Appendix 8

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REPORT OF THE WORKING GROUP ON SEALS

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1. EXCHANGE OF INFORMATION AND SUMMARY OF SEAL CATCHES IN 2012

Norwegian catches in the Greenland Sea in 2011 was taken by 2 vessels, whereas no Russian seal vessels participated in the area. Due to the uncertain status for Greenland Sea hooded seals, no animals of the species were permitted taken in the ordinary hunt operations in 2012. Only some animals were taken for scientific purposes. The 2012 TAC for harp seals in the Greenland Sea was set at 25 000 1+ animals (where 2 pups balance one 1+ animal), i.e. the removal level that would reduce the population with 30% over the next 10 year period. Total catches in 2012 were 5,593 (including 3,740 pups) harp seals, representing 22% of the identified sustainable levels.

A possible reduction in harp seal pup production in the White Sea may have prevailed after 2003. Due to concern over this, ICES recommended that removals be restricted to the estimated sustainable equilibrium level of 15,827 1+ animals (where 2 pups balance one 1+ animal) in the White and Barents Sea in 2012. The Joint Norwegian-Russian Fisheries Commission has followed this request and allocated 7,000 seals of this TAC to Norway. On this background, Russian sealing in 2012 was planned to be continued using the new boat-based approach introduced in the White Sea catch in 2008. This catch, using ice class vessels fitted with small catcher boats, would focus primarily on weaned pups (beaters), to a much less extent on adult seals. No white-coats would be taken. However, as was also the case in 2009-2011, Russian authorities implemented a ban of all White Sea pup catches. Despite considerable effort from PINRO specialists to explain that a sustainable harvest from the population would be perfectly possible, the Russian authorities concluded that all pup catches in the White Sea should be banned in 2012. Due to this, there were no commercial Russian harp seal catches in the White Sea in 2012, but local hunters took 9 adult seals for subsistence use. One Norwegian vessel had planned to conduct hunting in the southeastern Barents Sea in 2012, but was for various reasons unable to do this.

Norwegian and Russian catches in 2012, including catches under permits for scientific purposes, are summarized in the table below:

Area/species	Norway	Russia	Sum
GREENLAND SEA			
Harp seals			
Pups	3740	0	3740
Older seals (1yr+)	1853	0	1853
Sum	5593	0	5593
Hooded seals			
Pups	15	0	15
Older seals (1yr+)	6	0	6
Sum	21[1]	0	21
Area subtotal	5614	0	5614
BARENTS SEA / WHITE SEA			
Harp seals			
Pups	0	0	0
Older seals (1yr+)	0	9	9
Sum	0	9	9
Area subtotal	0	9	9
TOTAL CATCHES	5614	0	5623

[1] Animals taken under permit for scientific purposes

2. EXCHANGE OF INFORMATION AND SUMMARY REPORTS OF RESEARCH ACTIVITIES IN 2012

2.1 Norwegian research

2.1.1 Estimation of harp and hooded seal pup production in the Greenland Sea

In the period 18 March to 1 April 2012 IMR conducted aerial surveys in the Greenland Sea pack-ice (the West Ice), to assess the pup production of the Greenland Sea populations of harp and hooded seals. Two fixed-wing aircrafts, stationed in Constable Pynt (East-Greenland) and Akureyri (Iceland), were used for reconnaissance flights and photographic surveys along transects over the whelping areas. A helicopter, operated from the applied expedition vessel (M/V"Nordsyssel") also flew reconnaissance flights, and was subsequently used for monitoring the distribution of seal patches and age-staging of the pups. The reconnaissance surveys were flown by the helicopter (18 March - 1 April) and the fixed-wing aircrafts (22 March – 1 April) in an area along the eastern ice edge between 67°55'and 74°10'N. Obviously, the ice cover was narrow and the edge close to the Greenland coast in 2012. The reconnaissance surveys were adapted to the actual ice configuration, usually flown at altitudes ranging from 160 - 300 m. Repeated systematic east-west transects spacing10 nm (sometimes 5 nm apart) were flown from the eastern ice edge and usually 20-30 nautical miles (sometimes longer) over the drift ice to the west. Harp seal breeding was first observed on 19 March in an area between 73º00'N and 73º18'N; 14º28'W and 15º05'W (Patch A) and on 21 March in area between 72º00'N and 72º25'N; 15º30'W and 17º00'W (Patch B). Subsequent helicopter age-staging flights in the two patches confirmed substantially increase in the number of whelping harp seals in patch B which was also observed to include increasing numbers of whelping hooded seals to the east (i.e., closer to the ice edge) of the harp seals. The general drift of the two patches were in a south westerly direction. Due to more scattered and open drift ice in patch A, this patch drifted faster than patch B. Thus, on 28 March the two patches had merged, yielding one large patch. Outside the localized whelping patches no apparent harp seal breeding was observed, only a few scattered hooded seal families and, subsequently, solitary bluebacks were observed in the northeast.

Both aircrafts were equipped with Vexcel Ultracam Xp digital cameras, which provided multichannel images (Red Green Blue Infrared). On 28 March, a total of 27 photo transects, spacing 3 nautical miles, were flown using both aircrafts in the area between 70º43'N / 18º 31' - 18º 15' W and 72º 01'N / 17º 29' - 17º 29 W. The survey covered the entire area of the merged patches A and B. All transects were flown with cameras operating to ensure about 80-90 % coverage of the area along each transect line, resulting in a total of 2792 photos shot.The results from the aerial surveys will be used to estimate the 2012 harp and hooded seal pup production in the West Ice. Subsequently, the status of the stocks will be assessed by fitting the pup production estimates to population models.

2.1.2 Summer feeding of harp seals in the Barents Sea

IMR has carried out a study to assess harp seals use and preference of prey during their most intensive feeding period (May-August) around Svalbard in the northern Barents Sea. Based upon

gastro-intestinal (184) and feces (94) contents, the seal diet was studied in 1996, 1997 and 2004-2006. Parallel to the sampling of seals, the prey availability was assessed in one area in 1996 and 1997 and in two areas in 2006 by using standard acoustic methods. Canonical correspondence analysis showed that harp seals prey use vary significantly both in time (year) and space. Also, harp seals prey use appears to be size dependent; subadult (<150 cm) seals were particularly associated with pelagic crustaceans (krill and amphipods) whereas adult seals were more associated with various fish species (capelin, gadoids and flatfish). Krill, *Thysanoessa sp*. and *Meganyctephanes norwegica*, was the most important prey group in the seal diets (63%) followed by polar cod (16%) and other fish species (10%). The resource surveys revealed that krill was by far the most abundant prey group independent of area and year, constituting between 69% and 94.7% of the total prey biomass in the 1996, 1997 and 2006, followed by the amphipod *Themisto libellula* (13-18%) and gadoids (2.5-22.8%). Harp seals displayed major spatio-temporal variation in prey preference; polar cod was often preferred by the seals whereas krill was commonly consumed in less proportion as observed in the survey area. Gadoids and capelin had either been exploited in the same or less proportions as observed in the survey sea.

2.1.3 Barents Sea harp seal body condition

The Barents Sea fish community has undergone dramatic fluctuations over the past 40 years with variations in the abundance of capelin, herring, krill and polar cod. There is good evidence to suggest that Barents Sea harp seals respond to changes in the ecosystem. However, little is known about the functional predator-prey relationships. In a Norwegian sampling program conducted during April/May in 1992-2011onboard Norwegian sealers operating in the southeastern Barents Sea (the East Ice), body condition data were collected from a large number of juvenile and adult harp seals. The data were analyzed to assess possible relationship between harp seal body condition, environmental variables, and the biomass of major harp seal prey. The analysis suggests that the body condition of juvenile and adult seals (aged 1+) varied between years, increasing from 1992 until 2001 and later decreasing, with lowest condition in 2011. The body condition of pups also varied among years. When investigating covariates that might explain such inter-annual variation, it was observed that the North Atlantic Oscillation (NAO) index had a positive impact on seal condition. Significant predator-prey relationships (where prey abundance was estimated for the previous year) were also found between the seals and important prey items. Krill is obviously important food for the seals – good availability of krill yielded good condition in both pups and adult seals. High abundances of capelin and cod had a negative impact on seal condition. Polar cod abundance had a positive effect on seal condition until the biomass reached a certain level - above that level the relationship was negative. Presumably, indirect effects in the food web, for example competition between harp seals and their prey for shared resources such as krill, may result in unexpected negative effects of prey abundance on the condition of the top predator.

2.2 Russian research

2.2.1 Estimation of harp seal pup production in the White Sea

Last standard Russian multispectral aerial survey of the White Sea/Barents Sea harp seal pup

production was carried out on 20-23 March 2010. The survey resulted in an estimate of 163 032 pups (SE=33 342). The ICES Working Group on Harp and Hooded Seals (WGHARP) met during 15-19 August 2011 and agreed that the survey had been carried out very well. Taking into account recommendations from WGHARP, Russian scientists from PINRO focussed on monitoring of ice conditions in the White Sea and adjacent areas of the Barents Sea in 2011 and 2012. This information has considerable influence on harp seal pup production. Monitoring of the ice conditions were conducted during a period from November 2011 to the end of March 2012. In general the ice situation in 2012 was similar to the ice conditions observed in 2010 and 2011 which were years with more favourable conditions for survival of pups than in the previous 7 years. Thus, 2012 was also a year with good ice conditions for harp seal whelping, and Russian scientists suggest that most likely the harp seal pup production in 2012 was similar to what was observed in 2010.

2.2.2 Other issues

During late spring, summer and early autumn in 2012, several dedicated expeditions were carried out in the Kola Peninsula coastal zone including the Barents Sea and White Sea area, using small boats and vessels. In the Barents Sea open area, oportunistic sighting surveys onboard research and fisheries vessels, including the annual joint Russian-Norwegian ecosystem surveys, were carried out. During all surveys mentioned, data on marine mammal distribution and numbers were collected, taking into account also environmental conditions and fish species distributions and biomass. The main aim was to attempt to estimate marine mammals and fisheries interactions on one side, and influence of current climatic changes and human activity on marine mammals on the other. Research on mathematical modeling designed to estimate the total White Sea/Barents Sea harp seal population stock abundance and develop recommendations concerning harvesting strategy were continued.

2.3. Joint Norwegian-Russian work

2.3.1 Joint studies of life history parameters

To assess possible reasons for the apparent difficulties faced by the population of Greenland Sea hooded seals is a challenge. Based on new Norwegian reproductive samples collected in moulting patches off Northeast Greenland in July 2008 and July 2010, mean age at maturity was estimated at 3.7 (CI=0.4) years, which is considerably lower than the previous estimate of 4.6 years based on Russian moulting patch samples for the period 1990-94 used in previous models. In contrast, proportion based estimates of mean age at primiparity (MAP(P)) were similar for the 2008-10 and the 1991-94 data sets (5.5 years and 5.8 years, respectively) and a common MAP(P) of 5.7 years could be fitted. There were also no indications of consistent trends in frequency based estimates of mean age at primiparity based on both moulting and breeding patch data collected over the period 1958-2010. The most recent estimate of MAM(P) is based on samples collected in July and it is likely that the low estimate of MAM(P) is due to late ovulations in nulliparous females. A similar pattern has been found for Northwest Atlantic hooded seals, which also indicate that these late ovulations do not appear to result in successful pregnancies. Therefore, parity curves may be more appropriate for modeling of hooded seal population dynamics than maturity curves.

3. STATUS OF STOCKS AND MANAGEMENT ADVICE FOR 2013

WGHARP met during 15-19 August 2011 at the British Sea Mammal Research Unit (SMRU) at the Scottish Oceanographic Institute, University of St. Andrews, Scotland, to assess the status and harvest potential of stocks of Greenland Sea harp and hooded seals and harp seals in the White Sea. The advice given by ICES in September 2011, based on the 2011 WGHARP meeting, were used by this Working Group on Seals to establish management advice for 2013 to the Joint Norwegian-Russian Fisheries Commission.

The basis for the advice was a request from Norway in September 2010 where ICES was requested 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, and to assess the impact on the harp seal stocks in the Greenland Sea and the White Sea/Barents Sea of an annual harvest of: 1) Current harvest levels; 2) Sustainable catches (defined as the fixed annual catches that stabilizes the future 1+ population); 3) Catches that would reduce the population over a 10-year period in such a manner that it would remain above a level of 70% of current level with 80% probability.

ICES have developed a Precautionary harvest strategy for the management of harp and hooded seals. The strategy includes two precautionary and one conservation (limit) reference levels. The reference levels relate to the pristine population size, which is the population that would be present on average in the absence of exploitation, or a proxy of the pristine population (which in practical terms is referred to as the maximum population size historically observed, N_{max}). A conservation, or lower limit reference point, N_{lim}, identifies the lowest population size which should be avoided with high probability. The first precautionary reference level is established at 70% (N_{70}) of N_{max}.When the population is between N_{70} and N_{max}, harvest levels may be decided that stabilise, reduce or increase the population, so long as the population remains above the N_{70} level. ICES has suggested that this could be done by designing the TAC to satisfy a specific risk criterion which implicate 80% probability of remaining above N_{70} over a 10-year period. When a population falls below the N_{70} level, conservation objectives are required to allow the population to recover to above the precautionary (N_{70}) reference level. N_{50} is a second precautionary reference point where more strict control rules must be implemented, whereas the N_{lim} reference point (set by ICES at 30% (N_{30}) of N_{max}) is the ultimate limit point at which all harvest must be stopped.

The ICES management of harp and hooded seals require that the populations in question are defined as “data rich”. Data rich stocks should have data available for estimating abundance where a time series of at least three abundance estimates should be available spanning a period of 10-15 years with surveys separated by 2-5 years, the most recent abundance estimates should be prepared from surveys and supporting data (e.g., birth and mortality estimates) that are no more than 5 years old. Stocks whose abundance estimates do not meet all these criteria are considered “data poor”, and should be managed more conservatively.

Population assessments were based on a population model that estimates the current total population size, incorporating historical catch data, estimates of pup production and historical values of reproductive rates. Modifying the model by incorporating the full range of reproductive data available, as requested by ICES in 2009, gave lower, but more realistic, population estimates and catch options than in the previous modelling. The modelled abundance is projected into the future to provide a future population size for which statistical uncertainty is provided for various sets of catch options. In case of data poor populations, catch limits are estimated using the more conservative Potential Biological Removal (PBR) approach.

3.1. Greenland Sea

The Working Group **recommends** the opening dates for the 2013 catch season to be between 1 and 10 April for catches of both weaned harp seal pups and adult moulting harp seals. The Group recommends a closing date set at 30 June (2400 GMT) for harp seals. Exceptions on opening and closing terms may be made in case of unfavourable weather or ice conditions.

The Working Group agree that the ban on killing adult females in the breeding lairs should be maintained in 2013.

3.1.1 Hooded seals

Results from the most recent (2007) pup survey suggest that current pup production remains low, and significantly lower than observed in a comparable 1997 survey. The historical data on pregnancy rates that are available for this population are unreliable. Hence, the population model was run for a range of pregnancy rates, in addition to a run using the original model assuming constant reproduction rates. All model runs indicate a decrease in population abundance from the late 1940s and up to the early 1980s, and gave point estimates for the total population ranging between 85 000 and 106 000 animals, i.e., a population currently well below the N_{lim} of 172,577 (30% of the N_{max} estimate of 575,257).

Catch estimation: Following the Precautionary harvest strategy and the fact that the population is below N_{lim}, ICES recommend that no harvest be allowed for Greenland Sea hooded seals at this time.

The Working Group recommends that this ICES advice is implemented in future managenment of hooded seals in the Greenland Sea: Removals should still be prohibited until more information about current stock status becomes available.

3.1.2 Harp seals

Using the modified population assessment model, the size of the Greenland Sea harp seal population was estimated as 649,570 (95% C.I. 379 031 – 920 101) animals in 2011. This is the largest population size estimated for this area to date.

Catch estimation: ICES consider this population to be data rich, and above the N_{70} level (i.e.,

more than 70% of known maximum abundance measured). Thus, it is appropriate to provide catch advice using the assessment model and to apply the Precautionary harvest strategy. Current catch level will likely result in an increase in population size of 23% over the 10 years period 2011-2021, whereas a catch of 16 737 1+ animals, or an equivalent number of pups (where one 1+ seal is balanced by 2 pups), per year would sustain the population at present level over the same period.

Catches that would reduce the population over a 10-year period in such a manner that it would remain above a level of 70% of current level with 80% probability are 25,000 1+ animals, or an equivalent number of pups (where one 1+ seal is balanced by 2 pups), in 2012 and subsequent years. Any allowable catch should be contingent on an adequate monitoring scheme to detect adverse impacts before it is too late for them to be reversed, particularly if the TAC is set at a level where a decline is expected.

The Working Group recommend that the advice from ICES be used as a basis for the determination of a TAC for harp seals in the Greenland Sea in 2013:

- *If the management objective is to maintain the population at current level, a TAC of 16 737 1+ animals or an equivalent number of pups, is recommended.*
- *If the management objective is to reduce the population towards N_{70} over a 10-year period, a TAC of 25 000 1+ animals, or an equivalent number of pups, is recommended.*

In both harvest scenarios, one 1+ seal should be balanced by 2 pups.

3.2 The Barents Sea / White Sea

Current Russian regulations allows for seal hunting in the White Sea and southeastern Barents Sea from 20 March to 1 May. Both Parties **recommends** an extension of the hunting season which should include the entire period from 20 March to 15 May for the whole area. Exceptions from opening and closing dates should be made, if necessary, for scientific purposes.

The Working Group agreed that the ban on killing adult harp seal females in the breeding lairs should be maintained in 2013.

3.2.1. Harp seal.

Russian aerial surveys of White Sea harp seal pups were conducted March 2004, 2005, 2008, 2009 and 2010 using traditional strip transect methodology and multiple sensors. The results obtained may indicate a reduction in pup production as compared with the results obtained in similar surveys in 1998-2003:

YEAR	ESTIMATE	C.V.
1998	286,260	.150
2000	322,474	.098

	339,710	.105
2002	330,000	.103
2003	327,000	.125
2004	231,811	.190
	234,000	.205
2005	122,400	.162
2008	123,104	.199
2009	157.000	.108
2010	163,032	.198

As a result of the 2009 and 2010 surveys, regarded to be good by WGHARP, the Working Group feel that the reduced pup production observed since 2004 does not appear to be a result of poor survey timing, poor counting of imagery, disappearance/mortality of pups prior to the survey or increased adult mortality. According to WGHARP, the most likely explanation for the change in pup production seems to be a decline in the reproductive state of females.

Both the original and the modified population model used for the White Sea/Barents Sea harp seal population, provided a poor fit to the pup production survey data. Nevertheless, ICES decided to use the modified model which was assumed to provide the most reasonable future prediction. The total size of the population was estimated as 1,364,700 (95% C.I. 1 230 384 – 1 498 916).

Catch estimation: Based on current data availability, the Barents Sea / White Sea harp seal population is considered to be data rich, and above the N_{70} level by ICES. Thus, it is appropriate to provide catch advice using the modified assessment model and to apply the Precautionary harvest strategy. Current catch level will likely result in an increase in population size of 11% over the 10 years period 2011-2021, whereas a catch of 15 827 1+ animals, or an equivalent number of pups (where one 1+ seal is balanced by 2 pups), per year would sustain the 1+ population at present level over the same period.

Catches that would reduce the population over a 10-year period in such a manner that it would remain above a level of 70% of current level with 80% probability are 25,000 1+ animals, or an equivalent number of pups (where one 1+ seal is balanced by 2 pups), in 2012 and subsequent years.

The Working Group recommend that the advice from ICES be used as a basis for the determination of a TAC for harp seals in the White Sea / Barents Sea in 2013:

- *If the management objective is to maintain the population at current level, a TAC of 15 827 1+ animals or an equivalent number of pups, is recommended.*

- *If the management objective is to reduce the population towards N_{70} over a 10-year period, a TAC of 25 000 1+ animals, or an equivalent number of pups, is recommended.*

In both harvest scenarios, one 1+ seal should be balanced by 2 pups.

3.2.2 Other species

The Working Group agreed that commercial hunt of bearded seals should be banned in 2013, as in previous years, but it **recommend** to start catch under permit for scientific purposes to investigate results of long time protection.

4. RESEARCH PROGRAM FOR 2013+

4.1. Norwegian investigations

4.1.1 Estimation of harp and hooded seal pup production in the Greenland Sea

Data for pup production estimation were obtained from both harp and hooded seals in the Greenland Sea in March/April 2012. Analyses of these data, with subsequent publication and implementation in management, has high priority.

4.1.2 Studies of life history parameters

Biological material, to establish age distributions in catches as well as health, reproductive and nutritive status of the animals, will be collected from commercial catches of harp seals in the Greenland Sea in April/May in 2013. If feasible, similar data should be obtained from harp seals in the southeastern Barents Sea.

4.1.3 Studies of killing methods in Norwegian commercial sealing

Material to assess efficiency and animal welfare issues in the Norwegian commercial sealing will be collected during commercial sealing of harp seals in the Greenland Sea in April/May in 2013.

4.1.4 Studies of seal diets

IMR harp and hooded seal diet data (contents from gastrointestinal tracts and faeces) have been collected in summer 2008 and 2010 in the Fram Strait. These data are now being analysed by a master student at the University of Tromsø. The student will also compare these results with data collected in the same area in 2004 – 2006. Samples to analyse stable isotopes in harp seals and relevant prey species are collected from the Barents Sea, and will be analysed in collaboration with the Norwegian Polar Institute this year.

4.1.5 Seal physiology

On research cruises to the Greenland Sea in March/April 2013, various physiological parameters of harp and hooded seals will be studied.

4.1.6 Harp seals taken as by-catches in gill nets

Provided harp seals invade the coast of North Norway also during winter in 2013, biological samples will be secured from animals taken as bycatches in Norwegian gill net fisheries.

4.2.Russian investigations

4.2.1 Estimation of White Sea/Barents Sea harp seal pup production

The plan is to continue standard multispectral aerial surveys to estimate pup production – subsequently these data will be used to determine the total harp seal population size by modelling. This information is very important, both for the management of the stock and for the Joint Norwegian-Russian Research Program on Harp Seal Ecology. This research will be carried out under recommendations from WGHARP 2011 and the JRNFC 40th Session.

4.2.2 The White Sea/Barents Sea harp seal population biology

Research on harp seal reproductive biology is planned to be carried out in the White and the Barents Seas. The aim is to study harp seal biological data such as mortality, maturity, birth rate, and morphological and physiological indexes. During spring, work will be continued on pup mortality estimation in the White Sea. Plans include also continuation of research on harp seal feeding in the White and the Barents Sea during spring and summer. All these research activities will be carried out under the Harp Sea Ecology Programme and recommendations from WGHARP 2011 and JRNFC 40th Session.

4.2.3 Marine mammal species distribution and numbers

In 2013 annual research of marine mammal distribution and numbers in dedicated special surveys using research aircraft, research and commercial fisheries vessels, as well in the coastal zones (based on the use of small boats and coastal sightings) as in the open area of the Barents Sea, will be continued. The main purpose of these surveys is the study of marine mammal role in the Barents Sea ecosystem including influence upon fisheries as top predators.

4.3. Joint Norwegian - Russian investigations

4.3.1 Joint Research program on harp Seal Ecology

Harp seals are the most important marine mammal top predators in the Barents Sea. To be able to assess the ecological role of harp seals by estimation of the relative contribution of various prey items to their total food consumption in the Barents Sea, more knowledge both of the spatial distribution of the seals over time, and of their food choice in areas identified as hot-spot feeding

areas is urgently needed. For this reason, the Joint Norwegian-Russian Fisheries Commission has decided to initiate a joint research program on harp seal ecology aimed to:

- assess the spatial distribution of harp seals throughout the year (experiments with satellite-based tags)
- assess and quantify overlap between harp seals and potential prey organisms (ecosystem surveys)
- identify relative composition of harp seal diets in areas and periods of particular intensive feeding (seal diet studies in selected areas)
- secure the availability of data necessary for abundance estimation
- estimate the total consumption by harp seals in the Barents Sea (modelling)
- implement harp seal predation in assessment models for other relevant resources (modelling)

The program was adopted by the Joint Norwegian-Russian Fisheries Commission in 2006. Although both ecosystem surveys and abundance estimation of harp seals are in progress, the core activities of the program have not yet been properly started. The parties had planned to deploy satellite transmitters on harp seals in the White Sea in late May in 2007-2011. However, the Federal Technical Committee has forbidden all satellite tagging in Russian waters in all years. In 2012, however, permission to tag harp seals in the White Sea was given by the Russian Authorities, but lack of funding hampered the tagging of seals this year. Both PINRO and IMR scientists regret this. In 2013 PINRO will do a new attempt to obtain funding for and carry out both aerial surveys and satellite tagging in the White Sea – if only one of the projects proves feasible, tagging will be given priority over the aerial surveys. Both PINRO and IMR scientists strongly recommend that Russian Fisheries and Funding Agencies support this very important project. During the tagging experiment, PINRO will provide the necessary logistics required for helicopter- or boat-based live catch of seals in April-May 2013. IMR 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. All data obtained from the tags will be available for both PINRO and IMR scientists. For proper planning and budgeting on both institutes, PINRO scientist must obtain the necessary permissions from Russian authorities before December 2012. 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.

After the 2013 tagging season future seal tagging will be decided upon following an evaluation of both the tagging methods and the obtained seal movement data set. Due to low pregnancy rates and decline in pup production it will be important to focus on harp seal ecology and demographics in the coming years.

4.3.2 Life history parameters in seals

Russian scientists have participated in scientific work on Norwegian sealers during March-May both in the southeastern part of the Barents Sea and in the Greenland Sea. This type of Norwegian-Russian research cooperation is encouraged also in the future. This would enable coordinated and joint sampling of new biological material. If Russia can realize scientific or commercial vessel trips in the White, Barents and Greenland Seas, invitation for participation of Norwegian scientists is desirable.

Available, new material from Greenland Sea hooded seals (collected in 2007-2010) will be analyzed and compared with historical data (1956-1994) in 2013.

4.3.3 Reconnaissance of possible new harp and hooded seal breeding patches in the Greenland Sea

Substantial changes in extent and concentration of drift ice in the Greenland Sea may have triggered behavioral changes of such a magnitude as a relocation of breeding for at least parts of the seal populations. The Working Group **recommends** that this is further examined by using aerial surveys.

4.3.4 Reconnaissance of possible new harp seal breeding patches outside the White Sea

Possibilities to account for the reduced harp seal pup production in the White Sea since 2004 include a shift in contemporary pupping to areas outside of the traditional areas. During the late 1980s or early 1990s, some reports of harp seal pups being observed in Svalbard were received. Therefore, the Working Group conclude that it is important that areas in the northern and southeastern Barents Sea and Kara Sea (south western part) be searched during future aerial reconnaissance surveys.

4.3.5 Population model improvements

Work with improvements of the population model used for northeast Atlantic seal stocks, incorporating variable reproductive parameters and, if possible, also observed ecological variations, continues. This work occurs in close cooperation with Canadian scientists, but also other relevant institutions (e.g., SMRU in St. Andrews) may be included.

4.3.5 Comparison of methods used in pup production estimation

The Parties plan to continue work on comparison of methods used in pup production estimation, including both reading of images and subsequent calculations of the aerial survey data. This will continue the successful work started in 2009, and should include participation from Canada and Greenland.

4.4. Necessary research takes

For completion of the proposed Norwegian and Russian research programs, the following numbers of seals are planned to be caught under special permits for scientific purposes in 2013:

Area/species/category	Russia	Norway
Barents Sea / White Sea		
Whelping grounds		
Adult breeding harp seal females	200	0
Harp seal pups	100	0

Outside breeding period		
Harp seals of any age and sex	520	300
Greenland Sea		
Whelping grounds		
Adult breeding harp seal females	0	0
Harp seal pups	0	0
Adult breeding hooded seal females	0	50
Hooded seal pups	0	50
Outside breeding grounds		
Harp seals of any age and sex	0	200
Hooded seals of any age and sex	0	0

5. OTHER ISSUES

5.1 Bans on seal hunting and products

From a scientific point of view there is no doubt that harp and hooded seal stocks in the North Atlantic are well managed and sustainably harvested with acceptable hunting methods. This is acknowledged both by ICES and NAMMCO. For this reason the Working Group regrets the decision by Russian authorities to implement a ban on all hunting of weaned harp seal pups in the White Sea in 2009-2012. Also, the Working Group strongly regrets the recent political and emotion-driven ban on all import of seal products in EU. As also concluded by NAMMCO, this is a non-scientific step backwards in relation to requested ecosystem based management of all marine resources, seals included. Excluding the possibilities to harvest at all levels in the ecosystem may in the long run have implications for harvest possibilities at other levels than those decided to be excluded. If the subsequent results are reduced harvest possibilities for some species, the Working Group suggest that it be discussed whether the costs of such reductions should be covered by EU itself (e.g., by quota reductions) since this organization implemented the ban.

5.2 Observations of marine mammals on the ecosystem surveys

The PINRO and IMR scientists acknowledge the importance of ecosystem surveys in the research of the ecology of marine mammals in the Barents Sea. During the 2011 surveys one marine mammal observer participated on the PINRO research vessel, while two observers participated on each of the IMR research vessels. Numbers of baleen whales and white beaked dolphins observed were slightly lower than in previous years. Few harp seals were observed. The harp seals have, since the start of BES, likely been foraging outside the Barents Sea ecosystem in late summers. In 2012, two marine mammal observers will be on board research vessel Johan Hjort. One marine mammal observer will participate onboard PINRO research vessel. With restrictions in funding, it should be discussed whether it would be better to have full coverage every second year rather than a poor coverage every year. A coverage every second year implies that PINRO and IMR scientists a) cannot provide annually updated indicators for the marine mammal community as committed in the Barents Sea management plan, and b) reduce information on key predators in this ecosystem. Furthermore, the PINRO and IMR scientists have discussed the harmonization of

effort on PINRO and IMR vessels. However, using two marine mammal observers rather than one combined marine mammal and seabird observer on PINRO vessel is difficult due to limited space. The PINRO and IMR scientists will combine the marine mammal data from the PINRO and IMR research vessels collected since 2003 into joint publication on marine mammal distributions in the Barents Sea, and through this work assess the possibilities of combining these data despite different effort. The PINRO and IMR scientists recommend that analyses of joint data will be presented during the meeting in March 2013.

The PINRO and IMR scientists agreed on the necessity to continue aerial observation of marine mammals and environmental conditions from Russian research aircraft, which was carried out annually from 2003-2005 as part of the ecosystem surveys. Aerial surveys are particularly efficient for obtaining high quality results from a large area over a short time period.

5.3 Joint research program on grey seals

In Norway grey seal pup production surveys aimed to cover all the breeding colonies along the entire coast were conducted in 2006-2008 using boat based as well as aerial surveys. There are large breeding colonies of grey seals located on the Murman Coast in Russia. Previous tagging experiments have shown that there is exchange of seals between these colonies and feeding areas in North Norway. Abundance estimation, using pup counts, in the Russian colonies has not been performed since 1991. For this reason, both Parties **recommend** that the Russian grey seal breeding colonies at the Murman Coast should be covered again. Ideally each colony should be visited three times (minimum twice) during the breeding period. The Parties discussed possibilities of multispectral surveys carried out by PINRO using a smaller aircraft. Norwegian participation in the grey seal surveys in Russia is highly recommended by both Parties. Traditionally the Russian grey seal colonies have been surveyed by Murmansk Marine Biological Institute (MMBI), and continued cooperation with MMBI is encouraged.

The parties agreed that this task can be most effectively solved within the frames of a future joint research program, preferably developed within the frames of the JRNFC. In addition to abundance estimation, also other important issues should be addressed:

- Stock identity: Do the Murman Coast grey seal colonies constitute isolated stocks, or are they part of the stock distributed in North Norway north of Vesterålen? This question can be addressed using genetic analyses.
- Spatial distribution and habitat use, e.g., what are the feeding areas for the Russian grey seals? Could be addressed by using satellite tags.
- Feeding habits and conflicts with fisheries and fish farming (diet studies).

6. APPROVAL OF REPORT

The English version of the Working Group report was approved by the members on 9 October 2012.