## Methods for sampling, analyzing and processing data of nektobenthos

Nektobenthos are organisms that swim at the bottom of the sea or lake. In the Baltic Sea the target species of the nektobenthos are small opossum shrimps from Mysida order. Two of them – *Mysis mixta* and *Neomysis integer* – are the most abundant. They have a diurnal cycle of feeding strategy – during daylight time, they filter detritus over the bottom, but during the dark time after sunset, they lift up in the water column to feed with phytoplankton and zooplankton organisms. The mysids have a great role in both benthic and pelagic food webs, increasing during wintertime, especially for Baltic herring and young cod.

**Sampling equipment**

The BIOR uses the Isaacs-Kidd midwater trawl (IKMT), 10-feet model as sampling gear (Figure 1). IKMT is suited for towing with one trawling rope. Trawl built-up from wide V-shaped diving vane or depressor and the attached conical net with 6 sqm pentagonal mouse opening and MOnyl or similar material net with 500 µm mesh size at codend (the same is used for IKS-80 ichthyoplankton net). The depressor keeps the net mouse open during towing with speeds up to 5 kts. The depressor is attached to the vessel's trawl sonar to observe the depth of the sea.

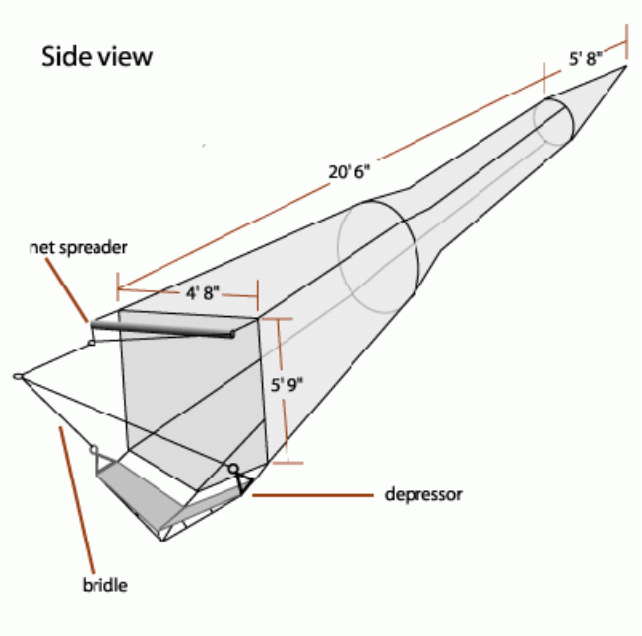


Figure 1. Principal scheme of the IKMT (Taken from Isaacs-Kidd midwater trawl – NOAA Teacher at Sea Blog files).

Trawling time is fixed by a chronometer. To collect samples from hauls, two containers, usually 12 l pails are used, for larger hauls – fish boxes are used. All sampled nektobenthos organisms are stored in 1 l plastic jars and buffered with 90 % alcohol or 4 % formaldehyde solution to process them later in the laboratory.

The sieve with 500 µm mesh size and 1 l measuring cup is also used during haul preparation.

**Sample processing equipment in the laboratory**

In the laboratory, samples are rinsed with pure water and put in a processing tub or Petri dish. Organisms are separated by groups using tweezers to the lowest possible level of taxa—species, genus, or family. For nektobenthos group separation, the Leica binocular is used.

All groups are weighed on scales with a resolution of 1 mg, but individuals are weighed on scales with a resolution of 0.1 mg.

Mysids individually have a length measured on a measuring board with a 1 mm of resolution.

**Sampling process in the sea**

Sampling of the nektobenthos is usually conducted on rented commercial fishing vessels. Since 2009, sampling has been made only in Latvian EEZ (ICES SD 28.2) in October-November in three geographical transects – Ventspils, Pavilosta and Liepaja. At each transect, 4 stations are made over 25, 50, 70 and 90 m of depth; in total, 12 stations per survey are made over (Figure 2).

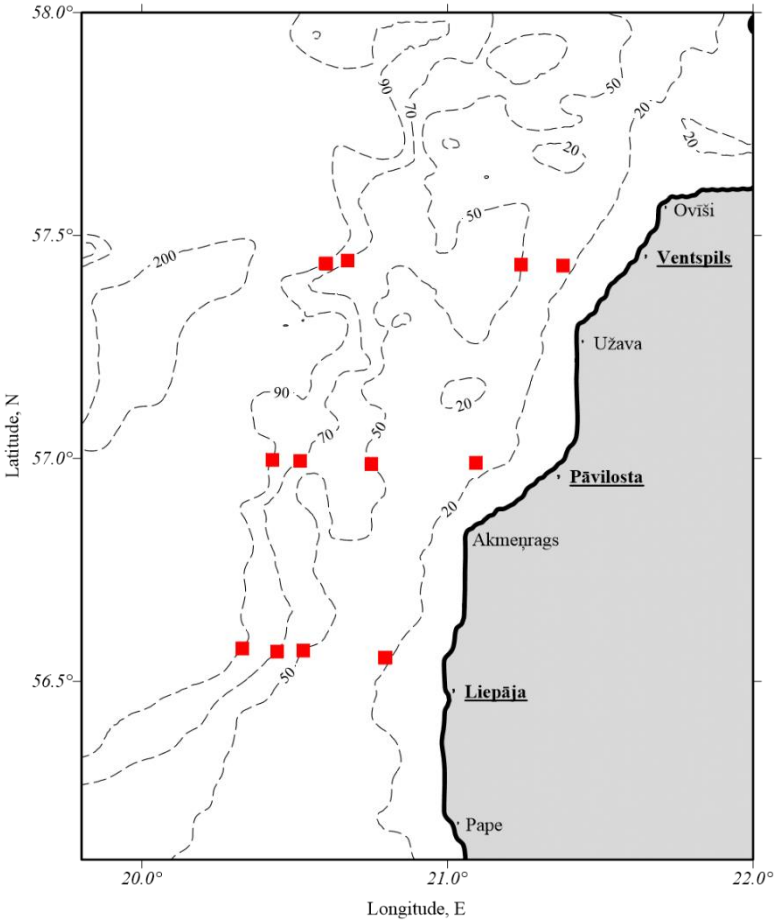


Figure 2. Nektobenthos stations in the Baltic Sea (ICES Subdivision 28.2, Latvian EEZ).

Hauls are made during dark time of the day due to diurnal particularities of mysids feeding behaviour. The trawling process is gradual by preselected horizons of the water column. First, IKMT is lowered to the bottom layer (1-3 m over the bottom), then lifted to the next horizon 10-15 m above, and then to the next

horizon 10-15 m above till the 5 m below the surface, and then to the surface layer (approx. 1 m below the sea surface). At each horizon, the trawl is towed for 1 minute. Only the total time of trawling is fixed by the chronometer. The towing speed of the vessel during trawling is usually 2.8 – 3.4 kts.

The general selection algorithm of horizons is:

- at 90 m depth – bottom layer-75-60-40-25-15-5-surface
- at 70 m depth - bottom layer-55-40-25-15-5-surface
- at 50 m depth - bottom layer-35-20-10-5-surface
- at 25 m depth - bottom layer-15-10-5-surface

The trawling logbook records all statistical information about station position, depth, weather conditions, and trawling statistics—date, daytime, course over ground, vessel's speed, rope length, observed horizons, and total time of trawling.

Then, the cod end of the trawl is taken onboard and emptied into a pail or fishing box. The Net is thoroughly rinsed to ensure that no organism is left behind. Then, the haul is observed, and nektobenthos organisms, if necessary, are separated from the jellyfish and rinsed through the sieve into a measuring cup. They are then stored in a plastic jar with prebuffered alcohol or formalin.

**Sample processing in the laboratory**

Before processing, samples are rinsed with pure water. Samples are observed through binoculars with changeable magnification. Then each sample by tweezers is separated into organism groups. Each larger group is weighed on scales with a resolution of 1 mg. For mysids the length measurements are taken too. From each mysid species max. 200 specimens are taken and measured by length classes with 1 mm step. Then each class is weighed on scales with a resolution of 0.1 mm. The length of mysids is taken from the baseline of the eyes to the end of the uropods.

**Data processing**

All data are recorded in MS Excel worksheets, where preliminary calculations are made. Then, the data are entered into the Biodata database, where they are stored permanently, and the report tables are made. All data on the abundance and biomass of mysids are calculated using 1000 cubic meters of sea water.