

## 10.3 Instruments and fishing gear used

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### 10.3.1. Instruments

The Simrad ER-60/18, 38, 120, 200 and 330 kHz scientific sounder was run during the survey for fish observation and bottom detection.

Standard sphere calibrations were carried out in Malangen fjord, Spilderbukta (79°25'N and 18°31'E) 05-06.09.2014 by using a 60 mm diameter copper sphere for 38kHz. Due to high fish densities only 38kHz was calibrated. Other frequencies were examined by running the appropriate calibration sphere through the echosounder beam in order to manually check that signal levels were normal. Thus eliminating the possibility of a faulty echo sounder.

The details of the settings of the 38 kHz echo sounder where as follows:

|  |           |                      |            |
|--|-----------|----------------------|------------|
| Reference Target:                              |           |                      |            |
| TS   | -33.60 dB | Min. Distance        | 21.00 m    |
| TS Deviation                                   | 5.0 dB    | Max. Distance        | 27.00 m    |
| Transducer: ES38B Serial No.                   |           |                      |            |
| Frequency                                      | 38000 Hz  | Beamtype             | Split      |
| Gain   | 25.51 dB  | Two Way Beam Angle   | -20.8 dB   |
| Athw. Angle Sens.                              | 21.90     | Along. Angle Sens.   | 21.90      |
| Athw. Beam Angle                               | 6.85 deg  | Along. Beam Angle    | 6.84 deg   |
| Athw. Offset Angle                             | -0.08 deg | Along. Offset Angl   | 0.15 deg   |
| SaCorrection                                   | -0.65 dB  | Depth                | 6.00 m     |
| Transceiver: GPT 38 kHz 009072034687 2-1 ES38B |           |                      |            |
| Pulse Duration                                 | 1.024 ms  | Sample Interval      | 0.190 m    |
| Power  | 2000 W    | Receiver Bandwidth   | 2.43 kHz   |
| Sounder Type:                                  |           |                      |            |
| EK60 Version 2.4.2                             |           |                      |            |
| TS Detection:                                  |           |                      |            |
| Min. Value                                     | -50.0 dB  | Min. Spacing         | 100 %      |
| Max. Beam Comp.                                | 6.0 dB    | Min. Echolength      | 80 %       |
| Max. Phase Dev.                                | 8.0       | Max. Echolength      | 180 %      |
| Environment:                                   |           |                      |            |
| Absorption Coeff.                              | 9.4 dB/km | Sound Velocity       | 1485.0 m/s |
| Beam Model results:                            |           |                      |            |
| Transducer Gain =                              | 25.37 dB  | SaCorrection =       | -0.60 dB   |
| Athw. Beam Angle =                             | 7.18 deg  | Along. Beam Angle =  | 7.17 deg   |
| Athw. Offset Angle =                           | -0.08 deg | Along. Offset Angle= | -0.13 deg  |

Data deviation from beam model:

RMS = 0.16 dB

Max = 1.56 dB No. = 221 Athw. = 4.5 deg Along = -1.1 deg

Min = -0.54 dB No. = 44 Athw. = -4.9 deg Along = -0.2 deg

Data deviation from polynomial model:

RMS = 0.13 dB

Max = 1.65 dB No. = 221 Athw. = 4.5 deg Along = -1.1 deg

Min = -0.38 dB No. = 275 Athw. = 4.5 deg Along = -1.9 deg

### **10.3.2.Fishing gear**

All vessels have used pelagic "Harstad" and bottom "Campelen" trawls. Additionally, the Norwegian vessels equipped with macro plankton trawl. Trawls were used for monitoring of pelagic and demersal community and identification of acoustic targets.

The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm mesh size in the cod end with an inner net of 10 mm mesh size. The trawl height was about 4.5 m and distance between wings during towing about 21 m. The sweeps are 40 m long. The trawl is equipped with a 12" rubber bobbins gear. New doors are 'Thyborøn' combi type, 7.41 m<sup>2</sup>, 1720 kg.

The SCANMAR system was used on all trawl hauls. This equipment consists of sensors, a hydrophone, a receiver, a display unit and a battery charger. Communication between sensors and ship is based on acoustic transmission. The doors are fitted with sensors to provide information on their distance, and the trawl was equipped with a trawl eye that provides information about the trawl opening. A catch sensor on the cod-end indicated the size of the catch.

ECOSYSTEM SURVEY OF THE BARENTS SEA AUTUMN 2014