

Technical report

from the Joint Norwegian/Russian Ecosystem Survey

in the Barents Sea, August – October 2012

From 2003, the survey has been part of a joint Norwegian-Russian ecosystem survey, designed and carried out in cooperation between the Institute of Marine Research (IMR), Norway and the Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO). The survey covers the ice free part of the Barents Sea and the Svalbard shelf. Four (five) vessels normally operate in the region, three Norwegian and one (two) Russian. Most aspects of the ecosystem are covered, from physical and chemical oceanography, pollution, garbage, phytoplankton and zooplankton to fish (both young and adults), sea mammals, benthic invertebrates and birds. A range of methods and gears are applied, from water sampling using CTD's, to plankton nets, pelagic and demersal trawls, grabs and sledges, echo sounders and direct visual observations. The use of these sampling tools and the treatment of the samples are detailed explained in the "Sampling Manual" for the Joint Annual Norwegian-Russian Ecosystem Survey in the Barents Sea" in August-October.

"Technical Report" presents all types of deviations from the standards presented in the "Sampling Manual" (http://www.imr.no/tokt/okosystemtokt_i_barentshavet/sampling_manual/nb-no). In addition to the standard monitoring of the Barents Sea, several studies and experiments are carried out. These methods of "special investigations" are also described in the "Technical Report".

1. Deviations from the standards presented in the "Sampling Manual"

by Wenneck T. and Prozorkevich D.

Equipment:

- 1:** Problems with the one of the trawl drums on G.O. Sars, made krill trawling difficult.
- 2:** Problems with the MOCNESS on Johan Hjort part 2.
- 3:** Calibration of trawl is an issue that should be addressed, both between Norwegian vessels and between Norwegian and Russian vessels.
- 4:** Winch used to handle the MOCNESS on Johan Hjort had some problems. Due to this problem, several mornings where aborted.

5: Due to soft bottom and/or large numbers of sponge, “Tromsø trawl” setup where used. There’s no code or routines, to describe this change of trawl settings.

6: Russian vessel has got the new Campelen trawl which have much more catchability for benthic organism then previous equipment.

2. SPECIAL INVESTIGATIONS (see also “Survey Report 2012”)

Acoustic monitoring of zooplankton (abundance and distribution)

by Gavin John Macaulay

Aim of investigations

The overall aim of this special investigation was to develop methods and procedures for the routine estimation of zooplankton abundance and distribution in Norwegian waters using acoustic techniques, with an initial focus on the Barents Sea. The particular objectives for the 2012 ecosystem survey were:

- to collect multi-frequency echosounder data
- to carry out targeted identification trawls on zooplankton marks
- to collect MS70 sonar data in three defined areas

The multi-frequency acoustic data and targeted trawls will be used to estimate zooplankton abundance and distribution for the Barents Sea via a conventional echo-integration analysis. The MS70 sonar data will be used to estimate the sampling efficiency of the echosounder data by comparing numbers and spatial densities of zooplankton aggregations observed by the echosounder and MS70 in three areas (shallow western, deeper region associated with Atlantic inflow, and an eastern area).

Equipment

The equipment used in this investigation was:

- Simrad EK60 multi-frequency echosounders
- Simrad MS70 3D sonar
- Krill trawl
- MOCNESS

- Harstad trawl

Procedure

Standard echo-integration techniques will be used to analyse the acoustic data using LSSS. Trawl catches will be used to broadly partition the zooplankton marks into species groups. The PROMUS software will be used to analyse the MS70 data to yield estimates of zooplankton school size and distribution.

Special investigation of 0-group cod (*Gadus morhua* L)

by Torild Johansen

Aim of investigations

The sampling of 0-group cod was part of a larger project where we study population genetic structure of Northeast Arctic cod and its connectivity to coastal cod along the Norwegian coast.

In two years we have collected samples of cod from the Barents Sea (Barents Sea winter survey, ecosystem survey), spawning stock from the Norwegian coast (from Finnmark to Lofoten) and the juvenile cod from the Barents Sea (the ecosystem survey). By collecting cod of all age groups and sizes we will study if there is any sub-structuring within Northeast Arctic cod from the Barents Sea.

Previous investigations of landings of gonads (Sundby & Nakken 2008), modeling studies (Vikebø 2007) and genetic studies (Skarstein and Fevolden 2007, Dahle 1992) have indicated such sub-structuring. In addition the typing of cod otoliths into coastal cod and Northeast arctic cod, show that some coastal cod migrate way into the Barents Sea. We wanted know the possible level of this possible invasion. So the overall aim of the ecosystem survey was to collect 0-group cod covering the Barents Sea and Svalbard to study the genetic structure. This project is closely connected to a similar cod project managed by VNIRO.

Method

Labeled boxes with 2 ml tubes filled with ethanol was stored on board all vessels in 2011 and 2012. 0-group cod was collected from all over the Barents Seas in addition to Svalbard in two years (2x500 cod). In 2012 the collection of juveniles was coordinated with University of Bergen who collected the whole fish for morphological studies and for more detailed studies of the juveniles' otoliths to identify time for settling of cod.

Procedure

Gill tissue was collected from the fish immediately after the catch came onboard. It was important that the gill tissue was as fresh when collected, to make sure we would get high quality DNA for the genetic analysis.