**Appendix 10**

**JOINT RUSSIAN – NORWEGIAN SCIENTIFIC RESEARCH PROGRAM ON LIVING MARINE RESOURCES IN 2023**

**Contents**

[1. Planning and coordination of investigations and submitting of results. 2](#_Toc116981213)

[2. Investigations on fish and shrimp stocks, including stock size, structure and distribution. 2](#_Toc116981214)

[3. Research program on deep sea fishes 4](#_Toc116981215)

[4. Red king crab (*Paralithodes camtschaticus*) and Snow crab (*Chionoecetes opilio)* 5](#_Toc116981216)

[5. Fishing technology and selectivity of fishing gears 5](#_Toc116981217)

[6. Marine mammals 6](#_Toc116981218)

[7. Investigations on age determination of fish 10](#_Toc116981219)

[8. Investigations on survey methodology, index calculations and assessment methods 10](#_Toc116981220)

[9. Benchmarks and evaluation of harvest control rules 11](#_Toc116981221)

[10. Research and long term monitoring on benthic organisms 11](#_Toc116981222)

[11. Determination of conversion factors 11](#_Toc116981223)

[12. Development of genetic database for fish species 12](#_Toc116981224)

[13. Monitoring of pollution levels in the Barents Sea 12](#_Toc116981225)

[14. Monitoring of the hydrochemical conditions in the Barents Sea 12](#_Toc116981226)

[15. Russian-Norwegian Fisheries Science Symposia 12](#_Toc116981227)

[16. Exchange program of scientific personnel 13](#_Toc116981228)

[17. Data exchange 13](#_Toc116981229)

[18. Catch volumes needed for investigations of marine resources and monitoring of the most important commercial species, as well as management 14](#_Toc116981230)

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

This appendix contains the program for investigations to be carried out in 2023 by Russia and Norway within the frames of the bilateral cooperation between the Norwegian and Russian Parties. The program is in accordance with the national research programs.

Planning, co-ordination 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 on 13-17 March 2023 to discuss joint research programs, results from surveys and investigations in 2022/2023 and to coordinate survey plans for the rest of 2023. If the situation does not permit a physical meeting, it will be held online on the same meeting dates. The cruise plans listed below are preliminary and may change. Missing names of vessels and periods for surveys in this report will be agreed by correspondence, latest by the annual Russian-Norwegian scientists’ meeting. Survey plans and methodology for preparing biological and acoustic data will be discussed and coordinated. Urgent data from surveys carried out before the scientists’ meeting will be exchanged by correspondence.

In the future work it is very important to take into account the knowledge about 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 2023 is presented below. The outlined plans should be considered as 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’s zones. Different mechanisms are possible and need 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.

As long as the suspension of Russian scientists from ICES continues, assessments of joint stocks will be carried out by the Joint Russian-Norwegian Working Group on Arctic Fisheries (JRN-AFWG).

### 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 the 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 in 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, JRN-AFWG | | |

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| --- | --- | --- | --- | --- | --- | --- |
| Nation:  Reference No.: | Norway  N-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.: | | Norway  N-2-03 | | Survey title: | | International ecosystem survey in the Nordic Seas |
| Organization: | | IMR | | | | |
| Time period: | | May – June | | Vessel: | | R.V. “G.O.Sars”,  3 international R.V. |
| 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: | | ICES WGWIDE | | | | |

***Joint surveys***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Nation:  Reference No.: | | Russia/Norway  J-2-01 | | Survey title: | Joint Russian-Norwegian multispecies trawl-acoustic survey for demersal fish stocks (Winter Survey) | |
| Organization: | IMR, VNIRO | | | | | |
| Time period: | January-March | | Vessel: | | | R.V. “Kronprins Haakon”  R.V. “Johan Hjort”  R.V. “Vilnyus” оr оther R.V. |
| 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 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: | Estimation of yearclass strength, abundance and biomass of cod, haddock and other demersal species. Collection of biological samples, oceanographic measurements. | | | | | |
| Reported to: | Joint IMR/ VNIRO Report Series, ICES AFWG, JRN-AFWG | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation:  Reference No.: | Russia/Norway  J-2-02 | Survey title: | Joint Russian-Norwegian ecosystem survey (BESS). |
| Organization: | IMR, VNIRO | | |
| Time period: | August-October | Vessel: | R.V “Professor Levanidov”  R. V. “Vilnyus” or other R.V.  R.V. “G.O. Sars”  R.V. “Johan Hjort”  R.V. “Kronprins Haakon” |
| 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 Sea 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/NAFO WGHARP, NAMMCO, JRN-AFWG | | |

### 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 WGIDEEPSWIDEEPS, 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, August 2019 and August 2022. Results are reported to ICES groups WGIDEEPS and AFWG as well as to JRN-AFWG.

A multi annual survey plan for monitoring of deep-sea species is in action for Norwegian surveys. In 2023 the northern deep-water slope will be surveyed with Greenland halibut and beaked redfish as main target species. In 2022 the southern deep-water slope was surveyed with Greater argentine, beaked redfish and Greenland halibut as main target species. In 2023 the northern deep-water slope will be surveyed with Greenland halibut and redfish 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 the northern Barents Sea and northern Kara Sea is sustained in the survey.

According to this, the following survey will be carried out in 2023:

***Norwegian surveys***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nation:  Reference No.: | | Norway  N-3-01 | Survey title: | Northern Deepwater Slope Survey (Egga-Nord) |
| Organization: IMR | | | IMR | |
| Time period: | | November | Vessel: | R.V. “G.O.Sars” |
| Target species: | | Greater argentine, beaked redfish and Greenland halibut | Secondary species: | Other deepwater 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, ICES AFWG, ICES WGEF, ICES WGDEEP, ICES WGIDEEPSWIDEEPS, JRN-AFWG | | | |

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

The Parties exchanged information about the ongoing national Red king crab and snow crab research and fishery in 2022 and the research plans for 2023.

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 new crab species in 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 continues to be carried out with the aim to develop:

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

- improved survey gears and methodology.

### 6. Marine mammals

The joint Russian-Norwegian research program on marine mammals 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 2023 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. Abundance estimation of harp and hooded seals based on surveys conducted in the Greenland Sea in 2022 is a priority. 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 seal hunt in the West Ice and in the south-eastern parts of the Barents Sea (the East Ice), continues. Furthermore, boat-based surveys to estimate abundance of harbour and grey seals will be carried out in Norwegian coastal areas. These surveys are included in a five-year cycle (2022-2026) which will result in a new, updated population estimates for the entire Norwegian coast in 2026. Comprehensive line-transect sighting surveys for minke whales (and other whales) will be conducted in the North Sea in 2023. 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 diet and life history parameters of minke whale will be collected during commercial whaling activities. Also, some experiments with tagging of minke whales with a new type of electronic tags will be carried out in Norway. Experiments will be carried out to test effects of acoustic alarms to reduce interactions of humpback and killer whales with coastal fisheries.

Russian activities in 2023 will include the traditional 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 2023, 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. In addition, the plan is to use drones equipped with photo- and infrared cameras in the reconnaissance flights. Besides, and if possible (i.e., funding secured), complex dedicated aerial surveys (using aircraft and/or drones) 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 be 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 hunt (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 attempted carried out in the White Sea in a joint Norwegian-Russian project if ice conditions are suitable in April-May 2023. Joint observations of marine mammals on the ecosystem surveys will continue. The survey will be carried out if suitable funding is obtained.

***Norwegian surveys***

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| --- | --- | --- | --- |
| Nation:  Reference No.: | Norway  N-6-01 | 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: | Barents Sea 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 | | |
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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nation:  Reference No.: | Norway  N-6-02 | Survey title: | Telemetric tagging of minke whales | |
| Organization: | IMR | | | |
| Time period: | August-September | Vessel: | | Rented vessels |
| Target species: | Minke whales | Secondary species: | | Humpback whales, fin whales |
| Area: | Coast of North Norway, Svalbard | | | |
| Purpose: | Telemetric tagging of minke whales. | | | |
| Reported to: | IWC, NAMMCO | | | |

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| --- | --- | --- | --- | --- |
| Nation:  Reference No.: | Norway  N-6-03 | | Survey title: | Boat- and drone-based studies of harbour seal abundance |
| Organization: | IMR | | | |
| Time period: | August-September | | Vessel: | Rented vessel |
| Target species: | Harbour seals | Secondary species: | |  |
| Area: | Southwest Norwegian coast | | | |
| Purpose: | Estimation of the total number of harbour seals by visual observations and use of drones. | | | |
| Reported to: | NAMMCO, ICES | | | |

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

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| --- | --- | --- | --- |
| Nation:  Reference No.: | Norway  N-6-05 | Survey title: | Testing methods to avoid whales in purse seine fisheries |
| Organization: | IMR | | | |
| Time period: | November | Vessel: | Rented vessel | |
| Target species: | Humpback whales | Secondary species: | Killer whales | |
| Area: | North Norwegian coast (Troms-Finnmark) | | | |
| Purpose: | Test effect of acoustic alarms to reduce interactions between whales and purse seine fisheries for herring. | | | |
| Reported to: | IWC, NAMMCO | | | |

***Russian surveys***

**If funding is secured**

|  |  |  |  |
| --- | --- | --- | --- |
| Nation:  Reference No.: | Russia  R-6-01 | Survey title: | Multispectral aerial survey of harp seal whelping patches (if funding is secured) |
| Organization: | VNIRO ~~(Polar Branch)~~ | | |
| Time period: | March | Vessel: | Special equipped aircraft (SEA) or other aircraft), drone |
| 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 countingestimation of number of pups onin 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 ~~(Polar Branch)~~ survey report, ICES, JRNFC, NAMMCO | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation:  Reference No.: | Russia  R-6-02 | Survey title: | Comprehensive aerial research surveys of marine mammals (if funding is secured) |
| Organization: | VNIRO ~~(Polar Branchand Northern Branches)~~ | | |
| Time period: | July-September | Vessel: | Special equipped aircraft (SEA) or other aircraft or/and drone |
| 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 White, 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 ~~(Polar Branchand Northern Branches)~~ survey report, JRNFC, NAMMCO | | |

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| --- | --- | --- | --- |
| Nation:  Reference No.: | Russia  R-6-03 | Survey title: | Marine mammal coastal research and observations including collection of biological samples |
| Organization: | VNIRO ~~(Polar Branch)~~ | | |
| 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 ~~(Polar Branch)~~ survey report, JRNFC, NAMMCO | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Nation:  Reference No.: | Russia  R-6-05~~04~~ | Survey title: | Joint Russian-Norwegian ecosystem survey (BESS). |
| Organization: | VNIRO ~~(Polar Branch)~~ | | |
| Time period: | August-August- October | Vessel: | PINRO research vessel (if funding is secured) |
| 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 ~~(Polar Branch)~~ survey report, JRNFC, NAMMCO | | |

***Joint surveys***

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| --- | --- | --- | --- |
| Nation:  Reference No.: | Russia/Norway  J-6-01 | Survey title: | Harp seal tagging in the White Sea within the framework of marine mammal coastal research |
| Organization: | VNIRO ~~(Polar Branch)~~, IMR, MMBI (as invited by IMR) | | |
| Time period: | April-May | Vessel: | Aircraft for reconnaissance, helicopter, vessel, boats |
| Target species: | Harp seal | Secondary species: No |  |
| 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 mammal monitoring, assessment of marine mammal influence on fish species, assessment of climatic changes and human activities on marine mammals | | |
| Reported to: | Joint VNIRO ~~(Polar Branch)/~~IMR survey report, JNRFC, ICES WGHARP, ICES AFWG, ICES WGMME, NAMMCO | | |

### 7. Investigations on age determination of fish

Lately, for different reasons (including Covid-19) there has been no exchange of experts in age reading and data on cod, haddock, sea redfish, Greenland halibut, polar cod and capelin. Along with that, PINRO’s and IMR’s views on age reading methods for redfish and Greenland halibut are still different and, therefore, require some alignment. Meetings of experts and the otoliths exchange should also be resumed.

Next meetings on age reading for cod, haddock and Greenland halibut are scheduled for May-June 2023 and, if funded, will be held in Bergen (Norway).

Further activities will be discussed during the annual meeting of Russian and Norwegian scientists in March 2023.

### 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 joint survey plan during the annual scientist meeting.

***Survey on spawning capelin***

IMR has carried out a survey on spawning capelin in February-March 2019, 2020, 2021 and 2022 using 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 is not planned for in 2023.

### 9. Benchmarks and evaluation of harvest control rules

Shrimp was benchmarked by ICES in January 2022. In 2022/2023, Greenland halibut, capelin, harp seal and hooded seals is scheduled to be benchmarked by ICES. Considering the temporary suspension of Russia from ICES, all activities related to the benchmarks should be coordinated between the Russian and Norwegian part. The results should be discussed as a prospective background for bilateral stock advice for 2024. Any evaluations of HCR of shared stocks will be addressed in bilateral Russian-Norwegian meetings.

According to the agreed workplan in the Protocol of JNRFC 2021 regarding the development of potential management plans for the Barents Sea shrimp stock, the technical work to provide a proposal to be considered by the JNRFC in 2023 continues. Co-ordinated evaluation and review of this scientific work will be conducted in bilateral meetings. A meeting to consider a first draft of a HCR for Barents Sea shrimp stock will be held in conjunction with the annual scientist meeting in 2023. The Russian part has informed that according to the Russian legislation, from 2022 shrimp is included in the list of TAC commercial species.

### 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 and selected crustaceans, taking into account inter-annual biological variations and effects of fishing gear and technological processing equipment.

Russia and Norway will continue efforts to set accurate conversion factors for products from Greenland halibut and beaked redfish.

Research will be carried out in accordance with paragraph 4.2 of the Protocol of the Permanent Russian-Norwegian committee on management and control issues in the fisheries sector.

To determine conversion factors, Russian and Norwegian scientists will collect data on-board 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 2023 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. For polar cod, more samples from the southeastern Barents Sea are needed.

Various types of genetic markers for the identification of species within the genus *Sebastes* have been tested at IMR and VNIRO. IMR have collected fish samples that can be used for such analyses. Workshops on this topic should be planned for in the future.

### 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 micro-plastic.

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, entitled “Multispecies management: species interactions and trade-offs, environmental changes and multiple pressures”, is rescheduled from 2022 to 2023 and will be held at the Fram Centre in Tromsø, Norway 13-15 June 2023. The dates are preliminary. The provisional programme includes 4 theme sessions with 8 main reports, 38 presentations and 5 posters. The number of presentations may be changed. The Symposium is supposed to be held in person in Tromsø, but an option of an electronic platform is also considered.

The programme includes the following theme sessions coordinated by the nominees from the Russian and Norwegian parties:

Session 1: Predation and competition. (Tore Haug / Andrey Dolgov);

Session 2: Mixed fisheries and bycatch. (Bjarte Bogstad / Konstantin Sokolov)

Session 3: Pressures on environment and ecosystems. (Mette Skern Mauritzen / Andrey Krovnin)

Session 4: Multispecies and ecosystem modelling. (Elena Eriksen / Yury Kovalev)

Further arrangement details will be discussed at the annual scientist meeting in 2023. 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.

A plan for the coming year will be developed and finalised at the annual scientist meeting in 2023 (Appendix 4). The exchange should in first place have a focus on coordination of research programs and methods between the institutions at their laboratories and at their research vessels during investigations, and will also include database and modelling. Scientists will also be invited to take part in exchanges on surveys.

The new Memorandum of Understanding will be discussed at the annual scientist meeting in 2023. All efforts will be continued in 2023 based on earlier versions of the MoU between IMR/PINRO/VNIRO. 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.

### 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 after the agreement of the relevant institutions;
* 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 scientist meeting in 2023. Oceanographic data obtained during surveys need to be exchanged during the survey. All 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

The catch volumes shall enable to carry out all tasks described in “Joint Norwegian – Russian Scientific Research Program on Living Marine Resources in 2023” 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 2023:

* 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

The 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 2023” 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 2023” 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 and in amounts not exceeding:

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