

## 2 SURVEY EXECUTION 2018

*Text by G.O. Johansen and D. Prozorkevich*

BESS 2018 was planned to progress according to the “standard scheme”, from south to north. The survey map with planned stations and vessel tracks are presented in figure 2.1.

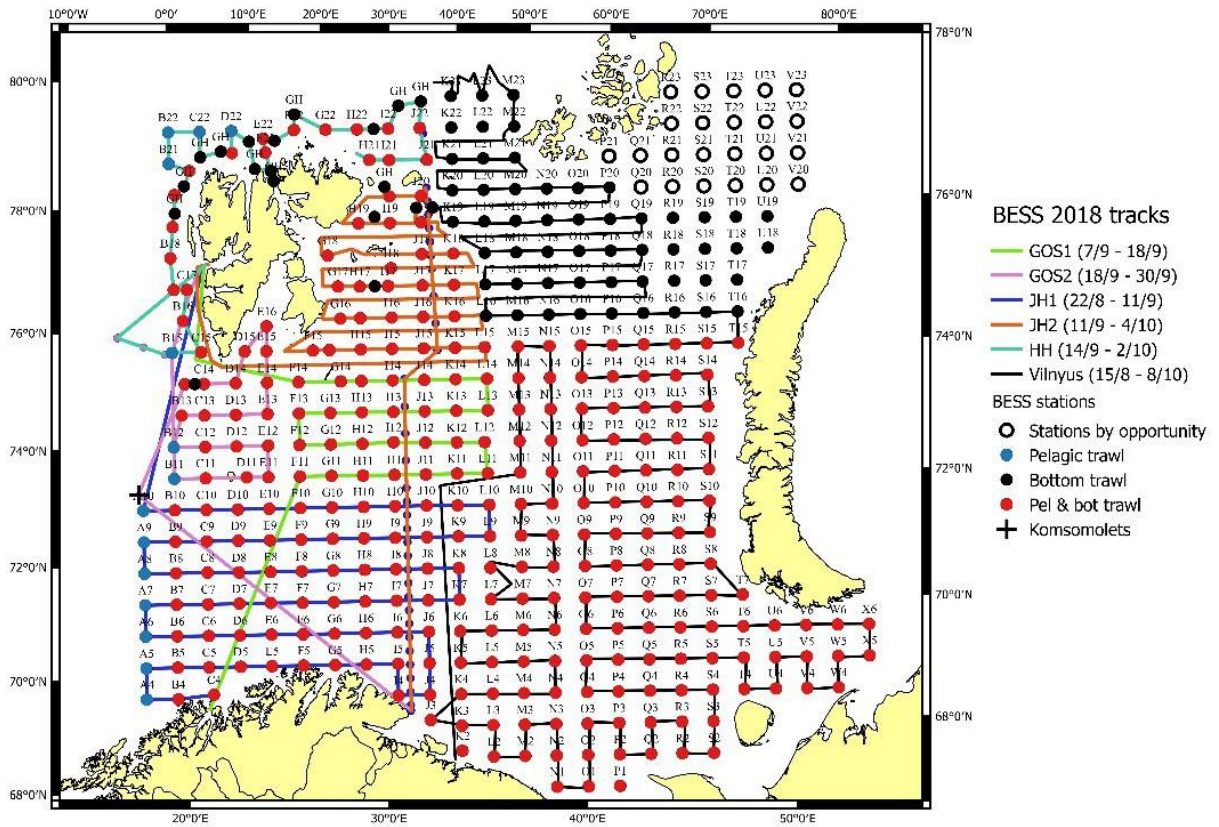
It was decided to keep all the main tasks of the survey similar to previous years. In addition, an extended part of the pollution monitoring was conducted on the Norwegian side, including sampling at the site of the sunken submarine “Komsomolets” (Fig 2.1). This monitoring is conducted every third year. The standard oceanography sections Vardø-Nord, Sørkapp-Vest, and a test section, Hinlopen strait, was sampled as part of the Norwegian survey effort and the standard Kola section as part of the Russian effort.

The BESS 2018 survey coverage was limited, leaving a large part of the Russian zone, as well as a smaller part between Bear Island and Svalbard (Spitsbergen) uncovered. This constitutes about 1/3 of the planned survey coverage (Fig. 2,2 and 2.3). There were several reasons for this lack of survey coverage. The Russian vessel “*Vilnyus*” had planned to work 52 vessel-days, but due technical problems, it had to return to port twice. Thus, the actual vessel-days was reduced to only 29 days and most of the south eastern part of the survey area in REEZ was not covered. Bad weather conditions prevented the *G.O. Sars* in completely covering the survey area between Bear Island and Svalbard (Spitsbergen). In addition, *G.O. Sars* carried out additional pollution sampling, requiring more time than planned before the survey.

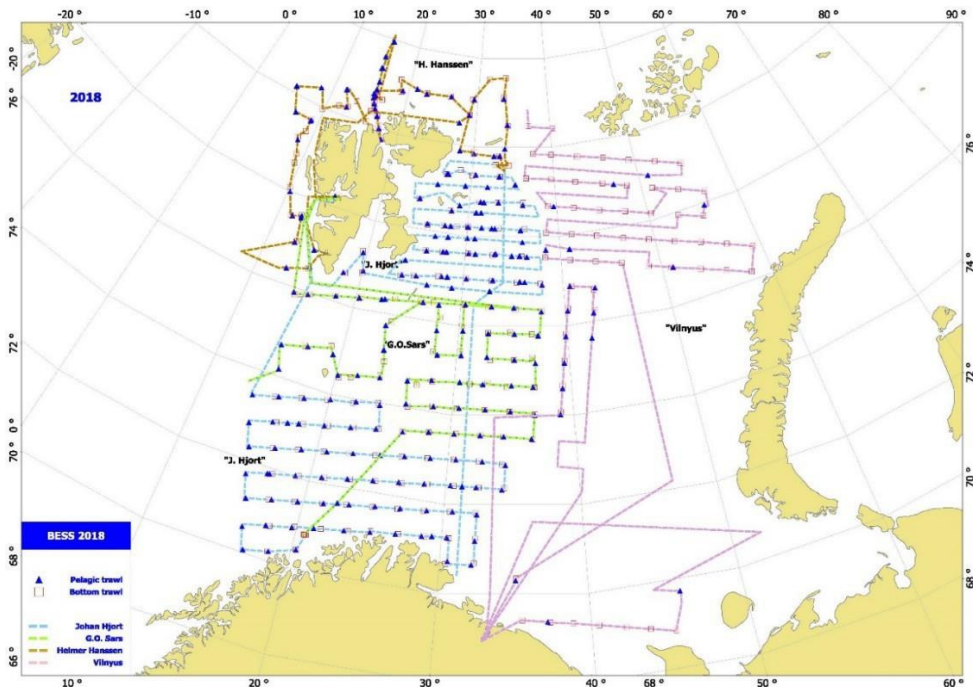
The effect of this coverage problems was dramatic and resulted in poor data for estimation of e.g. the 47-year long time series of 0-group indices, and the survey index for important 0-group species could not be calculated. All the other ecosystem monitoring time series is also hampered by this lack of survey coverage. However, the capelin distribution area was well covered in the last half of the survey and the stock assessment was successful.

The resulting survey coverage was; RV “*Vilnyus*” covered the Loophole and only the northern part of REEZ in the Barents Sea. The Norwegian RVs covered the NEZ of the Barents Sea, with “*Johan Hjort*” in south and northeast, “*G.O. Sars*” in the central parts, and “*Helmer Hanssen*” in the areas west, north and northeast of Svalbard (Spitsbergen). The effective vessel days in 2018 amounted to 110 days. The realized research vessel tracks and trawl stations for the 2018 ecosystem survey are shown in Figure 2.2. Hydrography and plankton stations are shown in Figure 2.3.

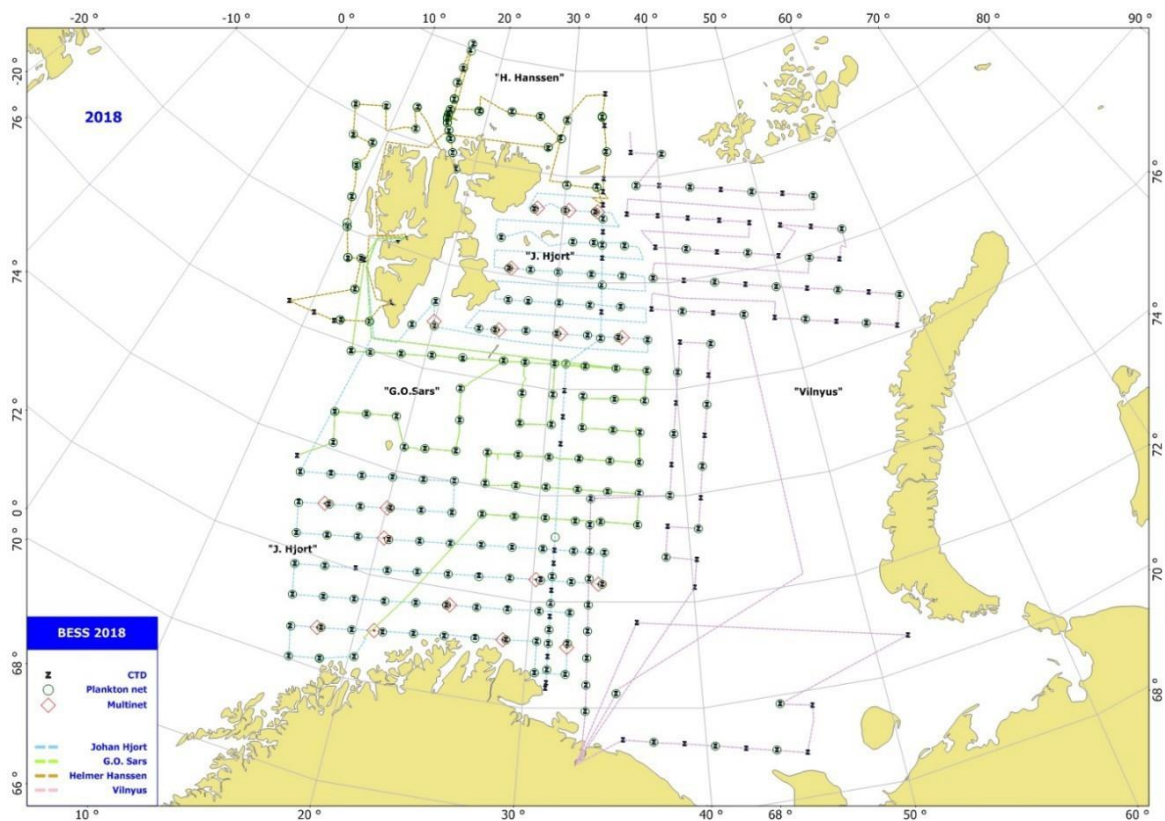
# ECOSYSTEM SURVEY OF THE BARENTS SEA AUTUMN 2018



**Figure 2.1** BESS 2018, planned survey map with ecosystem stations and vessel tracks (G.O. Johansen, IMR).



**Figure 2.2** BESS 2018, realized vessel tracks with pelagic and bottom trawl sampling stations, note that some trawl stations are taken in addition to the regular ecosystem stations. (Jaime Alvarez, IMR)



**Figure 2.3** BESS 2018, realized vessel tracks with hydrography and plankton samples at ecosystem stations (Jaime Alvarez, IMR).

### 2.1 Sampling methods

The sampling manual for this survey has been developed since 2004 and published on the Ecosystem Survey homepage by specialist and experts from IMR and PINRO ([http://www.imr.no/tokt/okosystemtokt\\_i\\_barentshavet/sampling\\_manual/nb-no](http://www.imr.no/tokt/okosystemtokt_i_barentshavet/sampling_manual/nb-no)). This manual includes methodological and technical descriptions of equipment, the trawling and capture procedures by the samplings tools, and the methods that are used in calculating the abundance and biomass for the biota. The manual is continuously updated.

The trawl rigging on both bottom trawl (Campelen-1800) and pelagic trawl (Harstad) at Norwegian vessels was changed in BESS 2017 and continued in 2018. All Norwegian vessels were equipped with semi-pelagic trawl doors of type “Tyborøn 7a”. In addition, the sweeps were changed from steel wire to Dynema wire. This was done to standardize the rigging on all vessels and to accommodate the use of only one type of doors on each vessel. For the pelagic trawl, the sweep length was reduced, and the amount of flotation was increased, to ensure similar the same behaviour of the trawl as earlier. Russian vessels used the same equipment as previously. The Campelen-1800 trawl and Harstad trawl with semi-pelagic trawl doors “Sparrow”  $V=5.0 \text{ m}^2$ .

There were some indications that the new rigging of the pelagic trawl led to problems positioning the trawl in the medium depth (20 m) during 0-group hauls. It was investigated at a gear technology survey in December 2018, after BESS 2018 is finished. The results of

this work will be available as a survey report at IMR. Contact: A. Engås, IMR and D. Prozorkevich, PINRO.

## 2.2 Special investigations

BESS is a useful platform for conducting additional studies in the Barents Sea. These studies can be testing of new methodology, sampling of data additional to the standard monitoring, or sampling of other types of data. It is imperative that the special investigations do not influence the standard monitoring activities at the survey. The special investigations vary from year to year, and below is a list of special investigation conducted on Russian Norwegian vessels at BESS 2018, with contact persons.

### Fish pathology research

PINRO undertakes yearly investigations of fish diseases and parasites in the Barents Sea (mainly in REEZ). The main purpose of the fish pathology research is annual estimation of epizootic state of commercial fish species. The observations are entered into a database on fish and pathology. This investigation was started by PINRO in 1999. Results are available in the report of the ICES Working Group on Pathology and Diseases of Marine Organisms (WGPDMO).

Contact: Tatyana Karaseva, PINRO. [karaseva@pinro.ru](mailto:karaseva@pinro.ru)

Link to more information: <http://www.ices.dk/community/groups/Pages/WGPDMO.aspx>  
<https://www.amazon.com/Barents-Sea-Ecosystem-Management-Cooperation/dp/8251925452>  
(pp. 743-749)

### Environmental DNA

BESS 2018 provided water samples from CTD casts at ecosystem stations west and north of Svalbard (Spitsbergen). These samples are used for detecting eDNA from of snow crab in the western parts of the Barents Sea.  
Contact: C.. Hvingel IMR.

### Samples of 0-group herring

BESS 2018 provided frozen samples of 0-group herring from 7-8 selected areas distributed in the Norwegian part of the Barents Sea. The aim is to establish the presence of distinct groupings within the 0-group Norwegian spring-spawning herring using otolith micro-chemistry and micro-structure analysis. This is continued from 2017.

Contact: O. Kjesbu , IMR.

### Isotope study of the Barents Sea food web

This is part of an IMR coordinated project describing the food web of the Barents Sea. The aim is to collect isotope data from all parts of the ecosystem (fish, benthos, zooplankton, marine mammals etc.). At BESS 2018 we sampled selected macroplankton and benthos species, which will be used for establishing a base line for the food web.

Contact: K. MacKenzie, IMR.



Invertebrate benthos for bioprospecting

BESS 2018 provided frozen samples of selected species and groups of benthos to MARBANK, IMR.

Contact: R. A. Johansen, IMR

Hinlopen strait standard section

This is a continuation of the standard section established by the SI\_ARCTIC project at IMR in the period 2014-2017. The section was taken from the Hinlopen strait northwards into the Arctic Ocean. The sampling included CTD, plankton nets and fish trawls (Fig 1 and 2).

Contact: R. Ingvaldsen, IMR

Macro-zooplankton trawl

A trawl for taking samples of krill, amphipods, mesopelagic fish, jellyfish etc. in the water column down to about 800-1000 m depth was tested at BESS 2018.

Contact: E. Bagøien, IMR

Micro plastics

Sampling of micro plastics with Manta trawl in the surface was tested on Norwegian vessels only. The purpose is to establish standard monitoring of micro plastic in the Barents Sea.

Contact: B. E. Grøsvik, IMR.

Optical species determination (DeepVision)

An optic system on the pelagic trawl to provide visual observations of fish in a vertical profile was tested out at RV Johan Hjort in the capelin area east of Svalbard (Spitsbergen). The purpose is to visually separate between capelin and polar cod and estimate their size composition to improve acoustic characterization of these two species.

Contact: G. Skaret, IMR

Link to more information: <https://www.deepvision.no/>

Pollutants in snow crab

Frozen samples of 25 individuals of snow crab of commercial size were provided to analyse the occurrence of pollutants.

Contact: M. Wiech, IMR

Micro plastics in the food web

Frozen samples of sediment living benthos, cod, shrimp, and zooplankton were provided to analyse the occurrence of micro plastic in the food web of the Barents Sea.

Contact: B. E. Grøsvik, IMR

Genetic studies of polar cod

Frozen samples of polar cod were provided from Norwegian vessels in the areas around Svalbard (Spitsbergen) and in the capelin area. This was done to test population genetic structure of this species in the Barents Sea.

Contact: T. Johansen, IMR

Pollutants in deep water fish

Frozen samples of Greenland halibut, deepwater redfish, and golden redfish from selected areas were provided from Norwegian vessels to analyse the occurrence of pollutants.

Contact: G. K. Bjørneset and B. Nilsen, IMR

Genetic studies of Gadoid fish

Tissue samples from cod, haddock, pollock, saith and whiting were provided for genetic analyses related to mapping of spawning and nursery areas for coastal commercial stocks.

Contact: S. Heiberg Espeland and I. K. Møllerud, IMR

Provenance studies of cod and haddock

Frozen tissue samples from cod and haddock of commercial size were provided for a baseline isotopic determination of how commercial fishes from different areas look isotopically. This is part of an investigation into isotopic methods for determining the area of origin of commercial fish sold in the market.

Contact: E. Olsen, IMR and C. Trueman, University of Southampton

Water samples for ocean acidification studies

BESS 2018 provided water samples for analysis of ocean acidification from Norwegian vessels along the Vardø-Nord hydrographic section.

Contact: M. Chierici, IMR.