**Appendix 10**

**JOINT RUSSIAN – NORWEGIAN SCIENTIFIC RESEARCH PROGRAM ON LIVING MARINE RESOURCES IN**

**Contents**

[1. Planning and coordination of investigations and submitting of results. 2](#_Toc53563430)

[2. Investigations on fish and shrimp stocks, including stock size, structure and distribution. 2](#_Toc53563431)

[3. Research program on deep sea fishes 4](#_Toc53563432)

[4. Red king crab (Paralithodes camtschaticus) and Snow crab (Chionoecetes opilio) 5](#_Toc53563433)

[5. Fishing technology and selectivity of fishing gears 6](#_Toc53563434)

[6. Marine mammals 6](#_Toc53563435)

[7. Investigations on age determination of fish 10](#_Toc53563436)

[8. Investigations on survey methodology, index calculations and assessment methods 10](#_Toc53563437)

[9. Revision of Greenland halibut reference points 11](#_Toc53563438)

[10. Research and long term monitoring on benthic organisms 11](#_Toc53563439)

[11. Determination of conversion factors 11](#_Toc53563440)

[12. Development of genetic database for fish species 12](#_Toc53563441)

[13. Monitoring of pollution levels in the Barents Sea 12](#_Toc53563442)

[14. Monitoring of the hydrochemical conditions in the Barents Sea 12](#_Toc53563443)

[15. Russian-Norwegian Fisheries Science Symposia 12](#_Toc53563444)

[16. Exchange program of scientific personnel 13](#_Toc53563445)

[17. Data exchange 13](#_Toc53563446)

[18. Catch volumes needed for investigations of marine resources and monitoring of the most important commercial species, as well as management tasks 14](#_Toc53563447)

### 1. Planning and coordination of investigations and submitting of results.

This appendix contains the program for investigations to be carried out in 2021 by Norway and Russia within the frames of the bilateral cooperation between the Norwegian and Russian Parties. The program is in accordance with the national research programs.

Planning coordination and exchange of specialists will be settled between the institutes involved.

Russian and Norwegian research institutes will exchange results and data from joint investigations.

Norwegian and Russian scientists and specialists will meet in Murmansk, 15-19 March 2021 to discuss joint research programs, results from surveys and investigations in 2020/2021 and to coordinate survey plans for the rest of 2021. If the Covid19 situation does not permit a physical meeting, the meeting will be held online on the same meeting dates. The cruise plans listed below are preliminary and may change. Missing names of vessels and time periods for surveys in this report will be agreed by correspondence, latest by the March meeting. Future plans for surveys and methodology for preparing biological and acoustic data will be discussed and coordinated. Urgent information according to surveys carried out before the meeting in March will be exchanged by correspondence.

In the future work it is very important to take into account experiences from recent developments in the ecosystem such as environmental factors, introduction of new species, distribution and stock sizes of commercial species.

A preliminary program for the planned surveys and cooperation for 2021 is presented below. The outlined plans should be considered a draft and will be shared when final plans are available.

In order to increase robustness of joint surveys the parties considered increasing the flexibility of mutual access to each other zones. Different mechanisms are possible and needs to be considered further. Appropriate applications for research vessels entering to the EEZ’s must be ready in sufficient time before Winter and Barents Sea ecosystem surveys.

### 2. Investigations on fish and shrimp stocks, including stock size, structure and distribution.

IMR and VNIRO will continue the co-operation on the monitoring of the most important commercial species. The parties will exchange primary information during joint investigations according to agreed formats.

***Norwegian surveys***

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | Norway N-2-01 | Survey title:  | Cod spawning stock  |
| Organization:  | IMR  |
| Time period:  | March – April | Vessel:  | R.V. “Johan Hjort”  |
| Target species:  | Cod  | Secondary species:  | Haddock, saithe  |
| Area:  | Spawning areas Troms – Lofoten |
| Purpose:  | Acoustic survey of the North East Arctic Cod spawning stock. Investigations on maturity, fecundity and egg abundance.  |
| Reported to:  | IMR survey report, ICES AFWG  |

|  |  |  |  |
| --- | --- | --- | --- |
| 20 | NorwayN-2-02 | Survey title:  | Fjord and coastal ecosystem survey  |
| Organization:  | IMR  |
| Time period:  | October-November | Vessel:  | R.V. “Johan Hjort” R.V. “Kristine Bonnevie” |
| Target species:  | Saithe, coastal cod, 0-group herring | Secondary species:  | Haddock, *Sebastes norvegicus* |
| Area:  | Norwegian fjords and coastal areas |
| Purpose:  | Acoustic and trawl abundance estimation of saithe, coastal cod and other groundfish species. Acoustic abundance estimation of 0-group herring. Environmental investigations.  |
| Reported to:  | IMR survey report, ICES WGWIDE, ICES AFWG  |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | NorwayN-2-03 | Survey title:  | Norwegian pre-spawning acoustic survey on capelin  |
| Organization:  | IMR |
| Time period:  | January-March | Vessel:  | 3 commercial vessels  |
| Target species:  | Capelin | Secondary species:  | Other demersal and pelagic species |
| Area:  | The Barents Sea and adjacent waters, Exclusive Economic Zone of Norway, Spitsbergen area |
| Purpose:  | Investigations about abundance and distribution of spawning capelin. Collection of biological samples, oceanography.  |
| Reported to:  | ICES AFWG  |

***Joint surveys***

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | Norway/RussiaJ-2-01 | Survey title:  | Joint Russian-Norwegian multispecies trawl-acoustic survey for demersal fish stock assessment (Winter Survey)  |
| Organization:  | IMR, VNIRO |
| Time period:  | January-March | Vessel:  | R.V. “Helmer Hanssen”R.V. “Johan Hjort” R.V. “Vilnius” оr оther R.V. |
| Target species:  | Cod, haddock, Greenland halibut, catfishes, saithe, redfishes  | Secondary species:  | Other demersal and pelagic species |
| Area:  | The Barents Sea and adjacent waters, international waters, Exclusive Economic Zone of the Russian Federation, internal sea waters and territorial sea of the Russian Federation, Exclusive Economic Zone of Norway, Spitsbergen area |
| Purpose:  | Assessment of the year classes, abundance and biomass cod and haddock, other demersal species, collection of biological samples, oceanography.  |
| Reported to:  | Joint IMR/ VNIRO Report Series, ICES AFWG  |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.: | NorwayJ-2-02 | Survey title: | International ecosystem survey in the Nordic Seas  |
| Organization: | IMR  |
| Time period: | May – June | Vessel: | R.V. “G.O.Sars”,- 3 international research vessels  |
| Target species: | Herring, blue whiting | Secondary species: | Other pelagic species |
| Area: | The Norwegian Sea, fishing zone of the Faeroe Islands, international waters, Exclusive Economic Zone of Norway, UK fishery zone, The Barents Sea and adjacent waters, Exclusive Economic Zone of the Russian Federation, internal sea waters and territorial sea of the Russian Federation  |
| Purpose: | Estimation of yearclass strength, abundance and biomass of herring and blue whiting, studies of their distribution and behaviour, marine mammal distribution and quantity. Acoustic survey of the stocks, oceanography, plankton. |
| Reported to: | International report, ICES WGWIDE, ICES WGIPS |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | Norway/RussiaJ-2-03 | Survey title:  | Joint Russian-Norwegian ecosystem survey (BESS). |
| Organization:  | IMR, VNIRO |
| Time period:  | August-October | Vessel:  | R.V “Professor Levanidov” R. V. “Vilnius”, or other R.V.R.V. “G.O. Sars”R.V. "Johan Hjort"R.V. "Helmer Hanssen" |
| Target species:  | Cod, haddock, saithe, catfishes, redfishes, Greenland halibut, plaice, herring, capelin, polar cod, shrimp, snow crab. | Secondary species:  | Other pelagic and demersal species, benthic organisms, marine mammals and sea birds, oceanographic and hydrobiological parameters |
| Area:  | The Barents and adjacent waters, Spitsbergen area, Exclusive Economic Zone of Norway, international waters, Exclusive Economic Zone of the Russian Federation, and territorial waters of the Russian Federation. The Kara Sea, Arctic Ocean. |
| Purpose:  | Investigations of distribution and abundance of 0-group of different species, estimation of abundance and biomass of pelagic species, demersal species, shrimp, snow crab, Greenland halibut juveniles, marine mammal and sea birds distribution and quantity. Oceanography, plankton, species interactions, sampling for determining pollution levels.  |
| Reported to:  | Joint IMR/VNIRO Report Series, ICES ACOM, ICES WGHARP, NAMMCO, ICES WGIBAR |

### 3. Research program on deep sea fishes

To assess the stock of *Sebastes mentella* in the open Norwegian Sea, an internationally coordinated redfish survey has been established (ICES WIDEEPS, earlier WGRS). This survey is a collaborative effort between Norway, Russia and the Faroes, coordinated by ICES. It is also supported by the Data Collection Framework of the EU. This survey was run as a coordinated effort by Norway, Russia and the Faroes in 2009. It was not conducted in 2010-2012, but was run by Norway in September 2013, August 2016 and August 2019 and is to be re-conducted every three years. Results contribute directly to the ICES groups WGIDEEPS and AFWG.

A multi annual survey plan for monitoring of deep sea species is in action for Norwegian surveys. In 2021 the northern deep-water slope will be surveyed with Greenland halibut and redfish as main target species. In 2020 the southern deep-water slope was surveyed with Greater argentine, beaked redfish and Greenland halibut as main target species.

In ICES Benchmark in 2015 two new survey indices for Greenland halibut were derived from the Joint Ecosystem Survey, and precursor surveys. In this context it is important that coverage of the nursery area in northern Barents Sea and northern Kara Sea is sustained in the survey.

According to this the following survey will be carried out in 2021:

***Norwegian surveys***

|  |  |  |  |
| --- | --- | --- | --- |
| Nation:Reference No.: | NorwayN-3-01 | Survey title: | Northern Deepwater Slope Survey (Egga-Nord) |
| Organization: | IMR |
| Time period: | November | Vessel: | R.V. “G.O.Sars” |
| Target species: | Greater argentine, beaked redfish and Greenland halibut | Secondary species: | Other Deep water species and elasmobranches |
| Area: | Ecosystem along the Norway slope from 68 to 80 degrees north. |
| Purpose: | Primary objective: to assess the state of commercial deepwater fish stocks. Secondary objective: to monitor the state of deepwater ecosystems along the slope. Part of IMR's multiannual survey strategy for deepwater species. |
| Reported to: | IMR survey report, ICESAFWG, ICES WGEF, ICES WGDEEP, ICES WIDEEPS |

### 4. Red king crab (*Paralithodes camtschaticus*) and Snow crab (*Chionoecetes opilio)*

Both Parties exchanged information about the ongoing national Red king crab and snow crab research and fishery in 2020 and the research plans for 2021.

The parties agreed that some of the questions of biology, stock assessment and fishery of crabs require further research. The parties confirmed their intention to continue the study of the following issues:

- Ecological role of the red king crab and the snow crab in the Barents Sea;

- Main life history parameters of these two crab species introduced into the Barents Sea;

- New methods for crab stock assessments and monitoring (sampling gears, survey area etc.)

Scientists from Russia and Norway will conduct a number of national surveys on the red king crab and snow crab in the Barents Sea. The objectives of these surveys are: to assess distribution, abundance, size/sex composition and biological characteristics of the crabs, in addition to tagging experiments.

Information will be exchanged between scientists and the results will be presented in survey reports and publications.

### 5. Fishing technology and selectivity of fishing gears

Research activity in these fields is carried out with the aim to develop:

- Fishing gears that are more species and size selective and that have less negative impact on fish that escape the gear, and have less negative ecosystem effects in general.

- Improved survey gears and methodology.

Scientists from IMR and VNIRO will continue the development of survey trawls to improve and ensure adequate survey sampling techniques.

### 6. Marine mammals

The joint Russian-Norwegian research should be aimed at assessments of distribution and abundance of the most important species, and their trophic linkages with other marine resources, with particular emphasis on fish species. The low population size of hooded seals in the Greenland Sea and apparent decrease in harp seal pup production in the White Sea in recent years is a matter of concern, which requires increased research and monitoring effort.

Norwegian activities in 2021 include efforts to keep the populations of harp and hooded seals data rich (i.e., data used in assessment models should be less than 5 years old), and to improve the models used in the assessments of these stocks. Sampling of biological material from harp seals (to assess their reproductive and nutritive status) during commercial sealing in the southeastern Barents Sea (the East Ice) will be conducted. Analyses of biological material from hooded seals, collected during research surveys in the Greenland Sea (the West Ice), and from harp seals, collected during commercial hunt in the West and East Ice) continues. Furthermore, boat-based surveys to estimate abundance and population structure will be carried out in Norwegian coastal areas for harbour seals and grey seals. Comprehensive line-transect sighting surveys for minke whales (and other whales) will be conducted in the Jan Mayen area (Greenland Sea in 2021). These surveys are included in a six-year cycle (2020-2025) of sighting surveys which will result in new, updated whale estimates for the Northeast Atlantic area in 2026. Samples to assess diets and life history parameters will be obtained from the commercial minke whale hunt.

Russian activities in 2021 will include study of correlation between ice conditions in the White Sea and adjacent areas of the Barents Sea and harp seals of the White Sea/Barents Sea population. Also, in 2021, Russia plans (if funding is secured) to conduct traditional multispectral aerial surveys of harp seal pups of the White Sea/Barents Sea population on their traditional whelping patches in the White Sea as well as in non-traditional areas in the northern and south-eastern parts of the Barents Sea using a specially equipped Russian aircraft. Besides, and if possible (i.e., funding secured), complex dedicated aerial surveys are planned to study other marine mammal species distribution and numbers, and also information about environmental conditions and the distribution of fish species and other marine organisms. Area for these aerial surveys will the Barents and Kara Seas. During Russian and international ecosystem survey in the Barents Sea and Kara Seas opportunistic marine mammal sightings will be carried out. Additionally, scientific observers will continue to collect data on marine mammal distribution on board commercial vessels in the North Atlantic, including the Barents Sea. Traditional annual coastal and motor-boat surveys with the purpose to observe marine mammal species and to collect biological material will be carried out. Sampling of biological material will occur during the Russian commercial harp seal catch (if it will be carried out). Also, there are plans to continue work on the improvement of the White Sea/Barents Sea harp seal population model used to assess abundance.

As part of the Joint Norwegian-Russian Research Program on Harp Seal Ecology, telemetric investigations of harp seals will be carried out in the White Sea in a joint Norwegian-Russian project in spring 2021. This activity will be given priority over other planned research of harp seals of the White/Barents Seas population. Joint observations of marine mammals on the ecosystem surveys will continue. The survey will be carried out is suitable funding is obtained.

***Norwegian surveys***

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | NorwayN-6-01 | Survey title:  | Monitoring of biological parameters, harp seals  |
| Organization:  | IMR  |
| Time period:  | March-May  | Vessel:  | 1 sealer  |
| Target species:  | Harp seal  | Secondary species:  |  |
| Area:  | Southeastern Barents Sea  |
| Purpose:  | Collection of biological material from harp seals during commercial sealing. |
| Reported to:  | ICES, NAMMCO, JNRFC  |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | NorwayN-6-02 | Survey title:  | Boat based studies of harbour seal abundance |
| Organization:  | IMR  |
| Time period:  | August-September | Vessel:  | Rented vessel |
| Target species:  | Harbour seals  | Secondary species:  |  |
| Area:  | North Norwegian coast (Troms, Finnmark) |
| Purpose:  | Estimation of the total number of harbour seals by visual observations and use of drones. |
| Reported to:  | NAMMCO, ICES  |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | NorwayN-6-03 | Survey title:  | Genetic studies of harbour seal population structure |
| Organization:  | IMR  |
| Time period:  | June | Vessel:  | Rented vessel |
| Target species:  | Harbour seals  | Secondary species:  |  |
| Area:  | West Norwegian coast |
| Purpose:  | Collection of biopsy samples from harbour seal pups, to be used in DNA analyses |
| Reported to:  | NAMMCO, ICES  |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | NorwayN-6-04 | Survey title:  | Boat based survey of grey seal abundance |
| Organization:  | IMR  |
| Time period:  | November-December | Vessel:  | Rented vessel |
| Target species:  | Grey seals  | Secondary species:  |  |
| Area:  | Troms, Finnmark |
| Purpose:  | Estimation of grey seal pup production. |
| Reported to:  | NAMMCO, ICES  |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | NorwayN-6-05 | Survey title:  | Ecological studies of minke whales |
| Organization:  | IMR  |
| Time period:  | May | Vessel:  | Whalers |
| Target species:  | Minke whales  | Secondary species:  |  |
| Area:  | Norwegian coast - Barents Sea - Spitsbergen  |
| Purpose:  | Collection of material from whales taken in commercial hunt, material to assess diet and life history parameters.  |
| Reported to:  | IWC, NAMMCO  |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | NorwayN-6-06 | Survey title:  | Line transect surveys of minke whales |
| Organization:  | IMR  |
| Time period:  | July - August  | Vessel:  | Rented vessel  |
| Target species:  | Minke whales  | Secondary species:  | Other large whales  |
| Area:  | Jan Mayen area  |
| Purpose:  | Sighting surveys to assess abundance of minke whales, and abundance, distribution and species composition of other marine mammals. |
| Reported to:  | IWC, NAMMCO |

***Russian surveys***

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.: | RussiaR-6-01  | Survey title: | Multispectral aerial survey of harp seal whelping patches (if funding is secured) |
| Organization: | VNIRO |
| Time period: | March | Vessel: | Special equipped aircraft (SEA) |
| Target species: | Harp seal | Secondary species: | White whale, walrus and other species of marine mammals |
| Area: | The White Sea and the Barents Sea adjacent area, Exclusive Economic Zone of the Russian Federation, internal sea waters and territorial sea of the Russian Federation.  |
| Purpose: | Study of distribution and abundance (by estimation of number of pups in the whelping patches) of the White Sea harp seal population, study of harp seal ecology and their influence on fish species as top predators.  |
| Reported to: | Internal VNIRO survey report, ICES, JRNFC, NAMMCO |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.: | RussiaR-6-02 | Survey title: | Comprehensive aerial research surveys of marine mammals (if funding is secured)  |
| Organization: | VNIRO |
| Time period: | July-September | Vessel: | SEA |
| Target species: | Minke whale, fin whale, humpback whale, white whale, white-beaked dolphin, harp, ringed, grey, common, and bearded seals, walrus | Secondary species: | Hooded seal, and other species of marine mammal, seabirds, fish schools, oceanographic and hydrobiological parameters  |
| Area: | The Barents and Kara Seas |
| Purpose: | Study of marine mammal distribution and abundance in relation to environmental conditions, fish species and other marine organisms’ distribution for better understanding of the effect of marine mammals on the main commercial fishes and for use in ecosystem models for management of commercial living marine resources  |
| Reported to: | Internal VNIRO survey report, ICES, JRNFC, NAMMCO |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.: | RussiaR-6-03 | Survey title: | Marine mammal coastal research and observations including collection of biological samples |
| Organization: | VNIRO |
| Time period: | March-September | Vessel: | Coastal expedition with the use of available transport and different types of motor boats |
| Target species: | Harp seal, minke whale, fin whale, humpback whale white whale, ringed, grey, common, and bearded seals | Secondary species: | Other species of marine mammals and fishes  |
| Area: | Coast of the Barents, White and Kara Seas |
| Purpose: | Collection of biological data, study of distribution and migration routes, estimation of numbers, marine mammals monitoring, assessment of marine mammal influence on fish species, assessment of climatic changes and human activities on marine mammals, data for ecosystem modelling  |
| Reported to: | Internal VNIRO survey report, ICES, JRNFC, NAMMCO |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.: | RussiaR-6-04 | Survey title: | Opportunistic marine mammal sightings during annual Joint Russian-Norwegian ecosystem survey (if funding is secured) |
| Organization: | VNIRO |
| Time period: | August-October | Vessel: | VNIRO research vessel |
| Target species: | Minke whale, fin whale, humpback whale, white whale, white-beaked dolphin | Secondary species: | Hooded seal, harp, ringed, grey, common, and bearded seals, walrus and other species of marine mammal, seabirds, fish schools, oceanographic and hydrobiological parameters  |
| Area: | The Barents Sea |
| Purpose: | Study of marine mammal distribution and abundance in relation to environmental conditions, fish species and other marine organisms’ distribution for better understanding of the effect of marine mammals on the main commercial fishes and for use in ecosystem models for management of commercial living marine resources  |
| Reported to: | Internal VNIRO survey report, ICES, JRNFC, NAMMCO |

***Joint surveys***

|  |  |  |  |
| --- | --- | --- | --- |
| Nation: Reference No.:  | Russia/NorwayJ-6-01  | Survey title:  | Harp seal tagging in the White Sea in the frames of marine mammal coastal research (if funding is secured) |
| Organization:  | VNIRO, IMR  |
| Time period:  | April-May  | Vessel:  | Aircraft for reconnaissance, helicopter, vessel, boats  |
| Target species:  | Harp seal  | Secondary species:  |  Other seal species, whales |
| Area:  | The White Sea area |
| Purpose:  | Study of the harp seal biology and ecology using satellite telemetry. Part of the Norwegian Russian Research Program on Harp Seal Ecology initiated by JNRFC.Marine mammals monitoring, assessment of marine mammal influence on fish species, assessment of climatic changes and human activities on marine mammals  |
| Reported to:  | Joint IMR/VNIRO survey report, JNRFC, ICES WGHARP, ICES AFWG, ICES WGMME, NAMMCO  |

### 7. Investigations on age determination of fish

The exchange of age reading specialists and material for cod, haddock, redfish, Greenland halibut, capelin and polar cod will continue. Twice every year otoliths are exchanged between the institutes and meetings between age readers are usually held every second year.

For capelin, a meeting was held in Murmansk in October 2019, and a meeting for cod and haddock was held in Murmansk in May 2019. The next such meeting for cod and haddock will be held in Bergen in 2021, preferably in May/June. Cooperation on capelin and polar cod age reading will continue.

There continues to be differences in opinion between VNIRO and IMR regarding age reading methods for redfish and Greenland halibut. Russian participation in international workshops on redfish age reading was noted and should continue. Further work will be discussed during the March meeting 2021. There continues to be differences in opinion between VNIRO and IMR regarding age reading methods for redfish and Greenland halibut. The ICES workshop on age reading of Greenland halibut (WKARGH2) in 2016 recommended two methods to be used to provide age estimates of Greenland halibut for stock assessments. Harmonisation of Norwegian and Russian age reading according to this recommendation is needed. Further work will be discussed during the March meeting 2021.

### 8. Investigations on survey methodology, index calculations and assessment methods

VNIRO and IMR hold on to the ideas of developing a joint program on methods and procedures for assessment of important fish stocks in the northern areas. This program should include methods for surveys, methods for calculations of survey indexes and methods for improving assessment tools, including the multispecies and ecosystem models.

Russian and Norwegian colleagues continue to develop new databases and software to make stock size estimates in a consistent, common, and quality assured way.

***Coordination of joint surveys in the Barents Sea***

Russian and Norwegian institutions see the need to continue the optimization of survey strategies, given the limited access to resources, both in terms of experts, ships and financial supporting for such activities. This issue remains one of the most difficult and requires very careful consideration. Many different aspects such as assessment needs, finance, prioritization of work, time period, etc. need be taken into account. Scientists will discuss survey strategies and implementation of an appropriate multi-year survey plan during the March meeting.

***Survey on spawning capelin***

IMR has carried out a survey on spawning capelin in February-March 2019 and 2020 on commercial fishing vessels. This survey has the initial aim to investigate whether the abundance of spawning capelin can be measured with acceptable uncertainty just prior to spawning. The survey will be carried out in 2021 as well, and Russian scientists are invited to take part in the survey as observers if Covid19 pandemic permits survey participation.

### 9. Revision of Greenland halibut reference points

In June 2020 ICES provided catch advice for Greenland halibut for 2021. ICES normally provide advice for a two-year period, but this year the advice is for only one year. The advice next year should be based on MSY or precautionary fishing mortality reference points that need to be defined. A possible approach for determining HRpa reference points was presented, but not fully addressed during AFWG 2020 due to the Covid-19 disruption. Work on this issue will be carried out before the March meeting in 2021 and reviewed at that meeting.  To support work on refining the Bpa, it is needed to exchange catch data from the 1980s and early 1990s (and earlier if possible) as part of work for a forthcoming benchmark planned for 2022.

### 10. Research and long term monitoring on benthic organisms

Long term monitoring on benthic organisms on both Russian and Norwegian side of the Barents Sea should be continued. This includes exchange of personnel between VNIRO and IMR in order to standardise processing of trawl samples and species identification.

Russian and Norwegian scientists will continue to contribute to collaborative and international projects within the Joint Russian-Norwegian Environmental Commission, as well as Arctic Council efforts.

Russian and Norwegian scientists will continue investigations of vulnerable habitats and species in the Barents Sea and adjacent waters.

### 11. Determination of conversion factors

Accurate conversion factors are necessary in order to estimate the actual catches of the joint exploited stocks. Varying fishing and processing conditions, such as fishing areas and seasons, length-weight characteristics, fishing gear, technological parameters of raw fish processing including different ways of processing (machine or manual), processing equipment, ways of freezing, packing and storage require continuous investigations. It is necessary to obtain additional data on conversion factors for fish taking into account annual, biological variations and effects of fishing gear and technological processing equipment.

Russia and Norway will continue their investigations on establishing accurate conversion factors for products for Greenland halibut and beaked redfish.

A joint investigation will be carried out in accordance with point 4.2 in the Protocol of the Permanent committee for management and control on the fisheries sector.

In order to determine conversion factors, Russian and Norwegian scientists will collect data onboard commercial vessels. Survey reports will be available for appropriate authorities in Russia and Norway.

### 12. Development of genetic database for fish species

The further development of joint VNIRO/IMR genetic database for Atlantic salmon populations will continue in 2021 and include sampling for farmed salmon escapees in coastal areas and in rivers. The aim of sampling for farmed salmon escapees in rivers is to provide data for quantifying genetic introgression of farmed fish into wild Atlantic salmon populations.

Russian and Norwegian scientists will continue to explore genetic polymorphism and to investigate population structure of several fish species in the Barents Sea. The studies are focused on but not confined by the cod, capelin, polar cod and the redfish, with the DNA markers for these species to be identified within the next years. The basis for sampling is the surveys conducted by both sides.

Various types of genetic markers for the identification of species within the genus *Sebastes* have been tested in IMR (Tromsø) and VNIRO (Moscow). IMR have collected whole fish that can be used for such analysis. Workshops on this topic are planned for 2021 (Russia) and 2022 (Norway).

### 13. Monitoring of pollution levels in the Barents Sea

VNIRO and IMR will continue to monitor pollution levels in accordance with national programs. Monitoring pollutants is an important task to understand potential impacts on the Barents Sea food web and related food safety. Samples of seawater, sediments and fish will be collected and analysed for organic pollutants, heavy metals and microplastic.

Parties will continue monitoring of marine litter as in the last years.

### 14. Monitoring of the hydrochemical conditions in the Barents Sea

Monitoring of the hydrochemical conditions in the Barents Sea will contribute to improving knowledge about the state and variability of the marine ecosystem. It was agreed to continue exchanging results of chemistry analysis of water samples utilizing national institutes.

### 15. Russian-Norwegian Fisheries Science Symposia

The 19th Joint Symposium, preliminary entitled “Multispecies management: species interactions and trade-offs, environmental changes and multiple pressures”, will be held at the Fram Centre in Tromsø, Norway in early June in 2022. The following sessions will be included: Session 1: Predation and competition. Session 2: Mixed fisheries and bycatch. Session 3: Pressures on environment and ecosystems. Session 4: Multispecies and ecosystem modelling. The conveners of the Symposium will be: Maria Fossheim (IMR), Mette Skern Mauritzen (IMR), Bjarte Bogstad (IMR), Tore Haug (IMR). Russian conveners will be appointed before the March meeting in 2021. The timing of the symposium, conveners, session chairs and further arrangement details will be further discussed at the March meeting in 2021. The contributions to the Symposium will be presented in a volume of the Joint IMR-VNIRO Report Series. In addition, selected contributions will be invited to submit manuscripts to be published in a special issue of a scientific journal.

### 16. Exchange program of scientific personnel

It has been agreed that the program for exchange of scientific personal between Russia and Norway on all levels (students – research technicians – senior scientists) will continue. It will be applied for new projects (from Troms and Finnmark county) to continue the exchange program beyond 2020.

A plan for next year will be developed and finalised at the annual March meeting in 2021. The exchange should have a focus on coordination of research programs and methods between the institutions at their laboratories and at their research vessels during investigations, but will also include database and modelling. Scientists will also be invited to take part in exchanges on surveys.

The parties agreed that the details on the economic arrangements related to exchanges of personnel will be covered in the new MoU between IMR and VNIRO. The new MOU will be discussed at the March meeting in 2021. All joint meetings and survey participation are dependent on how the Covid19 pandemic develops in the coming year. Exchange of personnel on surveys has not been possible since the pandemic started, and at present it seems likely that the pandemic will affect the exchange of scientific personnel also in 2021.

### 17. Data exchange

It was agreed to exchange data collected in joint and national scientific surveys and by observers on board of commercial vessels:

* all data collected in joint surveys relevant to stock assessments and environment conditions;
* field data on temperature and salinity in the Barents Sea with 1 m depth interval from oceanographic stations;
* results of hydrochemical analysis obtained during joint surveys in the Barents Sea;
* data on marine litter and pollutions;
* mean length and weight at age as well as maturity at age used in commercial stocks assessments;
* surveys abundance indexes and acoustic data used in commercial stocks assessments;
* stomach content of commercially important species;
* otoliths and scales collected under the program for age validation of bottom and pelagic fish;
* data on plankton and benthic fauna;
* scales and tissue samples collected for further development of joint genetic database for Atlantic salmon;
* data on the biology of seals of the White Sea population (mortality, maturation, size-at-age, feeding data, ice conditions in the White Sea and adjacent waters of the southeastern Barents Sea);
* data on marine mammals and sea birds distribution and numbers from annual joint ecosystem surveys;
* fisheries statistics for key commercial fish species in ICES Sub-areas 1, 2a, 2b needed for stock assessments of commercial fishes (catches, age composition of catches, mean weights at age in catch).

The above list will be updated during the March meeting. Oceanographic data obtained during surveys need to be exchanged during the survey. If some post processing is required data should be exchanged as soon as possible.

### 18. Catch volumes needed for investigations of marine resources and monitoring of the most important commercial species, as well as management tasks

The catch volumes shall enable to carry out all tasks described in “Joint Norwegian – Russian Scientific Research Program on Living Marine Resources in 20212021” including surveillance activities to provide recommendations on area closures/reopening as well as other decisions on management of fishing activities on living marine resources in ICES Subarea 1 and 2 including respective EEZs of Russia and Norway, international waters (“Loophole”) and Svalbard (Spitsbergen) area.

To solve these tasks the following catch quantities are decided and shall be available in equal parts for both Parties in 2021:

* 14 000 tonnes of cod in addition to volumes mentioned in Appendix 3
* 8 000 tonnes of haddock in addition to volumes mentioned in Appendix 3
* 500 tonnes of capelin in addition to volumes mentioned in Appendix 3
* 1 500 tonnes of Greenland halibut in addition to volumes mentioned in Appendix 3

Both Parties will make all efforts to fulfil the program.

All catches taken for research and management purposes should be recorded in the catch statistics separately.

Under “The Joint Russian – Norwegian Scientific Research Program on Living Marine Resources in 2021” the Norwegian party will grant permission to fish and catch their living marine resources to vessels owned or hired by VNIRO or other Russian scientific institutions in the Norwegian Economic Zone in amounts not exceeding:

* 5 000 tonnes of cod
* 3 000 tonnes of haddock
* 250 tonnes of capelin
* 700 tonnes of Greenland halibut

Under “The Joint Russian – Norwegian Scientific Research Program on Living Marine Resources in 2021” the Russian party will grant permission to fish and catch their living marine resources to vessels owned or hired by IMR and other Norwegian scientific institutions in the Exclusive Economic Zone of the Russian Federation in amounts not exceeding:

* 5 000 tonnes of cod
* 3 000 tonnes of haddock
* 250 tonnes of capelin
* 700 tonnes of Greenland halibut