How does ice cover affect the benthic fauna in the Barents Sea?

S.J. Cochrane[1], S.G. Denisenko[2], N. Anisimova[3] & L.L. Jørgensen[4]

[1] *Akvaplan-niva, Polar Environmental Centre, N-9296 Tromsø, Norway*
[2] *Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia*
[3] *Polar Research Institute of Marine Fisheries and Oceanography, Murmansk, Russia*
[4] *Institute of Marine Research, Sykehusveien 23, N-9294 Tromsø, Norway*

Ecological surveys have been carried out in the Barents Sea for many decades, but until recently, most expeditions have been carried out on either one or other side of the political boundary that divides the area. With today's large-scale fisheries and petroleum exploration activities, there is a pressing need for joint ecosystem-based environmental management of the area as a whole. To do this we need environmental data that is compatible, and which spans both Russian and Norwegian waters. Both spatial and temporal data are necessary in order to document natural variations and distinguish these from anthropogenic impacts. In some cases, indicators for environmental health or state may be selected, to make data collection manageable. Such joint data shall serve to evaluate the current ecosystem status and to make projections in the event of environmental changes. Ultimately, the knowledge gained shall be used as feedback to operational processes, which aim for best environmental practices.We present two large-scale joint Russian-Norwegian surveys of environmental conditions and benthic fauna in the Barents Sea.

The project "Benthic fauna at the Barents Sea ice edge in a changing climate" (BASICC), financed by the Norwegian Research Council, was initiated in 2003. Quantitative, replicated sampling and analyses of benthic infauna and sediments, together with productivity and ice regimes were carried out at 47 stations extending across approximately 400 000 km^2. Around 600 taxa were recorded. Ice cover showed a clear inverse relationship with both infaunal abundance and the overlying primary productivity regime

The first two years (2006 and 2007) of the ongoing annual monitoring programme "Russian-Norwegian Joint Annual Ecosystem Surveys" (JAES) sampled zooplankton, pelagic fish, bottom fish, benthic animals, and oceanography from over 1000 campelin trawl hauls in the Barents Sea. Joint publishing is in progress where we present results of benthos caught as 'bycatch' from approx. 500 hauls , Biomass ranged from under 1 kg to over 2 tonnes in the sponge-rich south-eastern area and highest numbers of taxa occurred around the Spitsbergen Bank.

Traditional faunal grab sampling is most efficient for capturing the small, numerically abundant benthic organisms, and tends to show a dominance of worms and molluscs. Trawling, on the other hand, mostly samples larger organisms, and due to the sheer area of sea floor covered, also sparsely distributed organisms can be well-represented. Grab sampling is a quantitative technique, for a small area of sea floor, whereas trawl samples can give only qualitative, or semi-quantitative information, but over a large area of sea floor.
Therefore, both techniques have different strengths and shortcomings, and the respective results cannot directly be compared or integrated into a single analysis. However, used in combination, grab and trawl samples can provide a more comprehensive picture of benthic conditions than each method alone.

Similarly, until recently, Russian and Norwegian benthic research was carried out largely independent of each other, even though both sides have worked in similar areas. Due to slight differences in methodology, equipment and working practices, the results have not always been directly compatible. By conducting joint cruises and data analysis, the BASICC and JAES programmes make a substantial contribution to generating large-scale inter-compatible faunal data from the Barents Sea.