these areas as a result.

Coastal Seals WG

A Coastal Seals WG meeting has been tentatively scheduled for February 2016 to address R-2.4.2 and R-2.5.2.

By February 2016, the CSWG will likely have by-catch estimates and a new complete grey seal estimate in Norway for consideration at the meeting.

Harbour seal
Aerial surveys aimed to obtain a new abundance estimate for harbour seals in Norway were started in 2011, and continued in 2012 and 2013 and supplemented with results from boat-based visual surveys in 2014, resulting in a final point estimate of 7,533 for the species for the entire Norwegian coast. This new estimate has been implemented in the 2015 management of the species; this management now follows the management plan reviewed by NAMMCO SC in 2011. Norway is now in the process of developing a model for management of harbour seals, which will include uncertainties around by-catch.

Surveys in Greenland searching for new haulouts have found 3 new colonies since 2009.

Iceland experimented with using drones for a survey this year. There are plans for full survey next year.

Walrus
A survey was completed in Greenland in early April 2014 only covering the eastern coastal part of the North Water with more than 30 sightings and should allow for a new abundance estimate to be developed soon. Together with updated hunting statistics, this new abundance estimate could be used for a revised assessment for this particular stock with a possible update on advice. The Walrus Working Group (WWG) should resume for a one day meeting or teleconference in March 2015 to address the possibilities for updating advice on sustainable takes of walruses in the Baffin Bay stock. If feasible, the meeting could be conducted as a teleconference.

In new a project in Svalbard sponsored by the Norwegian-Russian Environmental Commission 20 adult male walruses were instrumented with GPS loggers in 2014 and should collect GPS positions for at least five years. Blood and blubber samples were collected from these animals for various studies. New methods resulted in 0 mortality.

Newly published results from the recent survey of walrus haulout sites in Svalbard provides updates regarding the increasing numbers of land- based haulout sites, occupied sites, sites with mother-calf pairs, and a 48% increase in abundance in the six-year period between the two surveys to 3,886 (CI: 3,553-4,262) animals, including animals in the water at the time of the survey.
Several walrus research projects are ongoing in the Pechora Sea around Dolgy Island that are sponsored by a Russian oil and gas company and coordinated by the Russian public organization "Council of Marine Mammals" from Moscow.

CETACEANS

Fin whale
The distribution of fin whale catches in Iceland in 2014 was very different from any previous whaling season since the resumption of whaling in 1948. Whale densities appeared to be very low on the traditional whaling grounds west of Iceland and the bulk of the total catch of 137 fin whales were taken south of Iceland. Preliminary analysis of stomach contents suggest that this changed distribution may be due to shortage of krill in the Irminger Sea.

In 2013 a fin whale/blue whale hybrid was caught in the Irminger Sea west of Iceland. This is the fifth confirmed hybrid between these two species in Icelandic waters.

A Large Whale Assessment Working Group (LWAWG) meeting was previously planned for the fall of 2014. This was postponed to Fall 2015, awaiting work to be completed by the IWC on the fin and minke whale *RMP Implementation Reviews*. The IWC SC has proposed a workshop in January 2015, and plans to complete this work by the IWC SC 66a meeting in June. Therefore, the NAMMCO LWAWG will plan on meeting in the Fall of 2015 in hopes that the work on the IWC SC will be complete.

Minke whale
A recent study investigating the genetic structure of northeast Atlantic minke whales conducted a spatial,

temporal and cryptic population analysis of 2,990 whales harvested in the northeast Atlantic during the period 2004 and 2007–2011. This large data set, which had been genotyped according to strict protocols upon which the Norwegian minke whale DNA register is based, failed to reveal any indication of geographical or temporal population genetic structure within the northeast Atlantic based upon the analysis of ten microsatellites and 331 bp of the mitochondrial D-loop. Furthermore, while three mtDNA lineages were revealed in the data, these did not show any underlying geographic pattern, and possibly represent an ancestral signal. The obtained results give no genetic support to maintain the five management areas in the northeast Atlantic.

As a part of the IWC's RMP Implementation Review extensive revisions of management areas have been agreed. These include large reductions in the number of management areas. Although the latest genetic evidence suggest that there is only one stock in the North Atlantic, the IWC SC decided to retain the three main medium areas (E, Central, W) as a precautionary measure.

The sixth and last year of the six-year programme 2008-2013 to cover the northeast Atlantic to provide a new abundance estimate of minke whales every sixth year as part of the management scheme established for this species, was conducted during summer in 2013. The covered area was the IWC *Small Area EB* (eastern Barents Sea) which is part of the Medium Management Area E, comprising waters in the northeast Atlantic.

A wider distribution, compared to previous surveys, was observed during the last Russian-Norwegian Ecosystem Survey and from other observations in the Barents Sea between August and October. Several animals were observed in the far north-eastern part of the Barents Sea on the border with the Kara Sea.

Beluga and Narwhal

A programme continued with satellite tracking and collection of blood and blubber samples for various investigations of pollution, diet and health status of Svalbard white whales. Eight animals were captured for this purpose in the summer of 2014. At least one more field season will be needed before analysis will begin.

The Catch Allocation Sub-Group of the NAMMCO-Joint Commission on Narwhal & Beluga met in Copenhagen on 10–12 March 2014 with the main purpose of developing an allocation model that will provide a mechanism for assigning harvested animals (narwhals) to summer stocks. After review of available information on movements and phenology of narwhals in Canada and Greenland a matrix model with columns for harvest locations and rows for stocks was developed. Allocation of catches to stocks was based on different criteria of levels of availability ranging from no availability for stocks that with certainty did not contribute to the hunt, to stocks that definitely supplied the hunt at identified hunting localities. The model could potentially be used for both estimating the fraction of the hunt that is supplied from each summering stock as well as the sustainable takes at each hunting locality. The sub-group will meet again in March 2015 to finalize the model and update the assessment of narwhal and belugas.

Potential problems may arise if hunters take their whole quota from a single small stock. One way to reduce the risk of this is to look at within season movements with satellite tags to see how the stocks' movements overlap.

Killer whale

A 3-year research project on feeding behaviour, movements and acoustics of killer whales in Icelandic waters conducted by the MRI will be finalized in 2015. Photo-identification has revealed several instances of movement of killer whales between the Shetland Islands and Iceland.

Killer whales in SE Greenland were found to have tooth wear that looks like they are fish eating killer whales but seals were found in the stomachs. Ten years of observational and photo-identification data of a population of killer whales that follows the Norwegian spring-spawning stock of Atlantic herring were predominantly observed feeding upon herring. One pod of herring-eating whales was also observed interacting with seals. This supports the hypothesis based on the long-term markers, of a degree of specialization, with a small number of groups persistently feeding upon mammals, but switching between herring and seals. Playbacks of herring-eating killer whale sounds to harbour seals at haulout sites on the herring spawning grounds caused changes in behaviour consistent with an anti-predator response.

Pilot whale
The Faroes have increased the effort in sampling programme of harvested animals to a total of 270 in 2013, prioritized obtaining ages, skin samples, and reproductive parameters for each animal. Satellite tagging will be conducted in 2015 prior to T-NASS2015 survey activities.

Harbour porpoise
In contrast to previous taggings, the fifteen porpoises tagged off West Greenland in 2014 stayed on the continental shelf throughout September. Greenland also sampled about 150 porpoises from the hunt from June-October to complement previous sampling efforts from September 1995 and 2009 and to look at possible seasonal changes. The porpoises seem to react positively to climate change in terms of increased body mass. Stomach contents showed increased diversity of prey between 1995–2009, with large amounts of cod in 2009.

A future harbour porpoise WG will be scheduled after a report from the By-catch WG, new data from T-NASS2015, and progress on research requests from the 2013 HPWG.

Bowhead whale
A new abundance estimate for the population in West Greenland using genetics is larger than from aerial surveys, probably because of segregation of animals that mostly summer in the Canadian High Arctic. These results confirm an earlier assumption based on data that showed 83% of the whales passing through West Greenland were females, and older than 40 years, therefore the population must consist of more animals.

The programme using passive acoustic monitoring devices for bowhead whales in Framstredet and north of Svalbard is ongoing. Four units were deployed in 2013 and 3 retrieved and redeployed in 2014.

Blue Whale
Animals identified earlier via photo-id off West Iceland in mid-summer were identified north of Iceland in mid-summer in recent years. One blue whale was satellite tagged in 2013 and two in 2014 north of Iceland. The whale tagged in mid July 2013 travelled southwards to 59° N. The whales tagged in 2014 travelled north of Iceland towards 73° N. There has been a notable increase in the numbers of blue whales seen in Svalbard over the last 2–3 years. This year there were also many sighting during the Norwegian Sightings survey and the Arctic part of the Ecosystem survey. Perhaps those whales moving north from Iceland to the Svalbard area.

Iceland has been collecting biopsies and has 10-20 samples currently being stored in the MRI archive.

Global review of monodontids
The planning for a Global Review of Monodontids symposium has begun. Preliminary plans are to hold the meeting in conjunction with the Marine Mammals of the Holarctic meeting in the fall of 2016 in Russia.

Lockyer attended the Holarctic meeting this year in St Petersburg, Russia and discussed this venture with the organisers. In a proposal for the symposium the following items were included:

- The proposal is for a 3-day scientific symposium - workshop, with invited experts on monodontids, and about 50 international participants
- The focus of the scientific symposium - workshop would be a comprehensive review of all aspects of the biology and study of belugas and narwhals in all regions where they occur
- The scientific symposium-workshop should be held in conjunction with the 2016 Conference on Holarctic Marine Mammals – before or after the event
- The rationale being that this conference is attended by many Russian experts researching belugas, and would attract a high attendance of relevant experts
- External funding would be sought to support attendees internationally as well as from within Russia, and an organising committee has already been established
- A scientific report would be produced after the event, to be published online together with presented scientific papers in the free access NAMMCO Scientific Publications Series site at http://septentrio.uit.no/index.php/NAMMCOSP/index

The Council of the Marine Mammals was agreeable to the proposal and will cooperate with NAMMCO on this event. An international Steering Committee has already been set up.

Disturbance Symposium
Planning for a Disturbance Symposium that will deal with the impacts of human disturbance on narwhal, beluga and walrus is underway. Preliminary plans are to hold the meeting in early October 2015 in Copenhagen. Kit Kovacs has agreed to Chair the meeting and Mads Peter Heide-Jørgensen is the NAMMCO Convenor.

The primary objectives of the Symposium will be to 1) present an overview of the information currently available, and 2) make recommendations for both restrictions of anthropogenic disturbances and future studies. The conclusions will be available to stakeholders shortly after the meeting in the form of a report with specific recommendations. Participants may also be invited to submit papers stemming from the symposium for publication in a special volume of the *NAMMCO Scientific Publications* series.

The **SC recommended** broadening the scope of the Symposium to include presentations from other species/research. A number of external experts will be required for this meeting.

SURVEY PLANNING

Overview of plans and resources by jurisdiction
The proposed Iceland governmental budget includes 8.5 mill NOK, corresponding to ¾ of the required amount in the MRI T-NASS2015 proposal (including National Surveys and Extension survey), leaving ¼ unfunded. The Faroe Islands Fishery Ministry has put 1.81 mil NOK in the proposed governmental budget for a ship-based survey, and also included an additional 1.13 mill NOK for the extension survey. Greenland has applied for the funding for their National surveys through the Greenland Institute of Natural Resources and an additional 1.02 mill NOK has been included in the Greenland Government budget as a contribution to the Extension survey. Norwegian national surveys through the IMR would cover the EW *Small Area* (IWC terminology) which includes the Norwegian Sea from the coastline to 3°E in the northern part and around Faroe Islands in the south. The SC was unable to get confirmation on whether the Jan Mayen Extension area was included in the proposed Norwegian governmental budget (outside of the IMR budget) as Norway's contribution to the extension survey.

All of the proposed governmental budgets are yet to be approved.
One of three primary objectives for T-NASS2015 is to obtain a complete synoptic abundance estimate for minke whales in the central area of the North Atlantic. The **SC agreed** that it will not be able to achieve this objective if funding for the extension areas is not confirmed by early January 2015.

Shipboard surveys
Norwegian surveys will use the same methodology for both the *EW* small area and the Jan Mayen (*CM*) extension area as in previous surveys. Norway **stressed** that a condition to their contribution to the Jan Mayen Extension survey area is that the Norwegian IO method is fully implemented in the entire area.

The Norwegian survey methods use two symmetrical platforms with two sets of observers using cues as sighting units. The survey is conducted in passing mode. Sighting is done without binoculars, and it is important to have both platforms doing exactly the same thing.

The SC discussed that Svalbard was not included in the proposed T-NASS2015 area because it is included in the Norwegian mosaic survey. This area was last surveyed in 2014.

In Iceland the plan is to use 2 or 3 survey vessels: one would also be doing a mackerel survey and cover the Icelandic economic zone including roughly 1/3 of the Jan Mayen extension survey area. Mackerel surveys stop to trawl for about an hour 2 to 3 times during the day, therefore it seems acceptable to use this platform for cetacean surveys.

The Icelandic survey plans to use 2 symmetrical platforms, and will use binoculars to some degree. Cue count data will be collected and it will be investigated whether the Norwegian analysis method can be used, or else a conventional cue count analysis will be used. The mackerel vessel would not be able to close, so they will survey in passing mode. The other vessels will survey in delayed closing mode, but will not close on minke

whales. Fin whales frequently overlap with sei and blue whales and can easily be confused, therefore species ID is particularly important for the Icelandic surveys justifying the use of binoculars and delayed closing mode.

The Faroe Islands will be using both a dedicated survey vessel, and if feasible, a mackerel survey vessel. The dedicated survey vessel will operate with double platform IO mode and in delayed closing mode using standard line transect. The Faroese plan to measure noise on vessels to determine whether they can use acoustics.

A primary question is how to obtain reliable group size estimates for pilot whale groups. It was agreed that drones and helikites should be tested in the Faroes as a method of obtaining independent group size estimates of pilot whales.

Russian redfish surveys in the Irminger Sea in June/July 2015 will include dedicated cetacean observers.

Aerial Surveys
Greenland will fly the Twin Otter and plans to use the same protocols as previous surveys, including a full double platform setup, and allowing for cue counting, strip census, and line transect estimation if needed. Availability of whales at the surface will be estimated from dive data recorders.

Iceland will fly the Partenavia in coastal areas and will use the same protocols as previous surveys, with a partial double platform setup, data collected in cue counting mode for minke whales, and standard line transect for other species. Iceland plans to add either a still or video camera to assist the IO platform and distance and group size estimation.

Observers, Data collection and Equipment needs
It was considered mandatory for the success of the survey that initial testing of drones and recording systems should be started as soon as possible. The **SC recommended** that available funds from the SC should be spent on acquiring these pieces of equipment.

Other pieces of equipment needed for the surveys can be acquired during spring 2015 under the national budgets, or money budgeted in the SC for survey coordination.

Observer candidates should be contacted soon to ensure availability for the survey. It is also important that cruise leaders and observers and trained before the survey.

The T-NASS Steering Committee will keep in contact for the next 6 months and meet if necessary to ensure adequate planning and execution of the surveys.

NAMMCO Scientific Publications
All papers in Volume 9: *Walrus of the North Atlantic* have now been published online. The hard copy is now in the process of being typeset by the publishers (Bokstavhuset in Tromsø). The hope is that the printing will take place before the end of 2014, but by the end of January 2015 at the latest. The SC noted that Volume 9 will be the last volume printed as a hard copy. There are now four papers in Volume 10: *Age estimation of marine mammals with a focus on monodontids* that have been published online, and a few more are nearing completion.

The SC discussed whether to keep the *NAMMCO Scientific Publications* as themed volumes, or open the journal up to rolling submissions. The SC recommends that this issue is discussed with Editorial Board, especially since this could increase the workload of the Board members, whereas the themed volumes have scientific editors that take on the majority of the editorial work.

Work procedures in the SC
The SC **recommends** again that ROP should be amended to allow more than 3 members from each country at the meeting. Each country would still only have one vote.

Stock Status List Update
The Stock Status List website was presented to the SC, who welcomed this work. The website has been designed so that it will be easy to update with new information, and will be updated regularly by the Secretariat.

MAIN REPORT

1. CHAIRMAN'S WELCOME AND OPENING REMARKS

The Scientific Committee (SC) Chair Gunnlaugsson opened the 21st meeting of the NAMMCO SC. He welcomed the NAMMCO Scientific Committee members, as well as the observers from Japan and the Russian Federation (Appendix 3), and extended thanks to Nils Øien and the Institute of Marine Research (IMR) in Bergen, Norway for hosting the meeting.

2. ADOPTION OF AGENDA

The draft agenda was adopted with minor amendments (Appendix 1). Under item 6.1 a separate item (6.1.1 By-catch) was added. All items in 6.5 (T-NASS2015) were moved to Item 9. Blue whales were added to the agenda (item 8.14).

3. APPOINTMENT OF RAPPORTEUR

Prewitt (Scientific Secretary) was nominated as rapporteur, with the help of Lockyer (General Secretary) and Winsnes (Deputy Secretary) and the participants as needed.

4. REVIEW OF AVAILABLE DOCUMENTS AND REPORTS

The documents available at the meeting are listed in Appendix 2.

4.1. National Progress Reports [SC/21/NPR-F, -G, -I, -N, -C, -J, -R]

Progress reports for 2014 were received from Norway, Iceland, the Faroe Islands, and observer countries Canada, Russian Federation and Japan. The Greenlandic NPR was not received in time for consideration at the meeting. Observer countries were thanked for their reports.

Zabavnikov presented an overview of research conducted by PINRO North Atlantic Laboratory in the North Atlantic, Barents, Kara and White Seas.

Kitakado presented a summary of marine mammal research conducted in Japan.

4.2. Working Group Reports [SC/21/07, SC/21/13]

Reports from the T-NASS2015 Steering Committee meeting (SC/21/14), the Survey Planning Working Group (SC/21/13), and a summary of the NAMMCO-JCNB SC WG on Narwhal & Beluga Catch Allocation Sub-group Meeting report (SC/21/07) were available.

5. COOPERATION WITH OTHER ORGANISATIONS

Observer reports from meetings of other organisations were available for consideration and are available in Appendix 4.

5.1. IWC [SC/21/05]

Walløe presented a summary of the 65th (b) Meeting of the International Whaling Commission Scientific Committee was held in Bled, Slovenia from 12-24 May 2014. Pre-meetings starting on the 9th (North Atlantic common minke whales).

The full observer's report is available in Appendix 4.

Of particular interest to NAMMCO, for the North Atlantic common minke whales, there was a pre-meeting (Working Group - WG) in Copenhagen, chaired by Greg Donovan (IWC Secretariat) in April 2014 when population structure was discussed using new genetic data from 2004 and 2007–2011. The data now indicate only one population across the whole of the North Atlantic, but there is the possibility of adopting several population situations in the simulation implementation trials. Simulations are the core of the implementation

procedure. Three populations are up for consideration, but for Norway and Iceland, if 3 "medium areas" are assumed, the number of management "small areas" will be reduced.

From surveys of common minke whales in the period 2008-2013, a population size of 94,000 has been estimated compared with 108,000 from an earlier period. This decrease is due to fewer whales in the Jan Mayen (Central stock) area while the population in the eastern area has not changed during the previous 6 yr. This new estimate can be used in the simulation trials. The Norwegian scientists explained that the existing method is robust, but the WG wanted to see a comparison between old and new methods. Data from the previous survey period 1996-2001 used before the 2005 meeting, should also be used along with that from the 2008-2013 survey period.

Walløe – the leader of the steering group – will work inter-sessionally on the Implementation Review and also hold a meeting. During the actual IWC SC meeting, it was proposed to change the simulation programme to be used in the simulation trials and use a light version of RMP03. The plan is to finalise the Implementation review in the next SC meeting (2015).

Regarding the Aboriginal Whaling Management Procedure (AWMP), Greenlandic catches of bowhead and humpback whales were of concern. In West Greenland, the strike limit of 2 bowheads was deemed sustainable for the population (as previously), and an annual strike of 10 humpback whales. For other species, a strike limit of 19 for fin whales was accepted and for common minke whales there was a strike limit of 164. In East Greenland, the strike limit for common minke whales was 12.

Discussion by the NAMMCO SC

Víkingsson informed that work continued on the Implementation review on North Atlantic fin whales. Given the complexity of the trials, it had not been possible to complete conditioning successfully during the workshop. The IWC SC developed a work plan with the objective of finishing the Implementation Review at the 2015.

The SC of NAMMCO recognizes that the NAMMCO Large Whale Assessment should await the work of the IWC on minke and fin whales to be completed in 2015.

5.2. ASCOBANS [SC/21/06]

Desportes presented an observer report from the 21st ASCOBANS Advisory Committee meeting in Gothenburg, Sweden, 29 September – 1 October 2014. The full observer report is available in Appendix 4.

Discussion by the NAMMCO SC

One issue of note from the report was ASCOBANS' plan to write to the EU regarding the Faroese pilot whale hunt. The SC and Secretariat did not know if this letter had been written at the time of the SC meeting. These issues are usually handled by the Ministry of Foreign Affairs. The Secretariat informed the SC that they had received a letter from the UK regarding the Faroese hunts around the time of the ASCOBANS meeting. The situation is worth monitoring, especially considering what has happened with the EU seal ban.

The SC discussed the level of cooperation between NAMMCO and ASCOBANS. Formally NAMMCO and ASCOBANS have an official agreement for exchange of observers.

The SC recommended that the NAMMCO Secretariat request harbour porpoise by-catch numbers for the North Sea from ASCOBANS, when needed for future assessments/WGs.

5.3. ICES [SC/21/04]

Haug reviewed the 2013 and 2014 activities in ICES, which have some relevance to the work in the NAMMCO SC. The full observer report is available in Appendix 4. This included work in the ICES Working Group on Marine Mammal Ecology (WGMME) and the Working Group on By-catch of Protected Species (WGBYC). The ICES Annual Science Conference (ASC) generally include sessions with marine mammals included as an integral part, occasionally (including the 2014 meeting) also sessions entirely devoted to marine mammals.

5.3.1. Request to ICES for NAMMCO to join WGHARP

Prewitt informed the SC that a request for NAMMCO to join the WGHARP was sent from the NAMMCO Secretariat to the ICES Secretariat in August 2014. The Secretariat is awaiting a response, hopefully after the upcoming WGHARP meeting (two weeks after the SC meeting, November 2014, Quebec City, Canada).

5.4. JCNB [SC/21/07]

A sub-group of the NAMMCO-JCNB Joint Scientific Working Group met on 10–12 March 2014 in Copenhagen to develop a model for narwhal catch allocation. A summary of the report was available at the SC meeting (ANNEX 1; see Item 8.6.2). The full report was not presented at this meeting because the model is not yet complete, and the SWG sub-group will meet again in March 2015 to finalize the model.

The full Scientific Working Group will also meet in March 2015 in Ottawa, Canada, directly after the sub-group meeting.

5.5. Other

No other outside groups were reported to the SC.

6. ENVIRONMENTAL / ECOSYSTEM ISSUES

6.1. Marine mammals-fisheries interactions

With regards to **R-1.1.2** (fisheries interactions in the Davis Strait ecosystem), tagging studies have shown that harp seals use a huge area including waters off southeast Greenland, in Baffin Bay and adjacent waters. The number of seals that forage in the Davis Strait varies with season and the catch statistics along the coast indicate that there also might be significant annual variation in their distribution. The cod and the shrimp stocks have also varied in size and distribution and other components in the ecosystem might also be important. In other words: A study that can provide a reliable answer to "How harp seals influence the shrimp and cod stocks in Davis Strait" need to be a large scale monitoring programme that can produce a time-series not only on abundance and foraging behaviour of harp seals and cod, but also of other keystone species and of the physical environment. In 2001 The Greenland Institute of Natural Resources held a workshop "Ecosystem West Greenland - a stepping stone towards an integrated marine research program" in order to identify keystone species and to discuss how such a programme could be initiated. The large-scale programme was never implemented, but some minor components have been conducted. Financial commitment for a large-scale monitoring programme has not been available. The SC now considers this request as **outdated**.

In regards to **R-1.1.3** (impact of marine mammals on the ecosystem, especially economically important fish species), the first discussions revealed that there were too many unknowns to make such an assessment. The working group was therefore given the task to identify important gaps in our knowledge. A second part of the assessment would be to develop a model. It was therefore decided that four different models should be tried out using data from the most data-rich areas. The SC noted that this request is very similar to R-1.1.5 suggested that R-1.1.3 be **replaced** by R-1.1.5.

The SC recommends that **R-1.1.5** (interactions between marine mammals and commercially exploited marine resources) should **remain as a standing request** and also takes the place of R-1.1.3.

R- 1.1.8 (ecosystem modelling and marine mammal fisheries interactions): This request should **remain ongoing** until the results expected from Iceland are presented in the SC.

Haug reported from recent Norwegian research on the ecology of killer whales in the Norwegian Sea (Nøttestad *et al.* 2014). The traditional perception of prey species preference of killer whales in the Northeast Atlantic has, to a large extent, been linked to herring. Few studies have investigated the feeding ecology of killer whales from the offshore parts of this ecosystem. During two summer-season ecosystem-based surveys in the Norwegian Sea (2006 and 2007), using observational, acoustic, oceanographic, plankton net, and pelagic trawl haul data, it was possible to quantify any spatial overlap between killer whales and the three most common and abundant pelagic fish species: herring, mackerel and blue whiting. No spatial relationships were found between killer whales and herring or blue whiting. However, there was a significant relationship and spatial overlap between killer whales and mackerel. Feeding on this epipelagic schooling fish species during summer may incur lower migration costs and higher energetic gain than feeding on alternative prey. Killer

whale group size was also correlated to the size of mackerel trawl catches, indicating active group size adjustment to available prey concentrations.

Future work

Haug and Zabavnikov reported that a high priority part of the planned Joint Norwegian-Russian Research Program on Harp Seal Ecology is to deploy satellite transmitters on harp seals in the White Sea. In all the years 2007–2011 it was planned to do this in a joint Russian-Norwegian effort just after the moulting period (in late May), or, alternatively, in late March–early April if ice conditions turns out to be unfavourable in early May. Unfortunately, the Federal Technical Committee (FTC) did not permit satellite tagging using non-Russian tags in Russian waters in all years. In 2012–2014, however, permission to tag harp seals in the White Sea was given by the Russian Authorities, but now a lack of funding prevented tagging of seals. Application for funding has now been submitted to the Norwegian Research Council, and if successful, an attempt to do the tagging will be done in 2015. During the tagging experiment, PINRO will provide the necessary logistics required for helicopter- or boat-based live catch of seals in April–May 2015. The Institute of Marine Research, Norway, will, as before, be responsible for the satellite tags, including providing all necessary technical details, as well as for providing experienced personnel and equipment for anaesthetizing seals and tag deployment. For proper planning and budgeting on both institutes, a PINRO scientist must obtain the necessary permissions from Russian authorities before December 2014. The permission from Russian authorities is not dependent on the origin of the transmitters; both US and Russian transmitters can be used. The transmitters cannot collect geographically positioned temperature and salinity data.

6.1.1 By-catch

Gunnlaugsson presented SC/21/11 which reports on by-catch of seabirds and marine mammals in Icelandic waters net fisheries, including bottom set lumpsucker nets and cod gill nets. In Iceland it is mandatory to report all by-catch, but records for other gear are few, also in Marine Research Institute (MRI) trawl surveys where all by-catch is registered. Main sources of information are the annual cod gill net survey, conducted in April where routine recording of marine mammals started in 2002. Survey effort is about 2% of the fleet effort in April and is distributed in line with the fleet effort by area. Some reporting of marine mammals in the bottom set gill net fishery started in early 2002 or about 5% of the cod gill net fleet up to 2009 when a new electronic log-book system was implemented. No records have been received from the new system. Cod gill net fishery by-catch was estimated by assuming that the mean by-catch per net in the survey was the same as in the fishery 2002–2008. For other species their observed proportion in the cod fishery to porpoise is used to estimate numbers based on the porpoise by-catch estimate.

Lumpsucker effort in the period 1980–2013 was higher in the earlier years 1980–1997, with about 440 thousand net hauls annually. Effort decreased at the turn of the century to about 180 thousand, but increased again in 2009–2012 to just over 300 thousand. All by-catch reports from 2011-2014 have been entered in the database, but in 2013 and 2014, records with zero by-catch were not entered, because of a discrepancy between the handwritten data sheets and the entry programme. In 2011, 10–20% of the boats are missing as they changed over to the electronic log-book and encountered problems, but much less for 2012 as they changed back to handwritten reports. Only a part of the fleet has recorded marine mammals.

Directorate of Fisheries inspectors and MRI staff collecting samples for biological research have reported by-catches and these records are available since 2010, but it is not possible to state whether inspectors or researchers observed or recorded all by-catch. These data were compared to log-book records from the lumpsucker fleet to estimate the proportion of by-catch reported for the years 2011–2013. In 2014 inspectors specifically checked the records of the fishermen and urged them to fill in unreported catches and the proportion of vessels reporting is then much higher on these boats, therefore it is not possible to assume that the inspection did not influence the log-book recording then.

The harbour porpoise is the most commonly by-caught marine mammal, representing 73% in the gill net fishery and 79% in the survey, but 48% in the lumpsucker fishery. Survey records are of 4–18 animals in 2002–2007, but 12-68 animals in 2008-2014. There is some question whether the survey data are complete in the first years, but participants then claim that the data are reliable, as supported by no increase in other by-catch (excluding harp seals).

According to the calculations the porpoise by-catch in gill nets has decreased since 2003, from 7,300 animals

to about 1,600 animals in 2009–2013, in line with the decreased effort in the cod net fishery. With 400 porpoises taken in lumpsucker nets, the total has likely been about 2,000 animals from 2009. This is 1.2–6.5% of the abundance estimate range calculated from the 2007 aerial survey and may exceed the precautionary reference point usually used for harbour porpoise (1.7%). If, however, the recent increase seen in the net survey numbers is factual and reflects an increase in the stock due to the reduced net fishery effort, then the replacement potential must be much higher than 1.7%. Porpoises occur also in deep waters outside the aerial survey range. Animals tagged off the West Greenland coast (Nielsen *et al*. 2013) spent most of their time in deep waters. Surveys in deep waters target large whales, but porpoises are hard to detect and no estimates exist there. It is likely the abundance based on the aerial survey is also severely underestimated. Genetic mark-recapture analyses are ongoing and may result in a new estimate of abundance.

Harbour seal is the second most commonly by-caught marine mammal in both cod nets (21%) and lumpsucker nets (37%), with an estimated by-catch of 705 animals for 2013. The stock estimate from the 2011 aerial survey was 11,000 animals and the 2013 by-catch is 4–8% of this stock size range. In 2010 the management objective was defined to aim at keeping the stock above the 2006 level when it was estimated 12,000 animals, and was therefore just below this limit in the last count in 2011.

Grey seal is the third most commonly by-caught marine mammal in lumpsucker nets (18%), but is much rarer in gill nets, with a total by-catch estimated at 140 animals for 2013. The aerial abundance estimate in 2012 was 4,200 and the 2013 by-catch is 2-3% of this stock size range. In 2005 a management objective was defined where the aim is to maintain the stock above the 2004 estimated abundance of 4,100 animals. The stock is now just above this limit.

The vagrant harp seal comes second in the net survey (12%). The first 2 by-caught seals were recorded in 2008 and the highest 28 in 2009, but is rare in the lumpsucker fishery. Other species of marine mammals are rare as by-catch.

The lumpsucker net by-catch calculations for 2013 hinge on the assumption that the presence of observers had no influence in the log-book reporting of the fishermen, but there are signs that this is not fully true. The estimated lumpsucker fishery by-catch for 2014 of grey and harbour seals and some other species, obtained by multiplying up the records from inspectors, is higher than in 2013, in line with an increase in log-book records then. Other approaches at estimating porpoise and seal by-catch from these data gave both higher and lower numbers.

No attempt was made to estimate the precision in the estimates, but they are generally based on small numbers. Survey data will continue to accumulate, but are collected only during about 2 weeks in the spring. Extrapolation from the survey data to the whole area and all months is based on outdated records from the fishery 2002-2008.
Earlier estimates of porpoise by-catch based on questionnaires (Ólafsdóttir 2010), were considerably lower than those presented here. This supports the conclusion by Ólafsdottir that self-reporting is unreliable for estimating total by-catch.

Discussion by the NAMMCO SC
The SC noted that the estimates of harbour porpoise by-catch in this report are using similar extrapolations to Bjørge *et al.* (2013).

The SC discussed the reduction in effort in the gillnet cod fishery, mainly due to the fishery having moved to trawling and line. Trawl surveys in Iceland have not shown significant by-catch. This is similar to other areas in Europe where there is little to no by-catch of seals and harbour porpoises in trawls (except for the bass trawl fishery). Norway noted that they have video recording from trawls where harp seals are seen entering the trawl, eating, and then exiting safely.

In Norway, the monkfish fishery that uses gill nets is a serious issue for marine mammals (Bjørge *et al*. 2013). IMR receives by-catch data via the research reference fleet. There is also mandatory by-catch reporting in all fisheries in Norway, but the Directorate of Fisheries seems not to receive any reports of by-caught marine mammals. Gunnlaugsson noted that there is some monkfish fishing in Iceland, but no records of by-catch in

this fishery. In Iceland, the effort in the lumpsucker fishery has been reduced in recent years through shorter time periods and fewer nets allowed.

The SC **welcomes** these by-catch estimates from Iceland, and the previous data from Norway on harbour porpoise. It notes that the lack of by-catch recording in the gill net fishery from the log-book system implemented in 2009 in Iceland is of great concern. A functioning by-catch recording system is of highest priority. The uncertainty on reporting of by-catches in other gear such as monkfish nets should be given priority by fisheries inspectors. The SC noted that the Harbour Porpoise Working Group (HPWG) may want to review the data from Iceland to consider whether there are better methods of monitoring the by-catch. The 2013 HPWG considered the by-catch issue from Norway, including suggestions for mitigation. The SC noted that a future HPWG meeting requires information on by-catch before the assessment can continue.

With this new information on by-catch, the SC **recommended** convening a By-catch Working Group (WG). This would be a technical WG that could focus on discussing the methods that are being used to collect the data and extrapolate the results, and decide if further work is required.

Prior to a By-catch WG meeting, it will be important to have the by-catch numbers from the reference fleet in Norway, but also to compile the necessary fisheries data. These data would need to come primarily from management agencies, and includes fishery effort data (both spatial and temporal) from all fisheries, but most specifically net fisheries.

Suggested Terms of Reference:

By including external expertise from fisheries and marine mammal science, the WG would

1. Identify all fisheries with potential by-catch of marine mammals.
2. Review and evaluate current by-catch estimates for marine mammals in NAMMCO countries.
3. If necessary, provide advice on improved data collection and estimation methods to obtain best estimates of total by-catch over time.

The SC **noted** that the outcomes from the By-catch Working Group should be considered by the Coastal Seals WG (CSWG). The SC **suggested** that the CSWG be postponed until 2016 (see item 7.4.3.1), and that the By-catch WG could meet just prior to the CSWG.

6.2. Multispecies approaches to management

R-1.2.1 (developing multispecies models for the North Atlantic): This remains an **ongoing request**. A large-scale ecosystem modelling project (MAREFRAME) is underway, which includes marine mammals in Icelandic and adjacent waters.

R-1.2.2 (monitor stock levels and trends in stocks of all marine mammals in the North Atlantic): This remains a standing request.

6.3. Economic aspects of marine mammal-fisheries interactions

R-1.4.1-1.4.6: This series of requests are all regarding the economic aspects of marine mammals-fisheries interactions. The SC regards these requests as **outdated** and if the Management Committee would still like these issues addressed, a new, more specific request should be drafted. The SC also noted that socioeconomic impacts are included in a large-scale ecosystem modelling project (MAREFRAME) which includes marine mammals in Icelandic and adjacent waters.

6.4. Environmental issues [SC/21/O04]

In regards to **R-1.5.1** (radioactive material entering the North Atlantic ecosystem), the SC considers this request **outdated**.

Haug presented a report addressing questions whether ice breeding seals can adapt to habitat loss in a time of climate change (Stenson and Hammill 2014). Harp seals require stable ice for pupping, nursing and the first weeks after weaning when the young develop the capacity to swim and feed. Although ice conditions in the Northwest Atlantic have varied over the past 40 years, in 2010 and 2011, the total extent of ice suitable for

whelping harp seals was at, or near, the lowest ever recorded. These years of exceptionally poor ice yielded an opportunity to improve the understanding about how ice breeding seals may respond to the conditions expected in the future. Harp seals responded to poor ice conditions differently, depending on the presence or absence of ice at the beginning of the pupping period. If no ice was present, females moved away from their traditional whelping areas to find suitable ice. If small amounts of ice were present, females gave birth even if the ice was too thin to sustain the pups, resulting in high pup mortality. There was no evidence to indicate that harp seals pupped on land even in areas where ice was absent. Young seals that drifted to shore had high levels of abandonment and mortality. If the predicted warming trends continue, ice-breeding harp seals will encounter more years with poor ice conditions and may eventually adapt by moving to alternative areas. Until then, they will continue to have increased levels of mortality.

Lydersen presented a paper on the importance of glaciers to marine mammals (Lydersen *et al.* 2014). Approximately 60% of Svalbard's land areas are glaciated at the present time. The Archipelago has more than 1,100 glaciers (> 1 km^2) and 163 of these are "tidewater glaciers" – that is glaciers that terminate (with their calving front) at the sea. It has been known for a long time that these glacier front areas are important feeding areas for seabirds and marine mammals. Recent satellite tracking studies have shown that many of Svalbard's ringed seals spend the whole year in front of various glacier fronts, and white whales have been shown to spend about 55% of their time during summer and autumn at these sites. Prime breeding habitat for ringed seals in Svalbard occurs deep in the fjords where ice pieces calved from the glacier fronts become frozen into land-fast sea-ice, promoting the accumulation of snow to a depth suitable for ringed seal females to dig out birth lairs above breathing holes in the ice. These pupping areas are important hunting areas for polar bears in spring, especially female bears with cubs of the year during the period following emergence from the winter/birthing den. Glacier-ice pieces floating in coastal areas are also important for all seal species in the region as dry platforms during moulting and also as general resting platforms for both birds and seals. During the last decade there have been several years with a complete lack of spring sea ice in many of the fjords along the west coast of Spitsbergen. During the spring periods in these years, bearded seals have replaced their regular sea-ice platform with glacier ice, using it as a solid substrate for both birthing and nursing as well as general resting. The mechanisms that create foraging hotspots at the fronts of tidewater glaciers are related to the massive subsurface plumes of freshwater discharged from the glacier fronts. As these plumes rise towards the surface they entrain large volumes of ambient water, tens to hundreds of times the original discharge volume. This water is drawn from all depth levels as the plume ascends. This entrainment ensures a continuous resupply of intermediate depth waters from the outer parts of the fjords towards the glacier front and greatly amplifies the general estuarine circulation. The intermediate water masses carry plankton from a broad area, including the outer fjord, into the glacier front area, where they get entrained in the plume rising towards the surface, and often become stunned or die from freshwater osmotic shock. These small animals fall easy prey to the surface feeding predators. Large, strong swimming marine zooplankton species can sometimes escape by swimming below the inflow of marine water. But, they then become concentrated in a water layer near the bottom, making them of interest and susceptible to predators. Currently, the mass balance for Svalbard glaciers is negative and climate change predictions for the future suggest continued warming, and hence continued glacial retreat. This will result in a reduction in both the number of glaciers calving into the ocean in Svalbard, and also a reduction in the total length of calving fronts around the Archipelago. Similar to the retraction of the northern sea-ice edge (which is another diminishing foraging hot-spot for these same arctic vertebrates), the climate-warming-induced changes in glaciers will likely lead to substantial distributional shifts and abundance reductions for many arctic species.

Lydersen also presented Reeves *et al.* 2014. This paper summarizes information on the distribution and movement patterns of the three ice-associated cetacean species that reside year-round in the Arctic: the narwhal, the beluga and bowhead whale. It maps their current distribution and identifies areas of seasonal aggregation, particularly focusing on high-density occurrences during the summer. Sites of oil and gas exploration and development and routes used for commercial shipping in the Arctic are compared with the distribution patterns of the whales, with the aim of highlighting areas of special concern for conservation. Measures that should be considered to mitigate the impacts of human activities on these Arctic whales and the aboriginal people who depend on them for subsistence include: careful planning of ship traffic lanes (re-routing if necessary) and ship speed restrictions; temporal or spatial closures of specified areas (e.g. where critical processes for whales such as calving, calf rearing, resting, or intense feeding take place) to specific types of industrial activity; strict regulation of seismic surveys and other sources of loud underwater noise; and

close and sustained monitoring of whale populations in order to track their responses to environmental disturbance.

6.5. Monitoring marine mammal stock levels and trends in stocks / North Atlantic Sightings Surveys (NASS)

R-1.7.11: (abundance estimates from TNASS-2007 data): This request is **ongoing**.

R-1.7.12 is a **new request** from NAMMCO 22 from Greenland: "Greenland requests the SC to give information on sustainable yield based on new abundance estimates expected from TNASS2015 for all large baleen whales in West Greenland waters (NAMMCO 22)."

The SC **noted** this new request, and will consider this again after T-NASS2015.

6.6. Other

R-1.8.1 (need for greater input from hunters in the work of the SC) and **R-1.8.2** (SC report language must be kept precise and simple): These are now part of the SC working procedures, and suggest that the request is now **outdated**.

7. SEALS AND WALRUS STOCKS - STATUS AND ADVICE TO THE COUNCIL

7.1. Harp Seal

7.1.1. Review of active requests

R-2.1.4 (regularly update stock status of harp and hooded seals): This request will remain as **standing**.

R-2.1.6 (evaluate how a projected decrease in the total population of Northwest Atlantic harp seals might affect the proportion of animals summering in Greenland): This request is now considered **completed**, and the SC will await a new request from Council if needed.

R-2.1.9 (decline in Greenland stock of hooded seals): **Ongoing**

R-2.1.10 (advice on total allowable catch of harp seals): **Standing**

R-2.1.11 (effect of decreasing populations of harp seals in North Atlantic impacts summering seals in Greenland): The SC now considers this request as **completed**.

7.1.2. Update

Pup production in the White Sea

Zabavnikov and Haug reported that aerial surveys had been carried out by PINRO in 2013 to estimate pup production in the White Sea using the same multispectral methods as used in previous surveys. Six survey flights (15, 16, 17, 18, 20 and 21 March 2013) with a total duration of 31.5 hours were completed. Over 7,000 km^2 were covered by the surveys. The first 5 surveys provided complete coverage of the area. The survey on 21 March provided a second independent coverage of the area where pupping occurred. Ice conditions in 2013 were typical, corresponding to long-term average ice conditions. More than 16,000 digital photos and over 200 Gb of thermal images were obtained of the White Sea ice coverage and harp seal whelping patches. These data have now been processed in detail. The final result of the 2013 survey yielded a total pup production number of the White Sea/Barents Sea harp seal population of 128,786 (CV=0.237).

Use of drones in pup production surveys

Haug further reported from a new project aimed to renew the methods used in aerial surveys to estimate harp and hooded seal pup production (Nilssen *et al.* 2014). Thus, with funding from the Norwegian Research Council (NRC), IMR has now started experiments with alternative (and cheaper) methods to perform photo-based aerial surveys of seals in the West Ice. A research survey was conducted with KV "Svalbard" to the West Ice during 16 to 26 March 2014. The aim of the survey was to test the usefulness of UAVs (Unmanned Aerial Vehicles), operated by the Northern Research Institute (Norut), to perform aerial photographic surveys of harp and hooded seal whelping patches on the drift ice. Two drones were tested: One small (wingspan 2.10 m) with electromotor and one larger (wingspan 3.80 m) petrol-driven UAV. Digital cameras were used, and the largest UAV was also instrumented with thermal infrared (IR) camera. Both aircrafts were launched by a mechanical launcher from the ship deck. The smaller UAV could be landed on KV Svalbard's helicopter

platform, while the larger had to be landed on ice floes, preferably at least 80 m long and 20 m wide. Both UAVs fly along predefined transects and altitudes, both can be changes throughout the flight using satellite based communication. The UAVs are landed manually. The main aim of the pilot investigations in 2014 was to explore various survey altitudes and camera settings to obtain an optimal altitude and camera set up for photographing seal pups. Simultaneous use of digital and IR cameras enabled exploration of combinations of those to detect and classify seals. Experience obtained from using the UAVs and the quality of the images taken, are promising. Both harp and hooded seals, including pups, were easily identified on the images taken at a flight altitude of 300 m (the usual altitude for photographing during traditional surveys). Also preliminary results from the IR camera are promising. It is, however, necessary to improve the range of the largest UAV and the methods for landing the aircraft on ice floes. Also some technical improvements on both aircrafts and operational equipment should be performed. A new survey, building on the experience gained in 2014, will be conducted in the West Ice in 2015.

Status of Northwest Atlantic harp seals

Haug reported that photographic and visual aerial surveys had been conducted off Newfoundland and in the southern Gulf of St. Lawrence to determine pup production of Northwest Atlantic harp seals in 2012 (Stenson *et al.* 2014). The survey resulted in an estimated total pup production of 790,000 (SE=69,700, CV=0.088). This estimate is approximately half of the estimated number of pups born in 2008, likely due to lower reproductive rates in 2012 compared to 2008. Only 15% of the pups were born in the southern Gulf where years of poor ice conditions have been increasing in frequency over the past decade. Ice conditions observed during 2012, were similar to those observed in 1969, 2010, and 2011 and are among the worst on record. This continuing trend of poor ice conditions has serious implications for survival of harp seal pups and the longer-term persistence of breeding seals in the southern Gulf of St Lawrence.

Haug further reported that a population model had been used to examine changes in the size of the total Northwest Atlantic harp seal population between 1952 and 2014 (Hammill *et al.* 2014). The model incorporated information on reproductive rates, reported removals, estimates of non-reported removals and losses through by-catch in other fisheries to determine the population trajectory. The model was fit to 12 estimates of pup production from 1952 to 2012, and to annual estimates of age-specific pregnancy rates between 1954 and 2013. Pup production declined throughout the 1960s reaching a minimum in 1971, and then increased to a maximum in 2008. The total population size in 2012 were estimated to be 7,445,000 (SE=698,000). The maximum estimated population size, N_{max}, was estimated to be 7.8 million animals in 2008. The population appears to be relatively stable, showing little change in abundance since the 2004 survey, although pup production has become highly variable among years. Data on age-specific pregnancy rates indicate that herd productivity has declined compared to the 1980s and early 1990s.

Discussion by the SC

The SC discussed that the carrying capacity used in the modelling might need to be reduced because it appears that there may be density dependence influenced drops in reproduction at a lower carrying capacity than is being used.

Haug also updated the SC that the seals hunts have previously been subsidized by the Norwegian government, however, this year's proposed national budget has taken subsidies out. It is unclear how this may affect future harp and hooded seal research in Norway.

7.1.3. Future work

No new advice on the harp seals were available, but Haug reported that the ICES Working Group on Harp and Hooded Seals will meet again in November 2014 in Quebec, Canada, to review the status and assess the catch potential of harp seals in the Barents Sea/White Sea and in the Northwest Atlantic.

7.2. Hooded seal

7.2.1. Review of active requests

R-2.1.9 (investigate decline of Greenland Sea stock of hooded seals): This request is **ongoing**.

7.2.2. Update

Telemetry studies on West Atlantic hooded seals have provided very detailed information on distribution and

diving patterns (Andersen *et al.* 2009, 2013a, b). The important feeding areas have also been identified using two different methods: a) based on how much time the seals spend in certain areas, and b) using drift dives (dives of sleeping seals drifting in the water column) to calculate weight gain in certain areas (Andersen *et al.* 2014). Their buoyancy during these drift dives can be estimated from the rate of decent and the daily changes in buoyancy can therefore be used as an index of feeding success, and this is found not always to overlap with areas where the spend most time.

7.2.3. Future work

No new advice was available for hooded seals, but Haug reported that the ICES Working Group on Harp and Hooded Seals will meet again in November 2014 in Quebec, Canada, to discuss hooded seals in the Northeast Atlantic.

7.3. Ringed seal

7.3.1. Review of active requests

R-2.3.1 (stock identity, abundance estimate, etc.): **Ongoing**

R-2.3.2 (effects of removals of ringed seals in Greenland): This request remains **ongoing**.

7.3.2. Update

Lydersen presented Kovacs (2013). The SC noted that the Arctic Council's working group "Conservation of Arctic Flora and Fauna" (CAFF) has a working group on ringed seals throughout the Arctic where a lot of important work is being presented, and includes suggestions for future monitoring on this species.

7.3.3. Future work

Rosing-Asvid noted that there are ongoing tagging studies in West Greenland, and genetics studies are planned for the near future.

7.3.3.1 *Possible WG*

At SC20, it was suggested that a Working Group be considered in the next few years (2015 or later), but that the CAFF report should be considered first. The SC **noted** that the CAFF group is likely a better forum than convening a NAMMCO WG, however the group was not sure if CAFF is planning more meetings.

The SC **reiterated** that data on this species is sparse and a full assessment is not possible. The SC **recommends** that a future WG should await results of ongoing tagging studies in central West Greenland, and future genetics studies to elucidate information on population structure.

7.4. Grey seal

7.4.1. Review of active requests

R-2.4.2 (abundance estimates all areas): **Ongoing**.

7.4.2. Update

Haug presented results from a new study on the global population structure and demographic history of grey seals. The analyses, conducted on samples from more than 1,500 individual seals collected from 22 colonies spanning the western and eastern Atlantic and the Baltic Sea, showed a high degree of genetic differentiation between the regions (Klimova *et al.* 2014). Highly asymmetric patterns of gene flow were inferred, with the Orkney Islands being identified as a source of emigrants to other areas of the eastern Atlantic. The Faroese grey seals are closely related to grey seals around the UK. The Baltic and eastern Atlantic regions were estimated to have diverged a little over 10,000 years ago, consistent with the last proposed isolation of the Baltic Sea. Identification was made of genetic signals consistent with postglacial population expansion across much of the species range, suggesting that grey seals are highly responsive to changes in habitat availability.

Haug further informed that the most recent pup production estimate of grey seals in Norway is based on data obtained in 2006–2008. The management plan for coastal seals now implemented in Norway require that data used in assessments should be updated every 5 years. A boat-based visual survey aimed to obtain a new abundance estimate for the species in Norway was, therefore, started in November 2013 (covering the northernmost parts of Norway) and continued in 2014 (covering parts of mid Norway). Some of the new estimates obtained in mid Norway were much lower than in the previous survey, and quotas were immediately

reduced in these areas as a result.

Mikkelsen informed that no survey has yet been conducted to estimate stock size, however there are plans to conduct a survey within the next few years. The Faroes have implemented a system to obtain numbers on removals from fish farmers (salmon), however they have not received data from all areas, and the statistics are not complete. Effort will be put into completing this work by next year.

Mikkelsen informed that low numbers of grey seals are known to be caught in the halibut fishery.

Updates are available in the Icelandic progress reports on grey and harbour seals. Grey seal pups were tagged with flipper tags during the pupping season in 2012 and 2013 in western Iceland. In addition, pups were counted and aged based on appearance and growth.

The SC noted a recent publication on the first record of grey seal in Greenland (Rosing-Asvid *et al.* 2010). Two grey seals were seen in S.E. Greenland in 2009. In 2010 a grey seal pup of the year was caught and tagged and the tag remained attached for one month. The seal travelled about 200 km up the East coast of Greenland. A survey along the S.E. coast in July 2014 did not find any grey seals.

7.4.3. Future work

The current surveys, aimed to obtain a new pup production estimate for the entire Norwegian coast, will be completed in 2015. If possible, Russia and Norway will conduct a joint survey of grey seals on the Murman Coast - these grey seal colonies have not been surveyed since 1991.

7.4.3.1 *Coastal Seals WG*

A Coastal Seals WG (CSWG; Chair: Kjell Tormod Nilssen) meeting has been tentatively scheduled for February 2016 to address R-2.4.2 and R-2.5.2. By February 2016, the CSWG will likely have by-catch estimates and a new complete grey seal estimate in Norway for consideration at the meeting.

The Terms of Reference for the meeting will be for the WG to:

1) assess the status of all populations, particularly using new abundance estimate data that are available from Iceland and Norway.

2) address by-catch issues (grey seals) in Norway, Iceland, and the Faroe Islands

3) re-evaluate the Norwegian management plans (which have been already implemented) for grey and harbour seals.

7.5. Harbour seal

7.5.1. Review of active requests (R-2.5.2)

R-2.4.2 and **2.5.2** (assessment of harbour seals in all areas): **ongoing**.

7.5.2. Update

Haug reported that aerial surveys aimed to obtain a new abundance estimate for harbour seals in Norway were started in 2011 and continued in 2012 and 2013. The survey results were supplemented with results from some boat-based visual surveys in 2014, resulting in a final point estimate of 7,533 for the species for the entire Norwegian coast. This new estimate has been implemented in the 2015 management of the species – this management now follows the management plan reviewed by NAMMCO SC in 2011.

The catch statistics from Norway do not include by-catch removals. Norway is now in the process of developing a model for management of harbour seals, which will include uncertainties around by-catch.

In Greenland, recent surveys searching for new haulouts have found three new colonies since 2009.

A comprehensive seal count was conducted in July 2013 in N.W. Iceland. The count resulted in 755 seals (mainly harbour seals) compared to 618 in the same area and time of the year in 2012.

In Iceland experiments were made with using drones for a survey this year. There are plans for full survey next year.

7.5.2.1. *Presentation from Japan*

Kitakado introduced his on-going works on stock assessment for the Kuril harbour seals in Cape Erimo, Hokkaido, Japan. The population experienced a severe decline between the 1940s and early 1970s due to heavy exploitation, and was protected from commercial harvests until now. Since then the population has been recovering gradually. The population was once on the red list in Japan as "Endangered" in 1998 but was downlisted to "Vulnerable" in 2012. Recently, damage to the fishery around the habitat has become serious, especially at some set nets for salmon fishery. Also, the non-negligible extent of by-catch of younger animals is of concern, and therefore the stock assessment and developing management procedures for this population are now regarded as urgent matters to take a balance between the fishery loss and population conservation. As an initial work, Kitakado and his colleagues have started analysis with an "age-aggregated production model" and an "age-structured models with density dependent reproduction". Both the models showed the population recovered around 70% of its carrying capacity although the depletion level depends on the assumption for detection probability of seals and their biological parameters. The current preliminary assessment showed it might be possible to cull adult animals which are big consumers of fishery products, to some extent, without causing an unacceptable level of risks should implementation of some mitigation measures to reduce the by-catch dramatically become successful.

7.5.3. Future work

Haug reported that biopsy sampling of tissue from pups for genetic studies will continue on the Norwegian coast in 2015. The aim of such sampling is to assess the population structure of the species using DNA analyses.

7.5.3.1 *Coastal Seals WG*

As discussed in 7.4.3.1, a Coastal Seals WG has been scheduled for late February 2016.

7.6. Bearded seal

7.6.1. Update

New tagging results for seals tagged in Svalbard are presented in (Lydersen *et al*. 2014), and this work is ongoing.

7.6.2. Future work

Bearded seal tagging in Svalbard and Greenland continues.

7.7. Walrus

7.7.1. Review of active requests (R-2.6.3)

R-2.6.3 (effects of disturbance on distribution, behaviour and conservation status): Ongoing

7.7.2. Update

Lydersen reported on a newly started project on walruses in Svalbard. This was a cooperation between Norway and Russia, mainly sponsored by the Norwegian-Russian Environmental Commission. This year 20 adult male walruses were instrumented with GPS loggers that should collect GPS positions for at least 5 years (1 position per hr). Data has to be downloaded to stationary or mobile receiving stations via VHF. Also blood and blubber samples were collected from these animals for various studies on pollution, diet and health assessments. Drugging in walruses is generally associated with high mortality risk. Here a new reversal (Naltrexone) combined with intubation and administration of pure oxygen resulted in zero mortality.

Lydersen further reported on the newly published results from the recent walrus survey in Svalbard (Kovacs *et al.* 2014). This was a photographic aerial survey flown in summer 2012, covering all current and historical haulout sites for walruses in Svalbard. It provides updates regarding the increasing numbers of: (1) land-based haulout sites (from 78 in 2006 to 91 in 2012); (2) occupied sites (from 17 in 2006 to 24 in the 2012 survey); (3) sites with mother-calf pairs (which increased from a single site with a single small calf in 2006 to 10 sites with a total of 57 small calves in 2012) and; (4) a 48% increase in abundance in the 6-year period between the two surveys to 3,886 (confidence interval 3,553-4,262) animals, including animals in the water at the time of the survey.

In addition, the camera surveillance of selected haulout sites in Svalbard continues, and Lydersen finally presented photographic evidence for a walrus killing a swimming reindeer.

There are three stocks of walruses that are hunted in Greenland and the assessment of quotas for the two stocks in West Greenland has been much debated. It was therefore decided by the Greenland Institute of Natural Resources that the northern stock (Baffin Bay stock in NW Greenland, Qaanaaq area) should be surveyed in April as a supplement to previous surveys that were conducted in May–June when the walruses are more dispersed in the North Water. The survey was completed in early April 2014 only covering the eastern coastal part of the North Water. The results were promising with more than 30 sightings and should allow for a new abundance estimate to be developed soon. Together with updated hunting statistics, this new abundance estimate could be used for a revised assessment for this particular stock with a possible update on advice. It was **suggested** that the Walrus Working Group (WWG) should resume for a one-day meeting in March 2015 to address the possibilities for updating advice on sustainable takes of walruses in the Baffin Bay stock. If feasible, the meeting could be conducted as a teleconference and participants would include Wiig (Chairman), Witting, Heide-Jørgensen, Hansen, Lydersen, Acquarone, Ugarte and Stewart.

Several walrus research projects are ongoing in the Pechora Sea around Dolgy Island which are sponsored by a Russian oil and gas company. This research is coordinated by the Russian public organization "Council of Marine Mammals" from Moscow.

7.7.2.1. *Review of recommendations from 2013 Walrus WG*

With regards to the recommendations made during the 2013 WG, there was no new information to report.

7.7.3. Future work

See above (7.7.2) regarding convening a one-day meeting of the WWG to update advice on sustainable takes of walruses in the Baffin Bay stock.

7.7.3.1 *Disturbance Symposium*

The planned Disturbance Symposium is discussed under narwhal and beluga.

8. CETACEANS STOCKS - STATUS AND ADVICE TO THE COUNCIL

8.1. Fin whale

8.1.1. Review of active requests (R-3.1.7)

R-3.1.7 (assessment of fin whales): This request is **ongoing**.

8.1.2. Update

The distribution of fin whale catches in Iceland in 2014 was very different from any previous whaling season since the resumption of whaling in 1948. Whale densities appeared to be very low on the traditional whaling grounds west of Iceland and the bulk of the total catch of 137 fin whales were taken south of Iceland. Preliminary analyses of stomach contents suggest that this changed distribution may be due to shortage of krill in the Irminger Sea.

In 2013 a fin whale/blue whale hybrid was caught in the Irminger Sea west of Iceland. This is the fifth confirmed hybrid between these two species in Icelandic waters.

Walløe updated the SC that concerns had been expressed about the lack of data for time to death in Iceland's fin whale hunt. In 2013 Icelandic authorities contracted Egil Øen to collect such data for the Icelandic fin whale fishery. Walløe will perform the statistical analysis, and the results will be submitted to NAMMCO before the Council meeting in February 2015. This will also be done for common minke whales.

8.1.3 Future work

See below regarding the Large Whale Assessment WG.

8.1.3.1 *Large Whale Assessment WG Fall 2015*

A Large Whale Assessment Working Group (LWAWG) meeting was previously planned for Fall 2014. This was postponed to Fall 2015, awaiting work to be completed by the IWC on the fin and minke whale *RMP Implementation Reviews*. The IWC SC has proposed a workshop in January 2015, and plans to complete this work by the IWC SC 66 a meeting in June. Therefore, the NAMMCO LWAWG will plan on meeting in the fall of 2015 in hopes that the work on the IWC SC will be complete.

8.2. Humpback whale
8.2.2. Review of active requests (R-3.2.4)
R-3.2.4 (formal **assessment): Remains pending.**

8.2.3. Update
The SC **noted** that IWC SC has accepted a strike limit algorithm for the Greenlandic humpback whale hunt.

8.2.4. Future work
Víkingsson informed the SC that a planned workshop for humpback whale researchers will be held in conjunction with the European Cetacean Society meeting in Spring 2015.

8.3. Sei whale
8.3.2. Review of active requests
R-3.5.3 (advice on status and minimum estimates of sustainable yield): This request remains **ongoing**.

8.3.3. Update
There were no updates for sei whales.

8.3.4. Future work
No future work was reported for sei whales.

8.4. Common minke whale
8.4.1 Review of active requests
R-3.3.4 (assessment): Response to this request is **pending** the conclusion of IWC Implementation Review (see above), and will be considered at the LWAWG planned for fall 2015.

8.4.2. Update
The SC **agreed** to use "common minke whale" as the common name for *Balaenoptera acutorostrata* going forward.

Attempts to collect time to death data for common minke whales in Icelandic waters were not successful due to the lack of catches during the planned observation period. During IWC's RMP Implementation Review of North Atlantic common minke whales extensive revisions were made on management areas in Icelandic and adjacent waters (see below). A satellite-tracking programme on common minke whales in Icelandic waters has provided the first indications of migration routes and winter destination of the species in the North Atlantic (Víkingsson and Heide-Jørgensen 2014).

Haug informed the SC about a recent study investigating the genetic structure of northeast Atlantic common minke whales. Several previous studies had investigated the population genetic structure within the north Atlantic minke whale with contrasting results. In order to shed further light on this topic, Quintela *et al.* (2014) conducted a spatial, temporal and cryptic population analysis of 2,990 whales harvested in the northeast Atlantic during the period 2004 and 2007–2011. This large data set, which had been genotyped according to strict protocols upon which the Norwegian minke whale DNA register is based, failed to reveal any indication of geographical or temporal population genetic structure within the northeast Atlantic based upon the analysis of 10 microsatellites and 331 bp of the mitochondrial D-loop. Furthermore, while three mtDNA lineages were revealed in the data, these did not show any underlying geographic pattern, and possibly represent an ancestral signal. The obtained results give no genetic support to maintain the 5 management areas in the northeast Atlantic. Anecdotally, north Atlantic common minke whales have been suggested to follow an annual migration cycle between Arctic feeding grounds and breeding grounds on lower latitudes. The information on sightings of common minke whales at low latitudes is, however very scarce and no breeding grounds have so far been demonstrated. Also, foetuses in different stages of development have been found in catches from the

northern feeding grounds, indicating that mating may take place even there and over a long period. The current suggestion of panmixia could therefore be supported by these observations, also implying that separate breeding grounds may not exist.

As a part of IWC's RMP Implementation Review extensive revisions of management areas have been agreed. These include large reductions in the number of management areas. Although the latest genetic evidence suggests that there is only one stock in the North Atlantic, the IWC SC decided to retain the three main medium areas (E, Central, W) as a precautionary measure.

The sixth and last year of the 6-year programme 2008-2013 to cover the northeast Atlantic to provide a new abundance estimate of common minke whales every sixth year as part of the management scheme established for this species, was conducted during the periods 25 June to 15 July and 15 July to 18 August 2013. Sighting surveys were conducted with the institute vessel R/V *Håkon Mosby* and the chartered vessel M/S *Båragutt*, respectively, in the eastern Barents Sea Norwegian coast. The covered area was the IWC *Small Area EB* (eastern Barents Sea) which is part of the Medium Management Area E, comprising waters in the northeast Atlantic. During primary search effort, the number of observations from the primary platform was 144 sightings of common minke whales.

Zabavnikov informed the SC that increases in common minke whale numbers and a wider distribution, compared to previous surveys, had been observed during the last Russian-Norwegian Ecosystem Survey and other observations in the Barents Sea. These observations took place between August and the beginning of October. For example, several individuals were observed in the far north-eastern part of the Barents Sea on the border with the Kara Sea.

8.5. Beluga

8.5.2. Review of active requests

R-3.4.9 (effects of human disturbance, including noise and shipping activities, on the distribution, behaviour and conservation status of belugas, particularly in West Greenland): **Ongoing**

R-3.4.10 (future surveys should be planned using hunter knowledge): The SC views this request as now **completed/archived**.

R-3.4.11 (update assessment of narwhal and beluga): This is a **standing** request.

8.5.3. Update

A programme continued in Norway with satellite tracking and collection of blood and blubber sampling for various investigations of pollution, diet and health status of Svalbard belugas. Eight animals were captured for this purpose in the summer of 2014. At least one more field season will be needed before analysis will begin on data that has been collected.

8.5.4. Future work

The above-mentioned work will continue for at least one more season.

8.5.4.1. *JCNB/NAMMCO JWG meeting*

A Scientific Working Group meeting is scheduled for 9-12 March 2015, in Ottawa Canada.

8.5.4.2. *Global review of monodontids*

The planning for a Global Review of Monodontids symposium has begun. Preliminary plans are to hold the meeting in conjunction with the Marine Mammals of the Holarctic meeting in the fall of 2016 in Russia (city to be determined).

Lockyer attended the Holarctic meeting this year in St Petersburg, Russia and discussed this venture with the organisers. The members of the Council of Marine Mammals organising the Marine Mammals of the Holarctic conference were presented with the NAMMCO proposal for a fall 2016 symposium – workshop by Christina Lockyer at their Council meeting. The following items were included:

- The proposal is for a 3-day scientific symposium - workshop, with invited experts on monodontids, and about 50 international participants
- The focus of the scientific symposium - workshop would be a comprehensive review of all aspects of the biology and study of belugas and narwhals in all regions where they occur
- The scientific symposium-workshop should be held in conjunction with the 2016 Conference on Holarctic Marine Mammals – before or after the event
- The rationale being that this conference is attended by many Russian experts researching belugas, and would attract a high attendance of relevant experts
- External funding would be sought to support attendees internationally as well as from within Russia, and an organising committee has already been established
- A scientific report would be produced after the event, to be published online together with presented scientific papers in the free access NAMMCO Scientific Publications Series site at http://septentrio.uit.no/index.php/NAMMCOSP/index

The Council of Marine Mammals was agreeable to the proposal and will cooperate with NAMMCO on this event.

The Steering Committee will be chaired by Arne Bjørge, and the other members of the Committee are Jill Prewitt (NAMMCO), Olga Shpak (Russia), Randy Reeves (Canada), Steve Ferguson (Canada), Rikke Guldborg Hansen (Greenland), Rod Hobbs (USA), Christina Lockyer (NAMMCO) and Rod Hobbs (USA).

8.5.4.3. *Disturbance Symposium*

Planning for a Disturbance Symposium that will deal with the impacts of human disturbance on narwhal, beluga and walrus is underway. Preliminary plans are to hold the meeting in early October 2015 in Copenhagen. Kit Kovacs has agreed to Chair the meeting.

The primary objectives of the Symposium will be to 1) present an overview of the information currently available, and 2) make recommendations for both restrictions of anthropogenic disturbances and future studies. The conclusions will be available to stakeholders shortly after the meeting in the form of a report with specific recommendations. Participants may also be invited to submit papers stemming from the symposium for publication in a special volume of the *NAMMCO Scientific Publications* series.

A first announcement of the meeting will be sent to prospective participants soon.

The SC **recommended** broadening the scope of the Symposium and include presentations from other species/research. A number of external experts will be required for this meeting.

8.6. Narwhal

8.6.1. Review of active requests

R-3.4.10 (future surveys should be planned using hunter knowledge): The SC views this request as now **completed**.

R-3.4.11 (update assessment of narwhal and beluga): This is a **standing** request.

R-3.4.12 (advice on sustainable takes of narwhal in Kane Basin). The SC noted that R-3.4.11 covers this request, and view this request as **replaced with 3.4.11**.

8.6.2. Updates

The Catch Allocation Sub-Group of the NAMMCO-Joint Commission on Narwhal & Beluga met in Copenhagen on 10–12 March 2014 with the main purpose of developing an allocation model that will provide a mechanism for assigning harvested animals (narwhals) to summer stocks (SC/21/07). After review of available information on movements and phenology of narwhals in Canada and Greenland a matrix model with columns for harvest locations and rows for stocks was developed. Allocation of catches to stocks was based on different criteria of levels of availability ranging from no availability for stocks that with certainty did not contribute to the hunt, to stocks that definitely supplied the hunt at identified hunting localities. Intermediate availabilities were established based on the proportion of satellite-tracked whales that visited the localities. Initial work on the sensitivity of the availabilities included estimating the variance around the detection of

tracked whales visiting hunting grounds. The model could potentially be used for both estimating the fraction of the hunt that is supplied from each summering stock as well as the sustainable takes at each hunting locality.

The SC **noted** that potential problems may arise if hunters take their whole quota from a single small stock. One way to reduce the risk of this is to look at within season movements with satellite tags to see how the stocks' movements overlap (e.g., early spring vs late spring, may be able to determine which stock moves early vs late).

Heide-Jørgensen presented preliminary results from research related to seismic activities and their effects on narwhal. Previous studies (Heide-Jørgensen *et al*. 2013) showed recent ice entrapments that may be related to seismic activity. New research in Greenland included studies of acoustics, kinematics, feeding behaviour and heart rate. One goal is to develop an instrument package that can be used to look at the effects of disturbance on different marine mammals. Tagging work is conducted in Scoresby Sound, East Greenland, with the aid of hunters helping to catch narwhal. The tags stay on from hours to a few days and then pop off. Currently they are working on obtaining baseline profiles, but in the future the aim is to look at the effects of an individual disturbance event (e.g., if normal bradycardic pattern is interrupted it could interfere with normal gas exchange).

Greenland is also deploying acoustic tags which record the background noise level in the animal's environment as well as animal vocalisations. These data have shown that "buzzes" from narwhals are linked to wiggles in the dive profiles. Stomach temperature pills are also being used, which record drops in temperature correlated with feeding activity. These tags remain in the stomach for about 8 days and communicate data to the satellite tag on the back. The stomach temperature data can also be correlated to the buzzes and the dive wiggles, and can give an estimate of feeding rate. In the future they also plan to look at larger scale changes in behaviour with disturbances.

8.6.3. Future work

Studies of the effects of disturbance on narwhal (described above) are ongoing.

8.6.3.1. *Planning JCNB/NAMMCO JWG meeting (taken above in 8.5.3.1)*

The next JWG meeting will be held in March 2015 in Ottawa, Canada.

8.6.3.2. *Global review of Monodontids (taken above in 8.5.3.2)*

The Global Review of Monodontids was discussed under Item 8.5.3.2

8.6.3.3. *Disturbance Symposium (taken above in 8.5.3.3)*

The Disturbance Symposium was discussed above in 8.5.3.3

8.7. Bottlenose whale

8.7.2. Update

There is an ongoing project being conducted in Norway related to sonar noise disturbance on bottlenose whales.

The Russian NPR reported that singles and pairs of northern bottlenose whales were observed. From acoustic trawl data, these animals appeared closely associated with squid aggregations in the western part of the northern trackline in their research area (Irminger Sea).

8.7.3. Future work

No future work on bottlenose whales was reported.

8.7.4. Abundance estimate

NAMMCO does not have an endorsed abundance estimate for the most recent sightings surveys. The latest available abundance estimate is 24,561 (CV 0.23), for the Icelandic and Faroese blocks of the ship-based part of the NASS-2001 survey. This abundance estimate was presented to the SC in 2003, but has not been formally endorsed.

8.8. Killer whale

8.8.2. Review of active requests (R-3.7.2)

R-3.7.2 (abundance, stock structure, migration and feeding ecology of killer whales in West Greenland): This request is **ongoing**. There is still not enough information to answer the request. Unfortunately catch information in Greenland was not available for review by the SC at this meeting.

8.8.3. Update

Rosing-Asvid updated the SC that killer whales in SE Greenland were found to have tooth wear that looks like they are fish eating killer whales but seals were found in the stomachs (9 killer whales; Foote *et al.* 2013).

A 3-year research project on feeding behaviour, movements and acoustics of killer whales in Icelandic waters conducted by the MRI will be finalized in 2015. Photo-identification has revealed several instances of movement of killer whales between the Shetland Islands and Iceland.

Lydersen reported on a newly published paper on killer whales in Norway (Vongraven and Bisther 2014). This study presents the results of 10 years of observational and photo-identification data of a population of killer whales that follows the Norwegian spring-spawning stock of Atlantic herring. Although the whales were predominantly observed while feeding upon herring, one pod of herring-eating whales was also observed interacting with seals. This supports the hypothesis based on the long-term markers, of a degree of specialization, with a small number of groups persistently feeding upon mammals, but switching between herring and seals. They further investigated this prey switching by conducting playbacks of herring-eating killer whale sounds to harbour seals at haulout sites on the herring spawning grounds. They recorded changes in behaviour consistent with an anti-predator response, suggesting the seals perceived the herring-eating killer whales as a potential predatory threat and had not habituated to their calls.

Haug informed the SC of a study of possible interactions between sperm whales and killer whales took place in the Bleik canyon in the Vesterålen archipelago, North Norway. This area is a habitat for large solitary male sperm whales and killer whale pods. Using local whale-watching boats as opportunistic platforms and photo-identification as indirect method, the study examined the quantity and the nature of interactions between sperm whales and killer whales from 2008 to 2012. The results suggest that killer whale aggressions toward sperm whales are common in the area. The study shows that there are significant annual, but not seasonal, variation in killer whale attacks on sperm whales. Killer whales do not display a selective biting of the sperm whale fluke, suggesting that all the parts of the fluke are equally likely to be attacked.

Zabavnikov informed the SC that the Russian-Norwegian Ecosystem survey in 2013 observed several killer whales between Barents and Kara Seas and saw several harp seals in the same area. The killer whales are possibly feeding on these seals. This is the first time seeing killer whales this far north and east.

8.8.4. Future work

Rosing-Asvid informed the SC that there is ongoing research in Greenland on killer whales.

8.9. Pilot whale

8.9.2. Review of active

R-3.8.3 through **R-3.8.6**: These requests are all related to conducting an assessment of pilot whales. They are all ongoing, and the next assessment will not occur until after the next sightings survey.

8.9.3. Update

Mikkelsen updated on progress for a future assessment of pilot whales. No pilot whales were satellite tagged in 2013 and 2014. Efforts have increased in the sampling programme of harvested animals, prioritizing obtaining teeth for ageing, skin samples, and reproductive parameters for each animal. A total of 270 animals were sampled in 2013.

Desportes commented on the extent of pilot whale movement revealed by the 2012 satellite tracking and presented to the SC last year. As ICES (1996) concluded, the effect of catches of pilot whales in the Faroe Islands depended critically on the geographic range of the population where the catches are coming from, referring to four areas (Fig. 1): 1) the area covered by the NASS 1989 sighting survey, 2) Mid-Atlantic Ridge-Iceland Area, 3) Rockall-Iceland Area and 4) Faroe Islands Area.

A= Faroe Islands Area

A+B= Rockall-Iceland Area

A+B+C= Mid-Atlantic Ridge-Faroes Area

A+B+C+D= NASS-1989

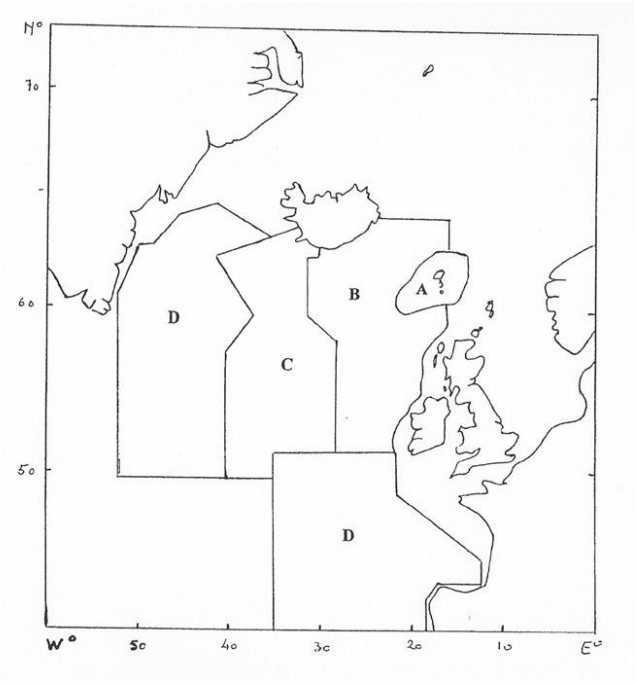

Figure 1. The four areas referred to in the 1996 assessment (ICES 1996)

Based on the result of the 1989 surveys, the catch over the last 150 years would have hardly any impact on the population trajectory if coming from the two larger areas. In this context, the 2012 satellite tracks are interesting as they show two pilot whales caught in the Faroe Islands moving well beyond the Mid-Atlantic Ridge Area (Fig. 2).

Figure 2. Satellite tracks of two pilot whales from the same pod tagged in the Faroes in 2012.

8.9.4. Future work

Satellite tagging will be conducted in 2015 prior to TNASS2015 survey activities.

8.10. Dolphins

8.10.2. Review of active requests

R-3.9.6 (assessments of dolphin species): The SC noted that this request is **ongoing**, and that there is no new information for bottlenose dolphins from the Faroes and the analysis of the data from white sided dolphins has not been completed.

8.10.3. Update

There were no updates of research on dolphin species.

8.10.4. Future work

Analysis from white sided dolphin data from the Faroes is awaiting completion.

8.11. Harbour porpoise

8.11.2. Review of active requests

R-3.10.1 (comprehensive assessment): This request is **ongoing**. A future harbour porpoise WG will be scheduled after a report from the By-catch WG, new data from T-NASS2015, and progress on research requests from the 2013 HPWG.

8.11.3. Update

Genetics studies are ongoing in Greenland and Iceland.

By-catch estimates from Iceland were received, and harbour porpoises were found to be one of the species of marine mammals most commonly caught in the net fisheries in Icelandic waters (see Item 6.1.1). The SC **recommended** that this information be passed on to the By-catch WG and the Harbour Porpoise WG.

Heide-Jørgensen updated the SC on tagging efforts of harbour porpoises in West Greenland. Fifteen animals were tagged in 2014, and in contrast to results previously presented to the HPWG in 2013, this year most of the tagged porpoises stayed on the continental shelf through September. Greenland also sampled about 150 porpoises from the hunt to complement previous sampling efforts in 1995 and 2009. The porpoises seem to react positively to climate change in terms of increased body mass (between 1995 and 2009; data from 2014 to come). The previous samples were collected in September, but this years' samples were collected from June-October to look at possible seasonal changes. In the period 1995–2009, stomach contents showed increased diversity of prey, with lots of cod in 2009.

Desportes informed the SC of an ongoing study investigating reproductive failure in over 320 female porpoises stranded in the UK in relation to PCB exposure. Nearly 20% of sexually mature females showed direct evidence of reproductive failure from a variety of causes. A low pregnancy rate of 50% was estimated for females that died of non-disease related (i.e. traumatic) causes of death, which significantly lower than other populations. The study should be published soon. These preliminary results are noteworthy.

Desportes noted that the SAMBAH (Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise) project, which includes the Baltic countries, and Sea Mammal Research Unit have deployed t-pods (passive acoustic devices) around the Baltic Sea. A method has been developed to use these recordings to obtain an abundance estimate. The SC noted that this may not be a useful method for areas of high abundance as is expected in Norway.

Lockyer noted recent papers (Bouveroux *et al.* 2014, Haelters *et al.* 2012) on grey seals attacking and eating harbour porpoises.

8.11.3.1. *Review recommendations from 2013 HPWG*

Regarding recommendations given at the HPWG in 2013, Norway are continuing to collect data from the reference fleet and bycatch estimations will be updated. The reference fleet has not yet been expanded to the lumpfish fishery. An application has been made for a feasibility study in Vestfjord for a shipboard survey for harbour porpoises in the fjord systems. Experiments with pingers on monkfish gillnets are in progress in the Vestfjord area.

8.11.4. Future work

Norway reported on a possible shipboard survey in Vestfjord area.

8.12. Sperm whale

8.12.1 Update

See above under 8.8.2 concerning interactions of killer and sperm whales in the Vesterålen archipelago, North Norway.

8.13. Bowhead whale

8.13.1 Update

Heide-Jørgensen presented Rekdal *et al.* (2014) which gives a new abundance estimate using genetics. The paper showed larger abundance estimates using genetics versus aerial surveys, probably because the population in West Greenland is a segregation of animals that mostly summer in the Canadian High Arctic. Aerial surveys provide a snapshot of the population; whereas genetics take into account all animals contributing to this population of animals. These genetics results confirm the assumption that the population is larger than previous abundance estimates. These assumptions were based on data showing that animals passing through West Greenland (not every year), are 83% females, and older than 40 years, therefore the population must consist of more animals.

In Norway, the programme using passive acoustic monitoring devices for bowhead whales using AURALs (**A**utonomous **U**nderwater **R**ecorded for **A**coustic **L**istening) is ongoing. Four such units were deployed in 2013 and three retrieved and redeployed in 2014 (too much ice on the 4th mooring). These AURALs will be analysed for presence of bowhead whales, in addition to presence of other marine mammals (narwhals, belugas, bearded seals, fin whales and blue whales) and anthropogenic noise from seismic and other activities.

8.13.2. Future work

8.13.3 OSPAR request

The Secretariat will respond to an inquiry from OSPAR regarding population status of marine mammals in the North Atlantic. NAMMCO regards bowheads as endangered in OSPAR Region 1 which covers the Northeast Atlantic.

8.14 Blue Whale

In Iceland, one blue whale was satellite tagged in 2013 and two in 2014. The whale tagged in mid July 2013 north of Iceland travelled southwards to 59° N. The whales tagged in 2014 travelled north of Iceland towards 73° N. Iceland has been collecting biopsies and the samples (10-20) are currently being stored in the MRI archive.

Notable increases in numbers of blue whales were seen in Svalbard over last 2–3 years. This year there were also many sighting during the Norwegian Sightings survey and the Arctic part of the Ecosystem survey, perhaps those whales moving north from Iceland to Svalbard area. Animals identified earlier via photo-id off West Iceland in mid-summer were identified north of Iceland in mid-summer now.

Zabavnikov informed the SC that during the last several Russian-Norwegian Ecosystem Surveys (ES) in the Barents Sea blue whales were regularly seen each year. In the last Ecosystem Survey, 24 blue whale individuals were observed close to Svalbard and between Svalbard and Franz Joseph Land.

9. SURVEY PLANNING

9.1. T-NASS2015 and Survey Planning WG

Heide-Jørgensen presented the T-NASS2015 Proposal (SC/21/13), which was presented at the Council meeting in February 2014.

Gunnlaugsson presented the Survey Planning Working Group report (ANNEX 1).

Overview of plans and resources by jurisdiction

The Iceland proposed governmental budget includes 8.2 mill NOK, corresponding to ¾ of the required amount in the MRI T-NASS2015 proposal (including National Surveys and Extension survey), leaving ¼ unfunded. The Faroe Islands Fishery Ministry has put 1.81 mill NOK in the proposed governmental budget for a ship based survey and also included an additional 1.13 mill NOK for the extension survey. Greenland has applied for the funding for their National surveys through the Greenland Institute of Natural Resources and an additional 1.02 mill NOK has been included in the Greenland Government budget as a contribution to the Extension survey. Norwegian national surveys through the IMR would cover the EW *Small Area* (IWC terminology) which includes the Norwegian Sea from the coastline to 3°E in the northern part and around

Faroe Islands in the south. The SC was unable to get confirmation on whether the Jan Mayen Extension area was included in the proposed Norwegian governmental budget (outside of the IMR budget) as Norway's contribution to the extension survey.

All of the proposed governmental budgets are yet to be approved.

One of three primary objectives for T-NASS2015 is to obtain a complete synoptic abundance estimate for common minke whales in the central area of the North Atlantic. The **SC agreed** that it will not be able to fully achieve this objective if funding for the extension areas is not confirmed by early January 2015.

The SC **recommended** that the "T" be removed from T-NASS, given that there will not be coverage in the West Atlantic. The NAMMCO project remains the same, but will be called NASS2015 going forward.

Survey design and methods

Norway

Norwegian surveys will use the same methodology for both the *EW* small area and the Jan Mayen (*CM*) extension area as in previous surveys. Norway stressed that a condition to their contribution to the Jan Mayen Extension survey area is that the Norwegian IO method is fully implemented in the entire area.

The Norwegian survey methods use two symmetrical platforms with two sets of observers using cues as sighting units. The survey is conducted in passing mode. Sighting is done without binoculars, and it is important to have both platforms doing exactly the same thing.

The SC discussed that Svalbard was not included in the proposed TNASS2015 area because it is included in the Norwegian mosaic survey. This area was last surveyed in 2014.

Iceland

In Iceland the plan is to use two or three survey vessels: one would also be doing a mackerel survey and cover the Icelandic economic zone including roughly 1/3 of the Jan Mayen extension survey area. Mackerel surveys stop for trawling and oceanographic sampling for about an hour twice to three times during the day, therefore it seems acceptable to use this platform for cetacean surveys.

The Icelandic survey will use two symmetrical platforms, and will use binoculars to some degree. For common minke whales, cue count data will be collected and it will be investigated whether the Norwegian analysis method can be used, or else conventional cue count or line transect analyses will be used. The mackerel vessel would not be able to close, so they will survey in passing mode. The other vessels will survey in delayed closing mode, but will not close on common minke whales. Fin whales frequently overlap with sei and blue whales and can easily be confused, therefore species ID is particularly important for the Icelandic surveys justifying the use of binoculars and delayed closing mode.

Faroe Islands

The Faroe Islands will be using both a dedicated survey vessel, and if feasible, a mackerel survey vessel. The dedicated survey vessel will operate with double platform IO mode and in delayed closing mode using standard line transect. The Faroese plan to measure noise on vessels to determine whether they can use acoustics.

A primary question is how to obtain reliable group size estimates for pilot whale groups. It was agreed that drones and helikites should be tested as a method of obtaining independent group size estimates of pilot whales.

The group discussed the status of satellite tracking in pilot whales. The tagging is fairly important for deciding on where to allocate survey effort, but if tagging data is lacking, plans could fall back on previous survey results for allocating survey effort.

Russia

Russian redfish surveys in the Irminger Sea in June/July 2015 will include dedicated cetacean observers.

Aerial Surveys in Greenland and Iceland

Greenland will fly the Twin Otter and plans to use the same protocols as previous surveys, including a full

double platform setup, and allowing for cue counting, strip census, and line transect estimation if needed. Availability of whales at the surface will be estimated from dive data recorders.

Iceland will fly the Partenavia in coastal areas and will use the same protocols as previous surveys, with a partial double platform setup, data collected in cue counting mode for common minke whales, and standard line transect for other species. Iceland plans to add either a still or video camera to assist the IO platform and distance and group size estimation.

Observers, Data collection and Equipment needs
It was considered mandatory for the success of the survey that initial testing of drones and recording systems should be started as soon as possible. The SC recommended that available funds from the SC should be spent on acquiring these pieces of equipment.

Other pieces of equipment needed for the surveys can be acquired during spring 2015 under the national budgets, or money budgeted in the SC for survey coordination.

Observer candidates should be contacted soon to ensure availability for the survey. It is also important that cruise leaders and observers are trained before the survey.

Future Plans
The T-NASS Steering Committee will keep in contact for the next 6 months and meet if necessary to ensure adequate planning and execution of the surveys.

The SC was pleased to see progress in the Action Plan as outlined by the Survey Planning Working Group.

9.2 Publications from T-NASS-07 [SC/21/12]
The SC noted that there are papers from the T-NASS-07 that the SC would like to see published. The Secretariat will contact the NAMMCO authors for updates on their publication plans for these papers. If there are enough papers to warrant a *NAMMCO Scientific Publications* volume, the Secretariat will contact the Canadians and Americans to see if they would like to publish in this potential volume.

10. NAMMCO SCIENTIFIC PUBLICATIONS

10.1. Walrus
Prewitt informed the SC that all papers in Volume 9: *Walrus of the North Atlantic* have now been published online. The hard copy is now in the process of being typeset by the publishers (Bokstavhuset in Tromsø). The hope is that the printing will take place before the end of 2014, but by the end of January 2015 at the latest.

10.2. Monodontid age estimation
There are now four papers that have been published online, and a few more are nearing completion.

10.3 Other matters- printing of hard copies
At the 22nd NAMMCO Council Meeting it was decided that Volume 9 will be the last volume printed as a hard copy. Starting with Volume 10, all future volumes will be published online only. However, professional typesetting will still be done when all papers are completed.

10.4 Next volume
The SC discussed whether to keep the *NAMMCO Scientific Publications* as themed volumes, or open the journal up to rolling submissions. The SC **recommends** that this issue is discussed with Editorial Board, especially since this could increase the workload of the Board members, whereas the themed volumes have scientific editors that take on the majority of the editorial work. The Secretariat will report back to the SC at the next meeting.

11. DATABASES ON ABUNDANCE AND CATCHES

11.1. Abundance

The Secretariat has begun working on a table of accepted abundances estimates. This will be presented to the SC at the next meeting.

The SC **recommends** that when future assessments are completed, all data used in the assessment should be archived in an appendix to the report and with the Secretariat.

11.2. Catches

Catches have been reported in the National progress reports using the new table format recommended last year.

12. WORK PROCEDURES IN THE SC

12.1. Classification of requests [SC/21/09]

Each request was discussed under the specific agenda item.

12.2. Requests for data from outside countries/organizations

The Secretariat and member countries regularly receive requests for data, particularly from sightings surveys. Collating and providing these data can be time consuming, and often is not particularly beneficial to the countries providing the data. The SC **agreed** that requests for data that come through the NAMMCO Secretariat should be directed to the individual country.

13. FUTURE WORK PLANS

13.1. Scientific Committee

The next meeting will be held in the Faroe Islands in the fall of 2015. The dates will be decided via correspondence.

13.2. Working groups

1) Walrus Working Group

The WWG should convene a one-day meeting in March 2015 to update advice on sustainable takes of walruses in the Baffin Bay stock. If feasible the meeting could be conducted as a teleconference and participants would include Wiig (Chair), Witting, Heide-Jørgensen, Hansen, Lydersen, Acquarone, Ugarte and Stewart.

2) JCNB/NAMMCO Joint Scientific Working Group

The next JWG meeting will be held in March 2015 in Ottawa, Canada. One of the tasks at the start of the meeting is for the Catch Allocation subgroup to complete the model.

The meeting will update the assessment of narwhal and belugas.

3) Large Whale Assessment

A Large Whale Assessment meeting was previously planned for the fall of 2014. This was postponed to the fall of 2015, awaiting work to be completed by the IWC on the fin and minke whale *Implementation Reviews*. The NAMMCO LWAWG will plan on meeting in the fall of 2015 in hopes that the work on the IWC SC will be complete.

4) Disturbance Symposium

Planning for a Disturbance Symposium that will deal with the impacts of human disturbance on narwhal, beluga and walrus is underway. Preliminary plans are to hold the meeting in early October 2015 in Copenhagen. Kit Kovacs has agreed to Chair the meeting and Mads Peter Heide-Jørgensen is the NAMMCO Convenor.

The primary objectives of the Symposium will be to 1) present an overview of the information currently available; and 2) make recommendations for both restrictions of anthropogenic disturbances and future studies. The conclusions will be available to stakeholders shortly after the meeting in the form of a report with specific recommendations. Participants may also be invited to submit papers stemming from the symposium for publication in a special volume of the

NAMMCO Scientific Publications series. Several external experts will need to be invited. A first announcement of the meeting will be sent to prospective participants soon.

The following meetings are planned for early 2016:

5) By-catch WG

With new information available on by-catch, the SC recommended convening a By-catch Working Group. This would be a technical WG that could focus on discussing the methods that are being used to collect the data and extrapolate the results, and decide if further work is required.

Suggested Terms of Reference:

By including external expertise from fisheries and marine mammal science, the WG would

1. Identify all fisheries with potential by-catch of marine mammals
2. Review and evaluate current by-catch estimates for marine mammals in NAMMCO countries.
3. If necessary, provide advice on improved data collection and estimation methods to obtain best estimates of total by-catch over time.

The SC suggested that the By-catch WG could meet just prior to the Coastal Seals WG and recommended that Desportes be appointed convenor.

6) Coastal Seals

A Coastal Seals WG (Chair: Kjell Tormod Nilssen) meeting has been tentatively scheduled for February 2016 to address R-2.4.2 and R-2.5.2.

The Terms of Reference for the meeting will be for the WG to:

1) assess the status of all populations, particularly using new abundance estimate data that are available from Iceland and Norway.

2) address by-catch issues (grey seals) in Norway, Iceland, and the Faroe Islands

3) re-evaluate the Norwegian management plans (which have been already implemented) for grey and harbour seals.

14. BUDGET

14.1. Spending in 2014 [SC/21/08]

Prewitt presented the budget data to the SC members (SC/21/08). Approx. 64,000 NOK of the T-NASS2015 budget was allocated for purchasing and testing equipment. The items prioritized were the drone (for the Faroes survey), inclinometer and Redhen system. The Secretariat requested that bids for purchase be sent in as soon as possible so that the Scientific Secretary can check costs against the budget available. It was noted that if the items were ordered immediately they might be available by the end of the year.

14.2. Budget for 2014/15

A budget for 2015 was prepared and the total is 466,000 NOK, including 200,000 for T-NASS2015.
A preliminary budget was prepared for 2016.

15. ANY OTHER BUSINESS

15.1. Number of SC members at meeting from each country

The SC **recommends** again that ROP should be amended to allow more than three members from each country at the meeting. Each country would still only have one vote.

Proposal by the NAMMCO SC for rewording of the ROP, item II on Membership:

Current wording:

II. Membership

1. Each Member Country shall nominate up to six scientists as members of the Scientific Committee with no more than three members present at any Scientific Committee meeting. The appointment is permanent or until the Member Country nominates new member(s) to the Committee. Each Member Country shall have one vote when procedural or organizational matters are being dealt with.

Revised wording (changes are in **bold**):

II. Membership

1. Each Member Country shall nominate up to six scientists as members of the Scientific Committee, **every one of whom may be** present at any Scientific Committee meeting. The appointment is permanent or until the Member Country nominates new member(s) to the Committee. Each Member Country shall have one vote when procedural or organizational matters are being dealt with.

15.2 Stock Status List Update

Desportes presented the Stock Status List website that will be incorporated into the new NAMMCO website. SC members are asked to provide comments on the website to Desportes or the Scientific Secretary before 15 November 2014 in order to have the site ready by the end of the year.

The website has been designed so that it will be easy to update with new information, and will be updated regularly by the Secretariat. However, SC members are encouraged to send new information and photographs at any time.

The SC was very pleased with the website and **commended** Geneviève Desportes and Daniel Pike for their work.

15.3 NPR format

The format of the NPR was not discussed.

16. MEETING CLOSURE

16.1. Acceptance of report

The report was accepted via correspondence on 26 November 2014.

16.2. Closing remarks.

The SC thanked the Chair and the rapporteur for their efforts. They also thanked Nils Øien and Tore Haug for their help with the lunches and other logistics.

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Appendix 1: Agenda

Paper numbers in [ ]. Grey shading means not available yet.

1. CHAIRMAN'S WELCOME AND OPENING REMARKS
2. ADOPTION OF AGENDA
3. APPOINTMENT OF RAPPORTEUR
4. REVIEW OF AVAILABLE DOCUMENTS AND REPORTS
- **4.1.** National Progress Reports [SC/21/NPR-F, -G, -I, -N, -C, -J, -R]
- **4.2.** Working Group Reports [SC/21/07, SC/21/13]
- **4.3.** Other reports and documents

5. COOPERATION WITH OTHER ORGANISATIONS
- **5.1.** IWC [SC/21/05]
- **5.2.** ASCOBANS [SC/21/06]
- **5.3.** ICES [SC/21/04]
  - **5.3.1.** Request to ICES for NAMMCO to join WG
- **5.4.** JCNB [SC/21/07]
- **5.5.** Other

6. ENVIRONMENTAL / ECOSYSTEM ISSUES
- **6.1.** Marine mammals-fisheries interactions (R- 1.1.2, 1.1.3, 1.1.6, 1.1.7, 1.1.8) [SC/21/O/09]
  - **6.1.1.** By-catch [SC/21/11]
- **6.2.** Multispecies approaches to management (R- 1.2.1, 1.2.2)
- **6.3.** Economic aspects of marine mammal-fisheries interactions (R- 1.4.1, 1.4.2, 1.4.3, 1.4.5, 1.4.6)
- **6.4.** Environmental issues (R-1.5.1); [SC/21/O04]
- **6.5.** Monitoring marine mammal stock levels and trends in stocks / North Atlantic Sightings Surveys (NASS) (R-1.7.11, 1.7.12)
- **6.6.** OTHER (R-1.8.1, 1.8.2)

7. SEALS AND WALRUS STOCKS - STATUS AND ADVICE TO THE COUNCIL
- **7.1.** Harp Seal
  - **7.1.1.** Review of active requests (R-2.1.4, 2.1.6)
  - **7.1.2.** Update
  - **7.1.3.** Future work
- **7.2.** Hooded seal
  - **7.2.1.** Review of active requests (R-2.1.4 {also in 7.1.1}, 2.1.9, 2.1.10, 2.1.11)
  - **7.2.2.** Update
  - **7.2.3.** Future work
- **7.3.** Ringed seal
  - **7.3.1.** Review of active requests (R-2.3.1, 2.3.2)
  - **7.3.2.** Update
  - **7.3.3.** Future work
    - 7.3.3.1. Possible WG
- **7.4.** Grey seal
  - **7.4.1.** Review of active requests (R-2.4.2)
  - **7.4.2.** Update
  - **7.4.3.** Future work
    - 7.4.3.1. Coastal Seals WG
- **7.5.** Harbour seal
  - **7.5.1.** Review of active requests (R-2.5.2)
  - **7.5.2.** Update
    - 7.5.2.1. Presentation from Japan
  - **7.5.3.** Future work
    - 7.5.3.1. Coastal Seals WG
- **7.6.** Bearded seal
  - **7.6.1.** Update
  - **7.6.2.** Future work
- **7.7.** Walrus

7.7.1. Review of active requests (R-2.6.3)
7.7.2. Update
7.7.2.1. Review of recommendations from 2013 Walrus WG [SC/21/10]
7.7.3. Future work
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8. CETACEANS STOCKS - STATUS AND ADVICE TO THE COUNCIL
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8.5. Beluga
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8.5.3. Future work
8.5.3.1. JCNB/NAMMCO JWG meeting- March 2015, Ottawa Canada
8.5.3.2. Global review of Monodontids
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8.6. Narwhal
8.6.1. Review of active requests (R-3.4.9, 3.4.10, 3.4.11, 3.4.12)
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8.7. Bottlenose whale
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8.7.3. Abundance estimate?
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11. DATABASES ON ABUNDANCE AND CATCHES
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12. WORK PROCEDURES IN THE SC
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13. FUTURE WORK PLANS
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15. ANY OTHER BUSINESS
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16. MEETING CLOSURE
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Appendix 2: List of documents

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SC/21/NPR-F	National Progress Report – Faroe Islands	4.1
SC/21/NPR-G	*National Progress Report – Greenland*	*4.1*
SC/21/NPR-I	National Progress Report – Iceland	4.1
SC/21/NPR-N	National Progress Report – Norway	4.1
SC/21/NPR-C	National Progress Report – Canada	4.1
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SC/21/04	Observer's report on activities in ICES	5.3
SC/21/05	*Observer's report: 65th meeting of the IWC Scientific Committee (Walløe)*	5.1
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SC/21/07	Summary of Report of the JCNB/NAMMCO Scientific Working Group on narwhal and beluga – Narwhal catch Allocation Model	4.2, 5.4
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SC/21/11	Gunnlaugsson *et al.* Bycatch Iceland	6.1
SC/21/12	Status of TNASS-07 Papers for publication	6.5.2
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SC/21/14	TNASS Steering Committee- Proposal for TNASS2015 (prepared at 3Feb14 Steering Committee meeting)	6.5

BACKGROUND DOCUMENTS

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SC/21/O/01	CAFF Ringed seal report 2014	7.3
SC/21/O/02	Quintela *et al.* 2014 minke whale population structure	8.4
SC/21/O/03	Hammill *et al.* 2014 Abundance NWA harp seal	7.1.2
SC/21/O/04	Stenson and Hammill 2014 Harp seals poor ice	6.4
SC/21/O/05	Stenson *et al.* 2014 Density dependency reproduction in NWA harp seals	7.1.2
SC/21/O/06	Stenson *et al.* 2014 Pup production NWA harp seal 2012	7.1.2
SC/21/O/07	Rekdal *et al.* 2014 Trends bowhead W Greenland	8.13
SC/21/O/08	Klimova *et al.* 2014 Grey seal population structure	7.4
SC/21/O/09	Nøttestad *et al.* 2014 Killer whales Mackerel	6.1
SC/21/O/10	Blanchet *et al* 2014 Harbour seal movements	7.5.2
SC/21/O/11	Hamilton *et al.* 2014 Harbour seal haul-out	7.5.2
SC/21/O/12	Kovacs *et al* 2014 Walrus survey	7.7.2
SC/21/O/13	Lydersen *et al.* 2014 Glacier fronts	6.4
SC/21/O/14	Reeves *et al* 2014 endemic cetaceans	6.4 and 6.6
SC/21/O/15	Andersen et al. 2014 drift diving hooded seals	7.2
SC/21/O/16	Report of the IWC's Arctic Impacts Workshop	

Appendix 3: List of participants

Geneviève Desportes (F)
GDnatur
Stejlestræde 9, Bregnør
DK-5300 Kerteminde, Denmark
Tel.: +45 65321767
genevieve@gdnatur.dk

Þorvaldur Gunnlaugsson (Chair of SC, I)
Marine Research Institute,
PO Box 1390,
IS-121 Reykjavík, Iceland
Tel. +354 5752081
Mobile +354 8236084
thg@hafro.is

Tore Haug (Vice Chair of SC, N)
Institute of Marine Research
PO Box 6404
N-9294 Tromsø, Norway
Tel. +47 77 60 97 22
Mobile +47 95 28 42 96
tore.haug@imr.no

Mads Peter Heide-Jørgensen (G)
Greenland Institute of Natural Resources
c/o Greenland Representation
Strandgade 91, 3
PO Box 2151
DK-1016 Copenhagen K, Denmark
Tel. +45 32833827
Mobile +4540257943/ +299 550563
mhj@ghsdk.dk

Toshihide Kitakado, PhD. (Obs- J)
Tokyo University of Marine Science and Technology
5-7, Konan 4, Minato-ku, Tokyo
108-8477 Japan
Tel +81-3-5463-0568
kitakado@kaiyodai.ac.jp

Christina Lockyer (General Secretary)
NAMMCO
PO Box 6453
N-9294 Tromsø, Norway
Tel. +47 77 68 73 72
Mobile +47 99 58 54 51
christina@nammco.no

Christian Lydersen (N)
Norwegian Polar Institute
Polar Environmental Centre
N-9296 Tromsø, Norway
Tel. +47 77 75 05 23
Mobile +47 90 93 07 76
lydersen@npolar.no

Bjarni Mikkelsen (F)
Natural History Museum
Fútalág 40
FR-100 Tórshavn, Faroe Islands
Tel. +298 35 23 23
Mobile +298 21 85 80
bjarnim@ngs.fo

Jill Prewitt (Scientific Secretary)
NAMMCO
PO Box 6453
N-9294 Tromsø, Norway
Tel. +47 77 68 73 73
Mobile +47 95 48 73 48
jill.prewitt@nammco.no

Aqqalu Rosing-Asvid (G)
Greenland Institute of Natural Resources
PO Box 570,
DK-3900 Nuuk, Greenland
Tel. +299 361247
aqro@natur.gl

Gísli Víkingsson (I)
Marine Research Institute
PO Box 1390
IS-121 Reykjavik, Iceland
Tel. +354 57 52 080
Mobile +354 69 90 475
gisli@hafro.is

Charlotte Winsnes (Deputy Secretary)
NAMMCO
PO Box 6453
N-9294 Tromsø, Norway
Tel. +47 77 68 73 71
Mobile +47 91 54 64 30
charlotte@nammco.no

Lars Walløe (N)
University of Oslo
P.O. Box 1103
Blindern, NO-0317 Oslo
Tel. +47 22 85 12 18
lars.walloe@medisin.uio.no

Lars Witting (G)

Greenland Institute of Natural Resources
PO Box 570,
DK-3900 Nuuk, Greenland
Tel. +299 361202
larwi@natur.gl

Vladimir Zabavnikov (Obs- RUS)
PINRO
6 Knipovitch Street
Murmansk 183763, Russian Federation
Tel. +7 8152 472572
Mobile +7 921 5130781
ltei@pinro.ru

Nils Øien (N)
Institute of Marine Research
PO Box 1870
Nordnes 5817 Bergen
Norway
Tel. +47 55 23 86 11
nils.oien@imr.no

Appendix 4: Observer's reports

Agenda Item 5.1: IWC Observer's Report

Report of the work in the IWC Scientific Committee,
Bled, Slovenia
9-24th May 2014

The Norwegian delegation to the 65th IWC Scientific Committee (SC) meeting was led by Prof. Lars Walløe, who coordinated the report to the NAMMCO SC with help from Arne Bjørge, Tore Haug, Hans Skaug, Hiroko Solvang and Nils Øien. The report is structured so that it follows the SC agenda by topic. The report here reflects work of the sub-committees and also the SC plenary and provides items of both general interest and also of direct relevance for NAMMCO.

The meeting opened with a decision as to whether or not the JARPA II (Japan's Special Permit Programme in the Antarctic) should be discussed. The IWC Commission Chair requested the SC to evaluate the programme but Australia, United Kingdom and some other European and Latin American countries declined in the light of the International Court of Justice (ICJ) ruling in the Hague.

Catch Limit Algorithm (CLA) revision
In 2004 Norway proposed a change in the "tuning mechanism" of the CLA, and in addition that the MSYR should refer to the whole population (excluding young of the year). Reconsiderations in 2006, 2007 and 2013 permitted approval of this last change. However, before a decision could be made by the IWC SC on change in the tuning mechanism a few more trial simulations must be addressed, and these will be undertaken by the IWC Secretariat before the IWC SC meeting in 2015.

Revised Management Procedure (RMP) – implementation
Regarding the North Pacific minke whales and North Atlantic fin whales, there will be reviews in 2015.

For the North Atlantic common minke whales, there was a pre-meeting (Working Group - WG) in Copenhagen, chaired by Greg Donovan (IWC Secretariat) in April 2014 when population structure was discussed using new genetic data from 2004 and 2007 – 2011. The data now indicate only one population across the whole of the North Atlantic, but there is the possibility of adopting several population situations in the simulation implementation trials. Simulations are the core of the implementation procedure. Three populations are up for consideration, but for Norway and Iceland, if 3 "medium areas" are assumed, the number of management "small areas" will be reduced.

From surveys of common minke whales in the period 2008-2013, a population size of 94,000 has been estimated compared with 108,000 from an earlier period. This decrease is due to fewer whales in the Jan Mayen (Central stock) area while the population in the eastern area has not changed during the previous 6 yr. This new estimate can be used in the simulation trials. The Norwegian scientists explained that the existing method is robust, but the WG wanted to see a comparison between old and new methods. Data from the previous survey period 1996-2001 used before the 2005 meeting, should also be used along with that from the 2008-2013 survey period.

Walløe – the leader of the steering group – will work inter-sessionally on the Implementation Review and also hold a meeting. During the actual IWC SC meeting, it was proposed to change the simulation programme to be used in the simulation trials and use a light version of RMP03. The plan is to finalise the Implementation review in the next IWC SC meeting (2015).

By-catch
During an IWC workshop on Euthanasia, it was discussed and recommended that for large stranded whales, the most humane killing method was the use of the penthrite grenade using a darting gun. The IWC SC supported this recommendation.

AIS – Automated Identification System

AIS is used for larger vessels in all areas of high traffic. Along the US east coast, where humpback and right whales abound, regulation of ship traffic and speed reduction will minimise ship strikes. It has been observed that off Maui that with an increase in ship speed from 5 – 20 knots greatly increases the risk of ship strikes.

AWMP – Aboriginal Whaling Management Plan
Off Greenland, bowhead and humpback whales catches were of concern. In West Greenland, the strike limit of 2 bowheads was deemed sustainable for the population (as previously), and an annual strike of 10 humpback whales. For other species, a strike limit of 19 for fin whales was accepted and for common minke whales there was a strike limit of 164. In East Greenland, the strike limit for common minke whales was 12.

Environment
Focus was on the North Atlantic in the IWC SOCER report (an E mail-group). Here discussion was on contaminants, disease, mass strandings, the effects of noise and marine debris, and climate change.

On the east coast US, between July 2013 and April 2014, there had been outbreaks of DMV (dolphin morbillivirus); also in the Mediterranean. *Brucella* virus had also been reported in porpoises, common and striped dolphins off the US. There was a proposal for establishing a website where data and material on strandings, by-catch and catch – both at national and international levels – could be displayed and shared so that efforts to increase knowledge of the circumstances that favour epizootic outbreaks would help to monitor and understand the ecosystem.

Regarding noise, it was noted that military sonar problems in the Mediterranean and seismic disturbance continue to be a problem both at the level of causing physical damage to whales but also in causing behavioural changes.

Plans for an Arctic impact workshop remain unclear. Species in focus are beluga, narwhal and right whales, which may be affected by ice cover, ship traffic and human activities in the region. Reduced ice cover will expose whales to predators and also to competition with more southerly species that may ingress northwards as climate warms. The relatively slow-swimming right whales are especially vulnerable to high ship speed, particularly in calving areas.

Marine debris present an ongoing problem for whales which may consume plastic, leading ultimately to death. Presently, efforts are being made to chart marine debris, by type – consumable or of a type causing entrapment – and mitigation methods.

Ecosystem modelling
The IWC is seeking collaboration with CCAMLR in 2016 for a joint meeting. Here there was criticism for the JARPA II programme in connection with reported significant reductions in minke whale body condition (blubber thickness and fat content) during the JARPA period; also, for recent analyses of the decline in stomach fill. A full discussion of these matters was hindered by the non-participation of scientists from Australia and the United Kingdom (see earlier objections under the ICJ ruling).

Small Cetaceans
Here a variety of reports were received worldwide. Of concern was the reported live capture of belugas in the Okhotsk Sea where in 2013, there had been removals of 81 live individuals plus another 42 that perished during capture. The actual sustainable quota for the local population should not exceed 42 strikes annually.

Whale Watching
There is a growing development of ecotourism worldwide with an explosion of tour operators and boats which are often very fast, while restrictions and regulations regarding how close they may approach whales are often lacking. In addition, *swim with cetaceans* programmes are increasingly popular. There is a requirement for clear guidelines to regulate whale watching and contact, and also to monitor whale behaviour in relation to such activities.

DNA testing
In relation to the GenBank where there is a registry for catch and by-catch genetic data, Norway reported updating its registry for common minke whales.

Research Catches / Take
The conclusions from the JARPA II Antarctic research programme were that much investment had been placed on fieldwork, laboratory analyses and report writing but it was underlined that there should be an increased effort on data analyses. There were a series of recommendations from the review panel chaired by D. Palka (US).

After this review, Japan has stated that it will not proceed with JARPA II in the light of the ICJ ruling in the Hague, but will develop a new research programme that meets the requirements of the ICJ ruling. This new programme will be evaluated by an expert panel in the course of the first inter-sessional period and be discussed by the IWC SC next year (2015).

Agenda Item 5.2: ASCOBANS Observer's Report

Observer report from the 21th ASCOBANS Advisory Committee meeting
Gothenburg, Sweden, 29 September – 1 October 2014

NAMMCO was not represented at the meeting, but Desportes, who attended the meeting as Coordinator of the Conservation Plan for Harbour Porpoises in the North Sea, agreed to produce a summary of discussion items of specific interest and relevance to NAMMCO.

As usual, the ASCOBANS Advisory Committee (AC) meeting was organized in two sessions: a scientific session and an institutional session.

In the scientific session a number of reports were presented and discussed that emanated from various working groups appointed under ASCOBANS. Three of these focused on harbour porpoise conservation at a regional level in the remit of three regional Action Plans covering the Baltic, the Western Baltic, Belt Sea and Kattegat, and North Sea. Other working groups deal more generally with Threats to Small Cetaceans (By-catch, Underwater Noise, Negative Effects of Vessels and Other Forms of Disturbance, Pollution and its Effects, Marine Debris). Emerging issues are Climate Change, Renewable Energy and Migratory Species, Conservation Implications of Cetacean Culture, Boat-based Wildlife Watching, Live Captures of Cetaceans and Management of Marine Protected Areas within the EU Natura 2000 network. There is also a Large Cetaceans WG and Extension Area WG.

Of particular interest to NAMMCO, is the implementation work carried out within the framework of the Conservation Plan for Harbour Porpoises in the North Sea under the leadership of the North Sea Group (NSG). Norway is, as range state, represented in the North Sea Group. Data on by-catch rate in Norwegian fisheries operating in the North Sea are, indeed, necessary to the full assessment of the impact of by-catch on the North Sea harbour porpoise population.

Conclusions of the NSG were that monitoring of marine mammal by-catch in the North Sea remains inadequate. Proper data were still lacking for a reliable impact assessment, because of inadequate and unsufficient monitoring of the various net fisheries. The data at hand indicate, however, that by-catch rates in some fisheries may be above any proposed reference limits, although uncertainty is large. Better quality data on by-catch rates and fishing effort for net fisheries was required from EU Member Countries before this assessment could be refined and conclusions drawn as to the overall by-catch of harbour porpoise in the North Sea. Other approaches that could be appropriate for assessing the impact of by-catch should continue to be explored further such as taking a risk-based approach.

New information on matters relevant for small cetacean conservation was received from various sources. Several points concerned the Faroes catch of pilot whales. The ASCOBANS Secretariat requested further guidance from the AC regarding contacts with the Faroese authorities concerning the taking of cetaceans. The UK Ambassador to Denmark had recently visited the Faroe Islands and had asked for information about the sustainability of the hunt. The Netherlands informed that the Dutch government opposed the hunts as they were currently being conducted and consideration was being given to broadening the remit of the IWC to cover small cetaceans. It would contact Denmark and the Faroes for expressing its view that the killing of small cetaceans was not acceptable. M. Simmonds (Humane Society International) suggested that ASCOBANS should maintain contact with the Faroese authorities and seek information about the hunts and the utilization

of the meat, pointing out that dolphins as well as pilot whales were taken. Germany noticed that at least some of the Faroese cetacean populations were shared with ASCOBANS.

Two actions points related to the Faroese catch were adopted

- The Secretariat would contact the Faroese Authorities with a request to provide information on recent hunts, in particular details regarding the species affected by the hunt, how sustainability is assessed, what regulations and management are in place, and how the catches are utilized.
- Parties should ask the EU Presidency to write along similar lines to the Faroese Authorities, raising concerns that some of the populations affected extend into European waters.

Of potential administrative interest, mention was made of cooperation with ACCOBAMS, CMS, OSPAR, HELCOM, EU institutions and other stakeholders. A collation of meeting dates of relevance to ASCOBANS in the coming calendar year and appointment of observers was agreed.

The Netherlands offered to host the 22nd Meeting of the Advisory Committee and associated meetings, probably in the week beginning 28 September 2015.

Agenda Item 5.3: ICES Observer's Report

REPORT FROM THE 2013 and 2014 ACTIVITIES IN ICES

Tore Haug
Institute of Marine Research, Tromsø, Norway

ICES WGMME

The ICES Working Group on Marine Mammal Ecology (WGMME) met in Paris, France from 4–7 February 2013.

- In 2009, ICES requested that WGMME "Develop a framework for surveillance and monitoring of marine mammals applicable to the ICES area that is realistically achievable by contracting parties". This remained a term of the Terms of Reference (ToR) for the WG in 2010 and development of this work into a Cooperative Research report (CRR) was approved by ICES in 2011. Subsequently, due to continued slow progress during 2012, the decision was taken, in consultation with ICES, to withdraw the proposed CRR until such time as progress justified submission of a new proposal. During the meeting it was decided to refocus the report on the monitoring requirements for the common indicators identified by ICG-COBAM which could potentially contribute to OSPAR Joint Assessment and Monitoring Programme (JAMP) for biodiversity monitoring.
- Requests from the European Commission and OSPAR on the development of indicators and targets for determining Good Environmental Status (GES) under the marine Strategy Framework Directive (MSFD) and building on work undertaken in 2012, management units were further reviewed and delineated for cetaceans. Boundaries were specified so that the management units can be populated with abundance and by-catch estimates. As previously agreed, these boundaries coincide with ICES Area/Division boundaries where possible. It was not possible to provide a similar consideration of seal management units. Linked with this, further consideration was given to ICG-COBAM's common indicators for marine mammals. The proposals were accepted in principal but some changes will be required to make them operational.
- Current monitoring efforts to determine the distribution and habitat use of marine mammals, in relation to environmental impact assessments, e.g. for marine renewable energy developments, typically take place at much smaller spatial scales than are ecologically relevant to marine mammals, and are often undertaken independently without broader coordination. This results in numerous disparate datasets that are difficult to integrate when assessing overall impacts of marine renewable energy developments. Case studies were provided for Germany, The Netherlands, Belgium, and UK. A need for strategic decision-making in the early stages was identified. In the initial monitoring design stages, regulators and developers must develop clear, achievable monitoring objectives, and design realistic ways to achieve them, so that robust scientific data with sufficient statistical power can be gathered given available resources. There is also a critical need to improve integration of data collection efforts

throughout the lifetime of a project, thereby ensuring that data gathered during pre-consenting *site characterization* stages can act as the "before" dataset for later studies of *magnitude of impact*. This requires that BACI / BAGI or other suitable approaches be adequately considered and evaluated with respect to statistical power at, or near, the outset of site characterization data gathering. Too often, monitoring programs in adjacent marine renewable energy developments occur independently without broader coordination. Regulators and seabed owners need to acknowledge the need for data pooling, require it as an integral part for marine renewable consenting and develop internationally standardized comparable data formats for easy access and analysis. The Joint Cetacean Protocol (JCP) may serve as such an example.

In 2014 the WGMME met at Woods Hole, Massachusetts, USA from 10–13 March. A satellite meeting was held in Oban, Scotland, UK simultaneously (from 11-13 March), and during plenary, the two meetings were linked through video skype. Eight ToRs were address, two of which were special requests from OSPAR.

- The first reviewed new information on population sizes and population/stock structure for marine mammals in European waters.
- The second reviewed similar information as well as work on the incidental capture of marine mammals in the western North Atlantic (the latter specifically covering North Atlantic right whale, harbour porpoise and white-sided dolphin).
- The third ToR reviewed the further development of the By-catch Limit Algorithm framework for determining safe bycatch limits and included a comparison with approaches used to assess bycatch in USA.
- The fourth ToR, to review the applicability of the Joint Cetacean Protocol (JCP) for European reporting requirements such as MSFD and the Habitats Directive, could not be fully addressed due to continuing delays in the publication of the JCP.
- The fifth ToR reviewed the development of database for seals and its potential contribution to the operationalization of MSFD indicators.
- The sixth ToR reviewed approaches to marine mammal survey design used during pre-consent data gathering and post-consent monitoring in the offshore marine renewables (wind, wave, tide) industry.
- The seventh and eighth ToRs addressed two special requests from OSPAR. The first on interactions between aquaculture and marine mammals, including the identification of the pressures and impacts which have sufficient documentation to necessitate the implement of relevant monitoring, and to outline examples of effective management and mitigation solutions. The second special request was for the provision of technical and scientific advice on options for ways of setting targets for the OSPAR common MSFD indicators for marine mammals and to provide examples of the application of these options. The advice also considered target setting options, the consequences that these may have for the monitoring programme (including spatial and temporal implications) and also the precision necessary in target setting and monitoring.

Building on earlier requests from the European Commission and OSPAR on the development of indicators and targets for determining Good Environmental Status (GES) and work undertaken in 2012 and 2013, management units were further re-viewed and delineated for cetaceans and seals. Boundaries were specified so that the management units can be populated with abundance and by-catch estimates, where appropriate. As previously agreed, these boundaries coincide with ICES Area/Division boundaries and/or OSPAR boundaries where possible. Much of the current surveillance and monitoring of marine mammals in Europe will potentially contribute to MSFD monitoring programmes/indicator assessments. However, to be successful, monitoring programmes require clearly defined objectives, good design (based on power analysis) and well-articulated reference points/targets and indicators. In addition, there should be a well-defined mechanism to translate results into management actions to meet and policy objectives and a feedback mechanism to evaluate the success of the process. Targets need to be set in relation to reference levels and conservation objectives, while recognising the limits of statistical power to detect change based on logistically feasible monitoring.

ICES WGBYC

The ICES Working Group on By-catch of Protected Species (WGBYC) met in Copenhagen at ICES Headquarter from 4-9 February 2013. Since the group started as Study Group on Bycatch of Protected Species (SGBYC) in 2008 the broad aim of the meeting is to collate and review recent information on the by-catch of

protected species, especially under the requirements of European Commission (EC) Regulation 812/2004, to coordinate by-catch monitoring and by-catch mitigation trials and to disseminate and review information on methodologies associated with these topics. The group recently refocused the aim to work on the incorporation of monitoring requirements into the new Data Collection Framework (DCF) since the EC decided not to amend EU Regulation 812/2004 and to implement monitoring tasks for protected and endangered species in the future in the DCMAP by close cooperation with ICES expert groups (Planning Group on Commercial Catch, Discards and Biological Sampling/ Study Group on Practical Implementation of Discard Sampling Plans; PGCCDBS/SGPIDS and Regional Coordination Meetings (RCMs). This objective is consistent with a move to a wider ecosystem based approach to fisheries monitoring to include by-catch of cetaceans, seals, birds, turtles and non-target fish species.

Abundances of cetaceans, DCF catch and discards monitoring, and monitoring effort under the current Regulation 812/2004 were put together in a database to facilitate an overview of current gaps and overlap in monitoring. Furthermore, WGBYC reviewed and commented on EU Member States' reports under council Regulation 812/2004 to assess the status of information on recent by-catch estimates and evaluate the extent of the implementation of by-catch mitigation measures. It was noted that estimates are still very patchy, and several EU member states have not fulfilled their monitoring obligations. By-catch monitoring remains less than optimally directed in many cases. Observer effort may not be representative of fleet effort and any extrapolated numbers derived solely in this report are uncertain and should be treated with caution.

WGBYC reviewed recent by-catch mitigation trials, including trials of gillnet modifications and experiments that attempt to quantify the effect of "pingers" on porpoise displacement. Similar to previous assessments, implementation of by-catch mitigation measures was also found to be patchy, with few EU member states able to provide unequivocal confirmation that the obligations under Regulation 812/2004 for "pinger" deployment are being met. WGBYC continued to develop a streamlined and effective database for the collation, storage and analysis of European by-catch monitoring and fishing effort data for those fishing sectors where by-catch monitoring is mandated under Regulations 812/2004.

In 2014 WGBYC met in Copenhagen at ICES headquarters between 4-7 February. One significant aim of WGBYC continues to be the collation and review of recent annual information on the by-catch of protected species under the requirements of EC Regulation 812/2004. This is in addition to the continued coordination of by-catch monitoring and mitigation trial data, and the review and dissemination of information on methodologies associated with these broad topics.

As WGBYC continues to compile and assess data from Member State reports under Regulation 812/2004 and/or from the DCF, information available to identify fisheries with incidental catches of cetaceans and where further mitigation measures are needed is currently still limited. Furthermore, it does not necessarily allow any accurate or precise assessment of the impact of incidental catch on most cetacean populations. However, there are some data that have proven useful for a preliminary evaluation of the potential impact fisheries by-catch may be having on certain cetacean and protected fish populations. In addition, changes to the design of the DCF are expected to be adopted in 2015. Changes will stipulate minimum requirements for monitoring of target and non-target species (including protected species) with greater plasticity at the regional level for tailoring monitoring to meet the needs of Member States, national and wider European obligations. The extent to which these new developments will impact future quantity and quality of data available to WGBYC for evaluating levels of by-catch for various protected species is unknown.

A preliminary evaluation of estimated by-catch rates for North Sea Harbour Porpoise was conducted where expected by-catch rates were compared to four different thresholds to evaluate possible risk to this management unit. Without any measure of uncertainty, preliminary results of the by-catch risk approach (BRA) show that North Sea Harbour Porpoise may be near or above sustainable removal levels. WGBYC is still awaiting guidance from the EC on setting target removal levels for protected species so impacts from fisheries interactions can be fully evaluated. WGBYC agreed to continue with the BRA focusing on how to incorporate uncertainty into the assessment where possible.

ICES WGHARP

The ICES Working Group on Harp and Hooded Seals (WGHARP) met during 26-30 August 2013 at the

Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO) in Murmansk, Russia, to consider recent research and to assess the status and harvest potential of harp seal stocks in the Greenland Sea and White Sea/Barents Sea and of the hooded seal stocks in the Greenland Sea. The basis for the advice was a request from Norway in September 2012. The WG received presentations related to catch (mortality) estimates, abundance estimates, and biological parameters of all the stocks in question. Additionally, the WG received and reviewed information on the Northwest Atlantic harp seal stock.

ICES ASC

The 2013 ICES Annual Science Conference (ASC) was held in Reykjavik, Iceland, 23-27 September 2013. The conference included no particular theme session devoted entirely to marine mammals. Nevertheless, some sessions were designed with marine mammals included as an integral part - relevant sessions were: "Responses of living marine resources to climate change and variability: learning from the past and projecting the future", "Marine spatial planning: The multidisciplinary approach", "Identifying mechanisms linking physical climate and ecosystem change: Observed indices, hypothesized processes, and "data dreams" for the future" and "Advances in studying spatial distribution".

In 2014, the ASC was held in A Coruña, Spain, 15-19 September. This conference included relevant titles such as: "The science and tools for the management of networks of Marine Protected Areas", "One size does not fit all – what does an integrated ecosystem assessment mean to YOU?", "Fish tales from the past: Using sub-fossil, fossil, and prehistoric structures to describe past marine populations and oceans" and "Arctic biodiversity under climate change and other stressors". One session, theme session J ("Climate change: Back to the future for marine predators"), was particularly devoted to top predators including mammals.

Session J had been suggested by the ICES Working Group on Harp and Hooded Seals (WGHARP) who had made observations of possible effects of climate change on the populations of harp and hooded seals in the North Atlantic. In recent years we have seen expert reviews from the Intergovernmental Panel on Climate Change (IPCC) showing that climate change will induce temperature changes and associated adjustments in ocean circulation, ice coverage and sea level. Such changes will affect life-history parameters of marine top predators (mammals, birds, large pelagic fish) via changes in habitat features, e.g., ice cover and availability of food resources (bottom–up effects), or will alter the role that predators play in marine ecosystems (top-down effects). Theme session J intended to focus on presentations that show how environmental change has affected life-history strategies among large marine predators in the past, or how environmental change may affect the role that these species play as top-level predators in marine ecosystems in the future. The session included 13 oral presentations and one poster.

One of the mammal studies, involving grey and harp seals, showed how predation on commercial, well-monitored fish species may be radically influenced by alterations in abundance of other important forage and non-commercial fishes where information about abundance may be sparse. Such changes may particularly impact predator condition, with potential implications for changes in life history and population dynamics. It is generally assumed that change in forage fish distribution will trigger change in predator distribution. Results from joint Norwegian-Russian ecosystem surveys confirms this in that both forage fishes and several whale species tend to be distributed further north in the Barents Sea now compared to only a few years ago. The ecosystem surveys and other surveys with combined marine mammal observations and resource mapping using acoustics and trawls have facilitated more sophisticated understanding of associations between prey and predators. Thus, in the Norwegian Sea killer whales have been observed to be closely associated with the now very abundant mackerel in the area. Baleen whales, such as fin and humpback whales which were previously associated with krill and pelagic fish species, now appear to be associated with high and dense concentrations of juvenile cod and haddock. As in the Barents Sea, also cetaceans in the Norwegian Sea appear to be distributed further to the north now than a decade ago, probably as a result of changes in zooplankton concentrations and more northerly distribution of relevant forage fishes.

Seal species dependent on sea ice for reproduction would be expected to be particularly sensitive to climatic change. One study of harp seals in Canada demonstrated that in addition to direct mortality of pups, due to unseasonal break-up of sea ice, fecundity has also been reduced by an increasing frequency of late-term abortions. Abortion frequency again was linked to both capelin abundance and the amount of first-year ice,

but it was suggested that ice cover in this context acted as a proxy for prey availability. For another ice-associated species, the hooded seal, population size in the Greenland Sea has been reduced to a small fraction of historical levels due to past unsustainable harvest. This would be expected to lead to improved fecundity due to release from density dependence, but no decline has been observed in the age of primiparity. This lack of improvement could be due to deteriorating feeding conditions in the area.

More information is available at the ICES website www.ices.dk

Agenda Item 5.4: Canada/Greenland Joint Commission on Conservation and Management of Narwhal and Beluga (JCNB)

The Catch Allocation Sub-Group of the NAMMCO-Joint Commission on Narwhal and Beluga met in Copenhagen on 10–12 March 2014 with the main purpose of developing an allocation model that will provide a mechanism for assigning harvested animals (narwhals) to summer stocks. A summary of the report describing the preliminary model is discussed in Agenda Item 8.6.2 and provided in Annex 1. The Catch Allocation Sub-Group will meet to finalise the model in March 2015, with the full Scientific Working Group meeting directly afterwards.

ANNEX 1: Report of the T-NASS2015 joint technical, planning, and steering Meeting

Copenhagen, DK, 1-3 Oct 2014

1. WELCOME AND CONVENOR'S REMARKS

Prewitt informed the group of a few logistical matters. Chair Gunnlaugsson welcomed the group (Appendix 2).

2. ADOPTION

The agenda was adopted (Appendix 1). Documents provided are in Appendix 3.

3. RAPPORTEURS

Prewitt was appointed as the rapporteur, with help from participants as needed.

4. SUMMARIES BY JURISDICTION

4.1 Iceland

The proposed budget included ¾ of the amount originally included in the T-NASS2015 proposal. This reduction applies to both the National and Extension surveys.

4.2 Faroe Islands

The Fishery Ministry has put 1.6 mil DKK for a ship based survey (one vessel and 8 observers) in the proposed budget for 2015. The proposed budget also included an additional 1 mill DKK for extension. The budget was presented 1 October 2014, and the decision will come probably by December.

4.3 Greenland

Greenland has applied for the funding for their National surveys through the Greenland Institute of Natural Resources and about 900 thousand DKK has been included in the Greenland Government budget for 2015. The budget is expected to be approved before the end of 2014.

4.4 Norway

The situation in Norway is similar to Greenland, National surveys through the institute and then extension survey outside of the institute. The national survey would cover the EW *Small Area* (IWC terminology) which includes the Norwegian Sea from the coastline to 3°E in the northern part and around Faroe Islands in the south. The WG awaits confirmation that the Extension (Jan Mayen) was included in the proposed budget (outside of the IMR).

Other Areas:

EU/UK

The proposal for SCANS-III to survey all European Atlantic waters (shelf and offshore) in July 2016 will be submitted to the EU LIFE Nature programme on 16 October 2014. A decision is expected in early 2015.

Canada

The next Canadian cetacean surveys will likely occur in 2017.

USA

The US is planning a full-scale cetacean survey in 2016. A few aerial surveys may be done in 2015, but likely not during summer.

T-NASS2015 Summary

With the current status of plans and funds, there could be a gap in coverage between Iceland and Greenland which is a very important area for obtaining distribution patterns and abundance estimates for common minke whales. A primary objective for T-NASS2015 is to obtain complete abundance estimates for common minke whales in the central area of the North Atlantic.

The WG agreed that it might need to have options in place in the case that funding does not come through.

> *Plan A*: If Norway gets Jan Mayen funding, then T-NASS2015 should focus on common minke whales covering the central areas.
>
> *Plan B*: If Norway does not get Jan Mayen funding, Iceland will focus more on fin whale survey effort (surveying further south which will leave central areas uncovered). It may also be chosen to re-schedule the aerial survey of East Greenland to expand the covered area in West Greenland instead. The Faroes may also consider conducting their survey in 2016, together with the SCANS III survey (if funding is approved).

The group pointed out that if Plan B applies, the 2nd of the three objectives for T-NASS2015 concerning minke whale abundance, is no longer possible to achieve.

5. VESSEL-BASED SURVEYS

5.1 Vessels and timing

In Iceland the plan is to use 2 or three survey vessels: one would also be doing a mackerel survey in July and beginning of August with sufficient room for double platform observers. The mackerel survey vessel would survey cetaceans only during steaming and cover the Icelandic economic zone including roughly 1/3 of the Jan Mayen extension survey area. The survey in 2015 is being planned to better cover the north part of the economic zone than in 2014 and will also partly cover the area off East Greenland. Depending on special funding Norway will survey the remaining part of the Jan Mayen area. It is not clear yet to what extent the mackerel survey will cover the East Greenland area. It is unlikely that there will be an Icelandic participation in a redfish survey. There is interest in using the other Icelandic research vessel, which would otherwise be out of function, but is good for whale surveys and would be used probably towards the south.

Timing

The Faroese survey may be delayed for about 2 weeks.

Norway will survey the "EW" area, during the same time period (i.e. July) as in previous surveys such as the TNASS-2007.

5.1.1 Platforms of opportunity

Other national mackerel survey vessels will unlikely have space for double platform observers, but dedicated cetacean effort on these vessels would be valuable for distribution outside the NASS survey area and to detect shifts in distribution. The group also stressed the importance of dedicated cetacean effort on redfish survey vessels for this purpose. It could also be helpful to have marine mammal observers on the redfish surveys from other nations.

For the Faroese mackerel survey, if the Faroese research vessel is the only vessel, there is no space for marine mammal observers. Last year one of the commercial vessels was chartered for doing part of the mapping survey, which will have room for a full set of observers. It is unclear at this stage if the commercial vessel will participate in the survey in 2015, but if it does, it would give the opportunity to have marine mammal observers on that vessel.

The Ecosystem Surveys in Norway did not have dedicated marine mammal observers on this year. It would be helpful if there were dedicated observers on future Ecosystem Surveys.

Nils will send this report to the Ecosystems group and point out the recommendation. Gunnlaugsson will send the report to the ICES Redfish survey group and the separate mackerel group (ICES) WGINOR.

5.2 Survey design

5.2.1 Stratification

Survey stratification will depend on whether Plan A or B must occur (whether Jan Mayen is funded or not). For ship-based surveys the WG further discussed whether one should consider using the same tracklines (which makes trend analysis more intuitive), or different tracklines (which is preferred for design based survey abundance estimates). Previous NAMMCO recommendations have emphasised that stratification should be made in a way which makes trend analysis feasible.

For aerial surveys it may be more practical and efficient to follow an entirely systematic design in which case trackline designed in the past are likely to be repeated in 2015.

5.2.2 Effort allocation

It is critical to know whether Jan Mayen is funded or not in deciding on effort allocation. The group stressed that the area around Jan Mayen is very important if common minke whales are a primary objective. Without this area the survey is not a complete, synoptic one and misses key areas.

Last year the funding for the regular Norwegian surveys was given on 8th January. The 2015 governmental budget will be put forward on 8 October 2014. The NAMMCO Secretariat will contact Ole David Stenseth for updates on whether the Extension survey was included in the proposed budget.

If/then scenarios: If Jan Mayen is not covered, then shift the available funds towards the pilot whale and fin whale surveys and an abundance estimate for common minke whales in the central part of the North Atlantic may be difficult to obtain (Plan B).

5.2.3 Transects

Past surveys have used the tracks given by Distance.

Norwegian surveys use new sets of transects in each survey.

5.3 Field methodology

The group discussed whether Iceland should use the Norwegian method.

A problem last time in the Icelandic surveys was that there was little overlap of the primary minke whale sightings close to the vessel and the tracker sightings far from the track, with few duplicates.

Hammond pointed out that the tracker method is generally used to account for responsive movement. This has not been identified as a significant problem with the primary species in the T-NASS2015 survey (common minke whales, pilot whales and fin whales). Palka stated that their surveys use IO method. They investigate responsive movement using post-stratifying the data for far and near sightings (see Palka and Hammond 2001). In order to post-stratify in this way, searching must be done using high-powered binoculars to get sightings at greater distances.

Perhaps best method for Iceland is a 2 independent observer platform configuration. Some pros are that data collection is easier, and does not need communication between the observers (which requires more equipment and has the potential of parts not working). Duplicates could be identified afterwards during post processing, or have someone identifying duplicates in the field (although this would require using a third platform for the duplicate identifier). Norway uses automatic duplicate identifying afterwards (for common minke whales, based on tracking histories). Palka uses computer assisted duplicate identification using predictions of where whale would be during the second sighting. Norway records surfacings, Palka uses sightings.

For distance estimation, Norwegian surveys use naked eye estimation, and use training and experimentation to verify distances. Icelandic observers are generally not as experienced as minke observers, and it would probably be better to use binoculars with reticules to get distances.

Palka is doing multiple species surveys, using an IO mode configuration, and this method would probably work well for Icelandic surveys for both minke and fins. Palka prefers using high powered binoculars, which

allow for more opportunities to identify species further off and post stratifying data for far and near sightings for looking at responsive movements. The surveys use 2 IO teams, and are not focusing on individual species.

Norwegian method is not great for fin whales due to difficulty with species identification and because searching is done with the naked eye, focussed close to the vessel. They are trying to fix this by giving the task of identifying species for distant sightings to the scientists in the bridge. The main observers are focussed mainly on searching for minkes and spending their time tracking.

The group recommends that Iceland should use a method that is more applicable to multi-species surveys than the Norwegian method. Recommendation is to **use IO, double platform method.** Use of big-eye binoculars is not planned, but use regular power binoculars during searching (as in the last survey) and some use of medium powered binoculars should be considered, in particular for species ID.

Icelandic surveys may close in on pilot whale groups, and large baleen whales for species ID, however closing in should not occur in areas of high density of minkes and fins. Icelandic surveys will not use cues as sighting units for large whales, but will still try to get resightings of surfacings. Iceland will consult with Palka on specifics of logistics in the field and her field protocols.

For surveys in the Faroes, they will use the IO method, and use whales or groups instead of surfacings.

5.3.1 Searching strategies - platforms, binoculars

Both Iceland and the Faroes will use the double-platform, IO method.

Palka's surveys have 2 observers using big eyes, and no cameras. Another observer is a recorder that is searching through naked eye (peripheral vision). They use 2 independent teams, and are not using tracker method. The WG discussed whether cameras would be helpful in this type of situation, or if it is a lot of extra effort for not much gain. The group discussed the system developed by Leaper, which included video measurement of distance triggered by a sighting button. This system worked fairly well while the equipment was working and then distances were obtained for approximately 50% of sightings. There was also a minicam attached to binoculars pointing at lines on the deck that was triggered by a sighting button which worked very well (measured angles for 90+% of sightings).

5.3.2 Drones and Kites

5.3.2.1 *Group size*

Drones

The plan would be to use a quad copter drone which allows for track design in real time, collection of video, and post analysis. Video could be used as a verification of angle and distance measurements, and group size estimation. The drone would be deployed when a large group is encountered. This would likely require that the ship stop, perform delayed closing, and observers off-effort, while the drone is deployed to obtain group size. A decision must be made how much time would be devoted to delayed closing/drone deployment.

A primary question is, if group size estimates are obtained, how are these data used in the analysis? In addition, if independent average group sizes are obtained separately from the survey, perhaps they can be both spatially and temporally be applied to the survey data? The group agreed that it may not be acceptable to extrapolate group size from one area to another, but it could be possible to develop a correction factor to be applied to group size estimations from the survey. The WG agreed that if the drone can take video of individual subgroups, this would help get better group size estimates, however it should not be used to get an average group size estimate.

Palka informed the group that during their surveys, when they encounter lots of small groups of pilot whales moving in different directions— "super schools"— the recorder keeps track of where all the little groups are as they go by. They do not stop because this often makes it more difficult to keep track of the small groups. Perhaps drone or helikite could see how the groups are moving around better.

If the Faroes decides not to use drones or helikites, the default would be to handle the situation in the same way as Palka and NASS have done in the past, with keeping track of small groups.

Other idea is to handle the data in a similar way that Heide-Jørgensen did with humpbacks during an aerial survey in Greenland. They treated the larger group in a separate strip transect estimation, then added it later to the line transect survey. Perhaps a similar analysis could be performed with pilot whale super groups.

Helikites

Helikites (e.g., www.allsopp.co.uk) are helium filled kites/balloons which are connected to ship via a cable and can carry video recording equipment on it. These may provide another platform which is higher than ship deck (ca 1000 ft) and could record video of the trackline. This is a completely new survey technique, it is unknown whether they would work in this application, and would require a fair amount of testing. Concerns include how stable it is while the ship is underway, what kind of view the video would give, etc. Presumably the helikite gives wider field of view than the shipboard observers. There is a possibility that this would help with group size estimation, and could potentially be used to verify distance measurement. The helikite could almost act as a hybrid aerial/ship survey.

The realities of using the helikite must be considered. Currently the T-NASS2015 survey is only 9 months away, leaving a relatively short amount of time for testing and development. It is important to consider what survey problem this technique is aiming to solve, and if it is a big enough problem to warrant spending the time on investigating the helikites usefulness. The main application of the helikite would be to aid in group size estimation, which has been pointed out in all of the previous surveys as a problem with the data. Problems in past occurred because observers handled estimating group size in various ways, which was not always consistent and added a large amount of variability. This problem could be solved with the helikite, in the past attempts have been made to avoid this by providing very specific instructions to the observers.

Another application of the helikite could be to obtain information on availability bias, however, the video quality would have to be high.

If T-NASS implements IO, using binoculars to get multiple sightings of groups is important to get better group size estimates. Observers would get initial sighting, but as they get closer drones and/or helikites could be used to get updates on group size and species ID, and that data could be used to correct information on the initial sighting.

The Faroes will take charge of looking into drones and helikites and will follow up and see what is feasible.

5.3.2.2 *Independent platform?*

Whether the helikite can be used as an independent platform needs to be discussed.

5.3.2.3 *Testing protocols*

The group needs detailed testing protocols for both drones and helikites.

5.4 Sighting protocols

Iceland and the Faroes will follow a delayed/partial closing method to get species ID.

If using binoculars, there must be very firm protocols to make sure observers keep consistent search patterns, since it is likely easier to define search sectors with the naked eye, and have better peripheral view.

5.4.1 Fin whales (large baleen whales)

Fin whales frequently overlap with sei and blue whales and can easily be confused, therefore species ID is important.

In 2001, surveys closed on a few for species ID, but this is time consuming.

In 2007, ships did not deviate from track very much. They slowed down, went off effort, stopped or partially closed and everyone tried to get species ID and number. This did not take much additional effort and worked fairly well. Recommend doing this, but not during high density and only sightings within a reasonable distance from the track should be considered.

SCANS and CODA protocols included different ID categories, or observers recorded a level of certainty of the observer on the species ID. A misunderstanding resulted in one vessel implementing this protocol differently, which caused problems with analysis. Care must be taken to ensure that all vessels and observers are using the same method.

5.4.2 Pilot whales

Iceland should consider delayed closing in on pilot whale sightings. Some time-off effort for mapping out super groups may be worthwhile.

A preliminary protocol would be to describe sub-groups as individual sightings, as has been done in previous surveys. After the initial sighting of the group, the observers would go off- effort, close in and get better numbers. Another option is to continue on the line, but slowing down to half speed to get better estimates of group size.

Palka has these general guidelines: if a large group (a few hundred animals) is sighted they go off effort and divide up group to estimate group size. Observers work in groups, some pointing out new animals seen, others recording. They also try to identify calves. This could be considered delayed closing. They are using the IO method, but sometimes stop to get species ID and group number.

Because T-NASS has not used IO before, it would be advantageous for Iceland and the Faroes to collaborate with Palka to see Palka's protocols and observer's manual for ship-based surveys. Palka agreed to collaborate and share information and emailed her information.

5.4.3 Minke

Iceland plans to record each surfacing of a suspected minke whale: once a minke whale is sighted, they will track the individual whale until it is abeam. This will leave open the possibility of using the Norwegian analysis method. Focusing on tracking individual whales may compromise searching for fin whales but there is little overlap of these species.

5.4.4 Sperm

Sperm whales are not a primary target species for T-NASS2015, and extra effort spent on sperm whales must be carefully considered.

The recommendation is to monitor whales within 1 km of the trackline until they fluke. They will generally have little overlap with other species, therefore it should not take away effort from spotting other species.

In 2007, acoustics were used for sperm whale detections, but acoustic detections were too few to give an abundance estimate. Acoustics are usually robust for sperm whales but in 2007 there were only 11 detections acoustically, compared to 100 visual sightings. Low acoustic detections was likely due to high noise of vessel, but vessel will likely be the same one in 2015. For the next survey, the recommendation is to record the sightings in such a way that it will allow for abundance estimation corrected for availability.

Palka informed the group that they use both visual survey and passive acoustic array monitoring. They are working on combining the visual and the acoustic surveys, so that the acoustic monitoring could be used as an independent platform to the visual survey.

5.4.5 Other

For dolphin species identification, it is important to have experienced observers. For groups of dolphins, the recommendation is to use same method as pilot whales, but without closing. It is not a priority to get a good abundance estimate for dolphins, so it is not worth the extra effort that it would take to close on the groups. If it is possible to get the data for an abundance estimate, then that is good, but it should not be done at the cost of losing effort on the target species.

T-NASS-07 data was sufficient to give an abundance estimate for bottlenose whales, and it would be ideal to get this level of data again.

For sightings classified as unidentified species, one option is to make abundance estimate for unidentified sightings and then apportion them into the various species. The WG was unsure whether this was acceptable to the IWC.

5.5 Data collection

The group discussed that Iceland and the Faroes may use audio recording of observer sightings data, similar to the Norwegian method. They may investigate video recording for distance estimation (similar to the system developed by Leaper of SMRU, which uses video recorded around the sighting, analysed later to get distance.

For 2015 survey, one possibility is to record all audio in the field, and enter data later with post-processing. Iceland and Faroes would need to purchase the equipment, and will discuss the technical info with Nils outside of the meeting. As discussed under item 6, it may also be possible to use the updated "Redhen" system that Greenland is using for their aerial surveys during shipboard surveys.

For distance estimation, Palka reports that e-ranger is not working for them because it is not accurate enough. The binoculars with reticles work out fairly well, especially if people are trained. They are also looking into a cheaper inclinometer, but have not tested it. Their angle measurements are not automated.

Hammond informed the group that the SCANS-III proposal includes work to redesign the data collection system, but this would be only in time for their survey in 2016. They will not start working on developing the system until July 2015 (contingent upon funding from EU).

PAMGUARD is another option for a data collection system. It was developed for acoustics but can be used for visual sighting data collection as well.

5.5.1 Effort recording

Same as above.

5.5.2 Sightings recording by observers

Palka informed the group that during their surveys, one person is dedicated recorder and observers relay their observations to the recorder. Some observers also keep their own databooks. The recorder is responsible for obtaining the angle from the angle board. The data is verified every evening. For species ID, they allow observations to be corrected the next day.

For Norwegian surveys, there is a computer on the bridge with cables to the platforms, where there are microphones. For a sighting, the observer picks up the microphone and pushes button which starts the audio recording. In the evening they listen to the audio recording and fill out datasheet. It is important to review the data quickly to clear up any problems with audio clarity.

For T-NASS2015, it is important that the protocols say that all data should be verified on the same day.

5.5.3 Continuous/automatic sightings recording

The group discussed that it could be helpful to have continuous voice recording which makes it easier to review the recordings at a later time to correct/clarify data.

5.5.4 Acoustics

Faroes has the equipment from 2007, but it has not been used since then, and they have no experience using it. In addition, data collection methods have been further modified and developed. The hydrophone and cables are the same, but they would need to upgrade the front end (e.g., faster computer, new software). Gillespie can help a bit but cannot be fully responsible for building the system.

Palka suggested that passive acoustics for common minke whales could help south of Iceland. However getting funding for 2015 seems unlikely.

5.5.5 Equipment needs

Iceland and Faroese need good binoculars with good reticules, binocular poles with video recording and a gyroscope.

Headsets are not urgent because there will not be communication between observers but they may be convenient on noisy vessels. They need microphones for audio recording, including something to minimise wind noise, which could perhaps be something inside the clothes on the chest.

Special "sea-strong" computers may not be needed, if recording of sightings is only done on audio and transcribed in the evening on "normal" computer.

5.5.6 Software needs

There were no discussions of software needs (outside of the integrated systems which have their own software).

5.6 Cooperation on equipment and software development

SMRU can provide some help and advice for equipment, but for a 2015 survey, they cannot develop the whole system.

SCANS-III plans to update video recording system. Their aim is to develop a more efficient and robust data collection system which includes removing the complexity of wires everywhere and components that can fail. But this is planned for their survey in 2016, and will not be available for T-NASS2015.

Russell Leaper is one who developed their previous system, but he is busy and likely will not be available to help develop a system for T-NASS2015.

5.7 Cruise leaders and observers

The group discussed Iceland's and the Faroese's need for experienced observers. Palka has contact information for some of their observers, and will email this to Iceland. As for pay, they have 2 levels: very experienced observers are paid a bit more, and are often team leaders with more responsibilities. Other less experienced observers have a lower rate.

5.8 Training

Video of different species would be a helpful training tool.

Palka reported that their surveys have lots of repeat observers, but they do occasionally have some new people, or people with experience on different surveys. They prefer to have at max 1 out of 4 inexperienced observers, but it is usually closer to 1 out of 8. They have lots of on the job training, which includes having experienced people tell new observers how they collect the data. They use a cooperative methodology where the team works together to get group size. Other training methods are to have different people count separately and then compare the results from team to team. If the teams give different group sizes, they work that out in post processing.

The group recommended that since Iceland is using a method that they have not used before, they should have more intensive training. Palka informed the group that they start surveying while heading out to the actual survey area for training purposes, especially to get people used to searching, and how to enter data.

5.9 Experiments

The group discussed holding distance estimation experiments. Palka's experiments by having the ship stop, hold position, and point towards horizon. They deploy a small boat with a buoy and have observers use binoculars and naked eye to estimate distance. They hold one session of training with immediate feedback and afterwards they hold a test where they repeat the experiment but do not immediately tell the observers the exact distances. In addition to this being good training for the observers, they also use this info to see if need to calibrate distances and develop correction factors. They have used a correction factor in the past for distances for individual observers, but not for their most recent survey. Also, like Nils, they have looked at duplicates and compare distances. Biases depend on distances from the vessel- people are better at estimating distances closer to the vessel.

Øien noted that the Norwegians use similar experiments, and also look at duplicates to estimate variation in distances reported by observers.

For Iceland and the Faroes, should implement training for distance estimation for their observers. Testing may have limited utility (not collecting data that is useable), as test conditions are very different from survey conditions .

6. AERIAL SURVEYS

6.1 Equipment and software

Greenland will fly the Twin Otter and plans to use same protocols as previous surveys. They will be using an audio and video recording (Redhen system, more information below). If they encounter large aggregations, they go off effort (which takes a small amount of time, and is a good rest for observers), take pictures and then decide post-analysis whether to use the photos in group size estimations. They are flying at 700 ft, and some reaction to the plane has been observed (e.g., diving after passage of plane).

Iceland will fly the Partenavia and hopes to add camera to assist in IO and distance checking. Their plan is not to go through every image, rather, the main role of the camera would be to assist in being another IO platform and distance estimation. The camera could be used to set up a trial to see if observers saw same thing-estimation of $g(0)$.

Pike informed that a recent Canadian survey used 2 cameras slightly oblique, one on each side. They initially planned to use photos to give measurements (distances) that observers missed, such as when they encountered large groups of animals and the observers become overwhelmed and did not collect the distance data. This has not worked as planned because it has been impossible to match photos to sightings since the distances are critical in matching photos to sightings. This is probably not a problem in Iceland because it is not expected that they will be seeing such large aggregations. The Canadians are reading every photo. This is requiring 2 readers, and will take 1 year for 2 people to read all of them. The still photos have not been proven useful for group size estimation because some animals may be diving at instant photo was taken, and therefore can give lower group sizes than the observer. No objective way to tell if photo or observer had correct group size.

The still camera in Iceland would mainly be used for distance estimation, perhaps species ID.

Video may be a better option for Iceland to consider because easier/faster post-processing, easier detection of animals, better possibility to get group size, etc. The group recommends that Iceland contact the HighDef company in UK to see what their specs are. It is likely too expensive to use their system, but it could be useful to see what their system does and see if something similar can work for Iceland.

SCANS-III includes a component to test out high definition video methods for porpoise surveys in Kattegat/N Sea in spring 2016.

Recording systems

Palkas group uses the programme VOR- voice operating recording- which is the same programme as developed for and used in SCANS and other European surveys.

They are not using the circle-back method anymore. Instead, they use 2 teams look at perception bias, and a separate correction for availability bias. They are recording swim directions, and often see that they 2nd time around the animals are heading away from plane. Their surveys are flown at 600 ft (lower than Iceland and Greenland surveys, which are at 700 ft). They previously used circle back for 5 animals or less, which takes a long time. Another advantage of the two teams rather than circling back is that analysis is easier with 2 teams because one year's data is much more independent.

Palka's team did not use the audio recording part of the VOR system because they could not get to work. They record data on an external keyboard with 2 observers talking to 1 dedicated recorder. The VOR programme is run on a computer which is hooked up to a GPS so you can see the trackline, and points are added with sightings. The system is easy to use with the keyboard, mouse, and function keys. When they are off-effort,

their observers can use intercoms to talk to each other, and the pilots can listen to observers but cannot talk to observers.

Pike informed the group that in the Canadian surveys they used handheld digital voice recorders to record visual observations. The main problem with these was that they did not have clocks that record to the second, and therefore these had to be synchronised to watches and the GPS. A new recording was made on each transect (and re-synchronisation had to be done). The synchronisation was cumbersome and prone to errors. They did not have a dedicated data recorder. They did have 1 person that was dedicated to dealing with the camera systems.
The main point is that it is very important to have voice recorder with time stamp to the second. Ideally there would be an audio recording system integrated into the headset such that the intercom is on to talk to each other in the plane, and then the observers push a button for recording sightings. The system would use the power supply in the aircraft.

There was some discussion on whether the observers should be able to talk to each other. Although it is important for the observers to avoid alerting each other to sightings to remain independent, when they are off effort it is nice for them to be able to communicate.

Hansen described the systems that Greenland has been using, and a new system that they are considering for their next survey. This system is a new product from Redhen (http://r.b5z.net/i/u/10053748/f/RedHen_VMS-HDII.pdf) that is simpler, more reliable, records audio continuously, can handle both video and still photography, and integrates the data. The system needs a power converter for the plane, but otherwise is very small (e.g., roughly the size of 4 stacked iPhones), so would work on the Partenavia.

There is a possibility that the new Redhen system could be used for shipboard surveys as well, and would be able to record the camera system for distance estimation.

If this system looks like a good one to use, then NAMMCO could potentially arrange a training group. This training could potentially take place in Ottawa while Rikke Guldborg-Hansen is attending the JCNB-SWG meeting, which is only a few hours drive from Daniel Pike. NAMMCO would invite Daniel Pike to travel to Ottawa just before or after that meeting to go through the system with Rikke.

Along with the Redhen system, Greenland uses Bose QuiteComfort 15 headsets, Sony MP3 Linear PCM Recording with 2 sec prerecording. The also have still camera photography using Nikon D300 cameras.

The group also recommended that Iceland consider video recording. One option could be a GoPro, which is capable of 8 hours of recording and could be placed in the observer window in the very front of the cockpit or on the wing.

6.2 Availability
Equipment availability was discussed above.

6.3 Cooperation on development?
In the EU there is a company using HD video for seabirds, and they are interested in testing it for use on cetacean surveys as well. For SCANS-III, they plan on using this system in conjunction with sightings, and are developing methods to use this technology. There is a possibility that this could this be tested during the aerial surveys in West Greenland in 2015.

7. FUNDS

7.1 Available – allocation

7.2 Anticipated - allocation
Further discussion on funding will occur after budgets have been accepted in the individual countries.

8. PR

There is nothing to say at this time. This will be discussed further at the upcoming SC meeting.

9. NEXT MEETING

The group agreed to Skype in mid-December. Also, any updates should be given at the SC meeting (3-6 November 2014 in Bergen). It may be possible to meet for 1-2 hr before or during the SC meeting.

If we hear that funding has fallen through (e.g., if Jan Mayen has not been included in the Norwegian proposed budget), the group recommends that it holds an emergency meeting of the T-NASS Steering Committee to discuss how plans will change. This meeting could probably be a Skype meeting.

If funding comes through as planned right now, the Faroes and Iceland would need to meet again before the survey. If the Redhen system is going to be used, then this meeting could also be a training session. Possible timing for this meeting is the end of March (week 13). Key participants would include Gunnlaugsson, Vikingsson, Mikkelsen, Desportes (and Pike if Iceland is conducting an aerial survey).

Action Plan Table

Item	Responsible Person	Deadline
Drone plan	Mikkelsen	15 December
Helikite plan	Mikkelsen	15 December
VOR system- how it can be improved	Palka	Wait for Rikke's update on Redhen, late January?
GRLD data collection system- Redhen- can take 4 channels and GPS?	Hansen	15 December?
Can Redhen system be used in shipboard data collection	Mikkelsen	After Rikke's report on Redhen system, late January
Gyroscope- can it be used for recording angles on aerial and shipboard surveys	Prewitt will email Hansen, Pike and Palka	Email on 6 October, update at SC
Draft protocols for shipboard survey	Gunnlaugsson	End of November 2014 (reminder from Prewitt in mid-November)
Final protocols for shipboard survey	Gunnlaugsson	For March 2015 meeting
Final aerial survey protocols for Iceland (adapted from existing Greenland protocols)	Pike	For March 2015 meeting
Investigate whether there is space for marmam observers on mackerel survey in Greenland and Faroes (unlikely to use funds)	Gunnlaugsson/Mikkelsen	Await ICES planning group meeting results
Faroese mackerel survey effort- can full complement of observers be used (so get abundance estimates)	Mikkelsen	Update 15 December
Contact the HighDef company in UK to see what their specs and prices are	Gunnlaugsson	SC meeting
Vessel charters	Gunnlaugsson/Mikkelsen	Faroes- January 2015 Iceland (if necessary)- January 2015
Permission to enter EU waters (perhaps Norwegian waters as well)	Mikkelsen	January 2015

Appendix 1 Agenda

1. Welcome
2. Adoption
3. Rapporteurs
4. Summaries by jurisdiction
   - 4.1 Iceland
   - 4.2 Faroe Islands
   - 4.3 Greenland
   - 4.4 Norway
5. Vessel-Based Surveys
   - 5.1 Vessels and timing
     - 5.1.1 Platforms of opportunity?
   - 5.2 Survey design
     - 5.2.1 Stratification
     - 5.2.2 Effort allocation
     - 5.2.3 Transects
   - 5.3 Field methodology
     - 5.3.1 Searching strategies - platforms, binoculars
   - 5.4 Sighting protocols for
     - 5.4.1 Fin whales (large baleen whales)
     - 5.4.2 Pilot whales
     - 5.4.3 Minke
     - 5.4.4 Sperm
     - 5.4.5 Other
   - 5.5 Data collection
     - 5.5.1 Effort recording
     - 5.5.2 Sightings recording by observers
     - 5.5.3 Continuous/automatic sightings recording
     - 5.5.4 Acoustic?
     - 5.5.5 Equipment needs
     - 5.5.6 Software needs
   - 5.6 Cooperation on equipment and software development
   - 5.7 Cruise leaders and observers
     - 5.8 Training
     - 5.9 Experiments
6. Aerial Surveys
   - 6.1 Equipment and software:
   - 6.2 Availability
   - 6.3 Cooperation on development?
7. Funds- 3 October
   - 7.1 Available - allocation
   - 7.2 Anticipated - allocation
8. PR
9. Next meeting?

Appendix 2 Participant List

Geneviève Desportes (FRO; 2 &3 Oct)
GDnatur
Stejlestræde 9, Bregnør
DK-5300 Kerteminde
Denmark
Phone: +45 65321767
genevieve@gdnatur.dk

Þorvaldur Gunnlaugsson (Chair of SC, ISL)
Marine Research Institute,
PO Box 1390,
IS-121 Reykjavík, Iceland
Tel. +354 5752081
Mobile +354 8236084
Fax +354 5752001
thg@hafro.is

Phil Hammond (Invited Expert; 1 & 2 Oct)
Bute Building
University of St Andrews
St Andrews, Fife
KY16 9TS, UK
Email: psh2@st-andrews.ac.uk
Phone: +44 01334 463222

Rikke Hansen (G, 2 & 3 Oct)
Greenland Institute of Natural Resources
c/o Greenland Representation
Strandgade 91, 3
PO Box 2151
DK-1016 Copenhagen K
Denmark
Phone: Email: rgh@ghsdk.dk

Mads Peter Heide-Jørgensen (GRL)
Greenland Institute of Natural Resources
c/o Greenland Representation
Strandgade 91, 3
PO Box 2151
DK-1016 Copenhagen K
Denmark
Tel. +45 32833827
Mobile +4540257943/ +299 550563
Fax +45 32880100
mhj@ghsdk.dk

Bjarni Mikkelsen (FRO)
Natural History Museum
Fútalág 40
FR-100 Tórshavn, Faroe Islands
Tel. +298 35 23 23
Mobile +298 21 85 80
Fax +298 35 23 21
bjarnim@ngs.fo

Jill Prewitt (Scientific Secretary)
NAMMCO
PO Box 6453
N-9294 Tromsø, Norway
Tel. +47 77 68 73 73
Mobile +47 40 62 62 66
Fax +47 77 68 73 74
jill.prewitt@nammco.no

Gísli Víkingsson (ISL)
Marine Research Institute
PO Box 1390
IS-121 Reykjavik, Iceland
Tel. +354 57 52 080
Mobile +354 69 90 475
Fax +354 57 52 001
gisli@hafro.is

Nils Øien (NOR)
Institute of Marine Research
PO Box 1870
Nordnes 5817 Bergen
Norway
Tel. +47 55 23 86 11
nils.oien@imr.no

Daniel Pike (Invited Expert, via Skype)
kinguq@gmail.com

Debi Palka (Invited Expert, via Skype)
Debra.palka@noaa.gov

Appendix 3 Document List

Document No.	Title	Agenda Item
SC/21/SPWG/01	Draft Document List	
SC/21/SPWG/02	Draft Agenda	
SC/21/SPWG/03	Draft Participants List	

Background Documents	Title	Agenda Item
NAMMCO-22-6	TNASS2015 Proposal	