

5.6.3. Benthos community

5.6.3.1. Monitoring the northern shrimp

by T. Thangstad and C. Hvingel

Northern shrimp (*Pandalus borealis*) is a cold-water, demersal shrimp species found at depths down to 600 m in the Barents Sea. Their preferred temperature range seems to lie between zero and 4°C. High density shrimp areas have traditionally been found in the north-west around Spitsbergen, east to and south of Edge Island, and further south to the Hopen deep. With the influx in later years of warmer Atlantic water masses into the Barents Sea the most southern shrimp contingent appears for the most part to have moved steadily eastwards and into the Loop Hole and the Russian EEZ. The fishery for northern shrimp in the whole area has declined since the 1980s, but is still sizeable.

At present, the ecosystem survey is the only survey where data are collected for use in the assessment of the northern shrimp stock in the Barents Sea. It is therefore important that the main shrimp distribution area be covered in sufficient detail. The biological investigations on the shrimp in the catch should also have the necessary level of detail to adequately resolve the demography of the stock.

P. borealis are sorted from the Campelen trawl catches and recorded by total weight and (estimated) abundance.

From catches > 5 kg a subsample of 250-300 individuals is sorted to sex and maturity stage, weighed, and measured by carapace length (CL, 0.1 mm) (see *sampling manual*, Allen 1959, McCrary 1971). A sample of up to 100 juvenile individuals is taken from the juvenile (Hoita) bag and measured the same way as the adults.

Data from the sampling stations are stratified by depth and area as in Fig. 5.6.3.1. The stratification consists of five main areas, each of which is further sub-divided into 6 depth strata (0-600 m). The area of each stratum was calculated using GIS software. The catch in each trawl haul divided by the swept area represents a sample of shrimp density in a given stratum. From these samples the mean and standard error of the density in each stratum is calculated and multiplied by the area of the stratum to give an estimate of stratum biomass and abundance. For strata with only one tow the standard error is calculated as $B*0.985$ (Cochran 1977). The means and their standard errors for the strata are summed to give the overall biomass values for the whole survey area. The estimated

abundance of shrimp at 13-16 mm CL is taken as an index of recruitment of shrimp to the fishery. For further details on sampling and methods, see e.g. Hvingel *et al.* (2010).

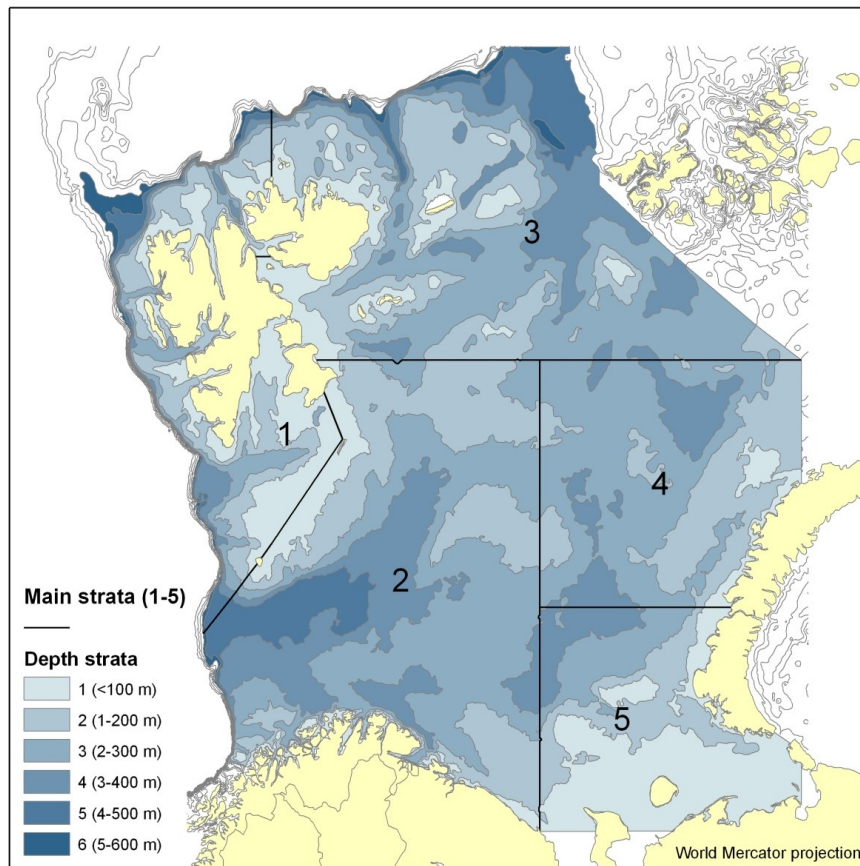


Figure 5.6.3.1. The shrimp survey stratification scheme.

5.6.3.2. Monitoring the red king crab (*Paralithodes camtschaticus*)

by J. Sunde and M. Pimchukov

The non native red king crab has dispersed differently in the Norwegian and Russian part of the Barents Sea; in Russian part the crab has a substantial off shore distribution, whilst it seems to be more attached to coastal areas in the Norwegian part, and only few crabs are caught further out than 15 – 20 nm from shore. This entails that magnitude of catches of red king crab during the ecosystem cruises will likely be very different in the two zones. In addition, the two countries have specific cruises targeting the red king crab in each national zone.

Therefore, the data acquisition on this crab on the ecosystem cruises will be different in the two parts of the Barents Sea.

The *IMR survey manual* gives detailed instruction on how to make recordings on the red king crab. However, due to the low expectations for bycatches of the crab, and that there

is targeted cruises for the crab in Norwegian waters, a full recording scheme in accordance to the survey manual is of limited use.

When red king crabs are caught as bycatch at the ecosystem cruises (commonly in bottom trawl), the following parameters in each specimen should be recorded as given in the sampling manual and stored in the database: Carapace length (from the right eye orbit to the notch at the rear of the carapace), sex (see drawings in the sampling manual), carapace age (see table in sampling manual) and presence/absence of external eggs.

One should be aware of that beyond the quota regulated area for red king crab fishery in the Norwegian zone (west of 26° E and north of 71° 30' N) it is prohibited to release viable red king crabs back to the sea.

5.6.3.4. Monitoring the snow crab (*Chionoecetes opilio*)

by J. Sunde and V. Pavlov

The snow crab is also a non native species to the Barents Sea and the abundance of the crab is several times much higher in the Russian than in the Norwegian part. In Russian waters the crab is found in high densities along the western shelf of Novaja Zemlja and is distributed on most parts of the eastern Barents Sea. In the Norwegian zone however, only occasional by-catches of this crab is taken, mostly in the deeper parts of Sentralbanken and Thor Iversen Bank. So far only a small number of crabs have been caught by Norwegian vessels during the winter- or ecosystem cruises (< 100). This entails that the sampling regime on snow crabs so far, will be different the Norwegian and in the Russian zone. As long as there is only small catches of snow crab it is not necessary to crew the Norwegian research vessels with people skilled in crab data sampling. Instead, total weight and number of all snow crabs caught must be recorded in the database for each station. Individual data on this crab will be recorded in the laboratory at the Institute. Legs and claws of the snow crab is easily broken off when this crab is handled frozen. In order to achieve all necessary individual data it is vital that each individual snow crab is sealed whole in a plastic bag (zip lock) prior to storage in the freezer. All bags with crabs should be marked with station number and date with a permanent felt pen.

Crabs (in single bags) from the same station should be stored in a bigger bag.