Length Related Diurnal Vertical Migration of Cod (*Gadus morhua* L.), Haddock (*Melanogrammus aeglefinus* L.) and Redfish (*Sebastes spp.*) in the Barents Sea.

Thesis for partial fulfilment of the Cand. Scient. degree in

Fisheries Biology

By

Haraldur Arnar Einarsson

Department of Fisheries and Marine Biology
University of Bergen
Norway
2001

Acknowledgement

First, I want to give my sincere thanks to my supervisor, Asgeir Aglen at the Institute of Marine Research in Bergen (IMR), for invaluable help at all stages during my research work. I also want to thank Magnar Aksland at Institute of Fisheries and Marine Biology (IFM) for his help, especially in planning and for good comments when writing the thesis.

I am greatly thankful to the directors of the Marine Research Institute in Iceland (MRI) for generous stipend during my last three semesters, and at the same time thanks to all my former co-workers in MRI which inspired my to start studying again.

Furthermore, I wish to thank all of the many helpful staff members at IMR-Bergen for advising and discussing the problems in this thesis, special thanks to Sigbjørn Mehl for reading over the thesis and giving my very good comments on my English and Atle Totland for the help in SAS programming and get the data right.

To all my co-students at IFM, especially those which joined my in the reading room in IMR, thanks for their companionship during my time there.

Finally and not at least, I want to thank my wife, Járngerður Grétarsdóttir for moving to Norway with me, and not at least for all her time reading and helping me with my English. And my son Dagur Viljar for always being in good humour and cheering my up after a working day.

Haraldur Arnar Einarsson

Bergen, Mai 2001

Table of contents

1. Abstract

Vertical fish migrations can increase variability in bottom survey data, especially if unknown diurnal length-frequency distribution is different between layers. Surveys, using echo sounder technique to estimate demersal fish found pelagic, can be seriously biased when using nearby bottom station to estimate the length distribution of pelagic fish. Knowledge about different length-frequency distribution between layers is very important for accurate stock assessments calculations. Three fish species; cod, haddock and redfish were explored from database (1993-1998), collected on demersal fish surveys (January - March) in the Barents Sea. For each species pairs were created of a pelagic station with selected bottom stations, and the length distributions compared between pairs in four categories. The stations were selected according to time of day, depth, distance and day intervals. There was a clear difference in length distributions for all of these three fish species, were the small fish was near the bottom during the light hours, and in the dark hours the small fish moved to pelagic layers. The larger cod and haddock seemed to do the opposite. It is possible to estimate length distribution in the pelagic by using estimators from the distribution in nearby bottom station. The difference between observed and estimated pelagic length distributions was small during the light hours, but larger in the night. Year classes variation between surveys can make the estimators inaccurate. To increase understanding on vertical movement of fish and improve the estimators it is necessary to observe stomach content of the fish and to measure the light were the fish is caught.

2. Introduction

Migration is well a known behaviour of teleost fishes, horizontal and vertical as well. Fishery-scientists and experienced captains of fishing vessels are well aware that fish availability varies from hour to hour with bigger catch during the light hours (e.g. Turuk, 1973, Shepherd and Forrester, 1987, Engås and Soldal, 1992, Ren, 1993, Aglen *et al*., 1997). And length related diurnal migrations have as well been observed for some fish species. Knowledge about diurnal variations on length-frequency distributions is very important for accurate stock abundance calculations (Shepherd 1987, Engås 1992, Godø and Michalsen, 2000).

This thesis is focused on three key demersal fish species in the Barents Sea (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and redfish species (*Sebastes spp.*) mostly *Sebastes mentella* and *Sebastes marinus*. These species are important for the commercial fisheries in Norway and nearby countries.
The Barents Sea is located north of Norway and Russia and is around 1,4 million square km with an average depth of 230 meters. It covers a relatively shallow continental shelf with a rich flora and fauna, but the ecosystem is unstable because of the tidal amplitude and current direction of warm water from south and cold water from north varies greatly (Sakshaug *et al*., 1994).

Since 1981, a combined acoustic and bottom trawl survey for demersal fish in the Barents Sea has been conducted annually in January – March by the Institute of Marine Research, Bergen (IMR) (Jakobsen *et al*., 1997). Data from these surveys is used to tune the VPA in the stock assessments in ICES as well as in several projects at IMR. But neither acoustic nor bottom trawls cover the entire vertical distribution of the cod, haddock or redfish stock's. Fish densities, which is distributed close to the bottom, are best estimated by bottom trawling, while acoustic recordings are easier to interpret when the fish are distributed more in the pelagic (Aglen *et al*., 1999). This problem involves a complex set of factors where fish behaviour is one of the most important (Aglen *et al*., 1997).

In an ordinary demersal fish survey, the bottom stations are distibuted over the whole survey area. The pelagic stations, however are only taken to identify fish observed pelagic with the acoustics technique. Although, it has been observed that catches vary throughout the day (e.g. Turuk, 1973, Ren, 1993, Michalsen *et al*., 1996, Hjellvik *et al*., 1999, Aglen *et al*., 1999). Even so, there is no organized time schedule to ensure equal numbers of day and night trawl stations within each stratum between years and surveys (Engås and Soldal, 1992). Until now it has been impossible to conclude whether the observed diel variability in bottom trawl catches was due to changes in availability (vertical movements), or to reduced trawl efficiency (Aglen *et al*., 1997). If daily vertical migrations depend on fish length it may result in reduced availability, smaller catches, and increased variability in the survey data (Shepherd and Forrester, 1987).

In this thesis the focus is on length distributions on fish taken in pelagic trawl hauls, compared with length distributions in nearby bottom trawl station, which is taken on the same day or nighttime, using mostly winter survey data from IMR-Bergen from 1993 to 1998. The first work on the datasets was to calculate the angel of the sun on every station, which was done to have an indicator of light when the station was taken. Because of lack of information's about weather and water-transparencies the "light" groups of stations was only two, day and night. From each group was then selected comparable stations in pairs, and the data were prepared to answer importunity questions:

- Is there a difference between the length distributions of fish catches in pelagic and demersal trawl hauls?
- Is this eventual difference between the length distributions dependant on daytime and/or bottom depth?

When acoustic observations are made, the length distribution of fish in nearby stations is used to estimate the length distribution of fish observed. If no pelagic station is taken, a nearby bottom station is used. If it is a difference in length distributions between pelagic and demersal fish, a bias or errors can make the estimations biased (Aglen *et al*., 1999). Knowledge about coherence on length distribution in vertical movements, would improve the calculation on stock assessments. Therefore the last goal of this paper is to:

- Try to estimate the length distribution of fish in pelagic layer by using catch data from bottom trawl.

Because pelagic trawl hauls was not standardised in time or haul-length, most of the data was compared with relative cumulative length distributions. Then the fish length was calculated where the cumulative number of fish was 25%, 50% and 75% of total number. Finally, an estimator was calculated for every length group in every day or night group and shallow or deep-water group for the three fish species, to find possible length distributions in the pelagic layer from fish in bottom trawl catches. The estimator was tested both on the depended data (1993-1998) and on independent data, which were from winter surveys in 1999 and 2000.

3. Material and methods

3.1 The surveys

All the survey data used in this thesis is from the database at the Institute of Marine Research, Bergen. Surveys covering the Barents Sea stocks of cod, haddock and redfish were relevant for this study, but only the surveys applying both pelagic and bottom trawls. In 1993 a larger and more effective pelagic trawl was introduced (Valdemarsen and Misund, 1994). Therefore only the data from 1993 onwards was included in the analyses. Most of the data was from the winter surveys (January-March) and some from the summer surveys (August). Both these surveys are combined acoustic and bottom trawl surveys where the pelagic trawl is used to identify fish in the pelagic layer. The surveys are described by Jakobsen *et al*. (1997) and Aglen (2000). For some years, data were also available from some experimental studies made during March, in connection with the winter surveys. Here those data has been treated as a part of the winter survey. Data from the Lofoten survey on spawning Barents Sea cod has also been considered. This is a pure acoustic survey where both pelagic trawl and bottom trawl are used to identify the acoustic records (Korsbrekke and Nakken, 1997).

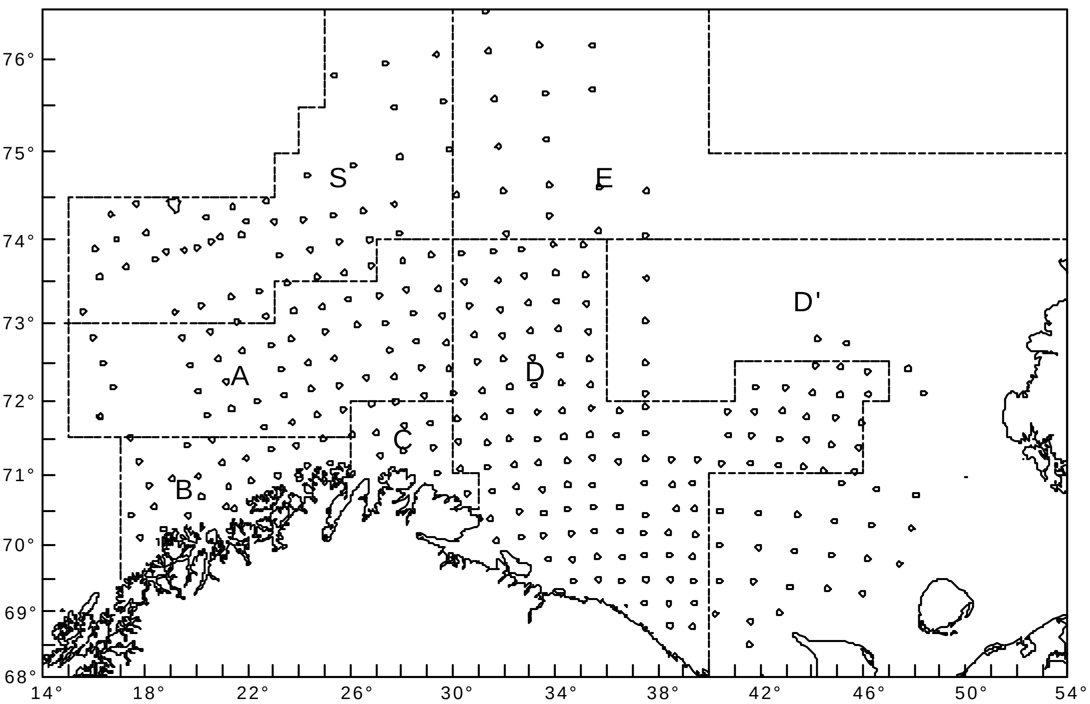

Figure 3.1. The dots are showing typical station grid for bottom trawl winter survey. The main areas A, B, C and D and additional areas D', E and S is shown. From the winter survey 2000 (Taken from Aglen, 2000).

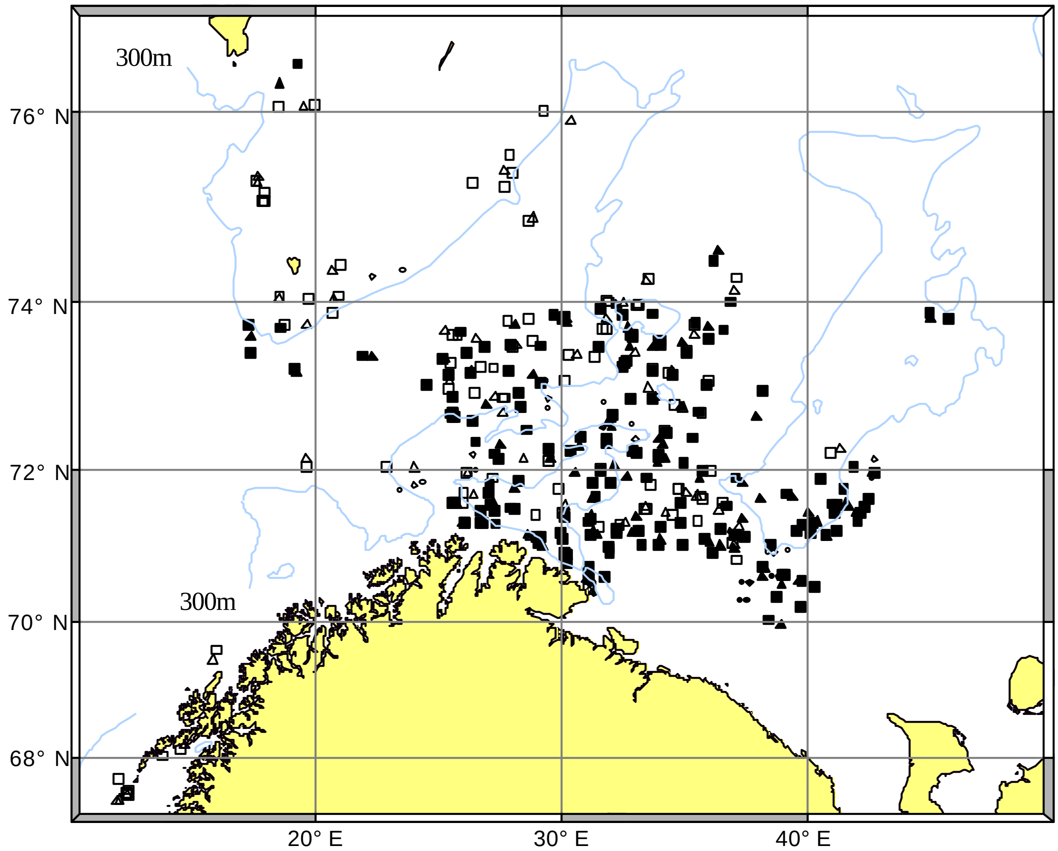

Figure 3.2. Selected stations from the cod data. For the dependent data base ('93-'98) in the day is pelagic trawl station △ and bottom trawl station □ and the night stations is the marks fill. For the independent database (1999-2000) is the marks smaller, the pelagic trawl station and bottom trawl station O, and the night stations is filled.

Figure 3.1 shows the typical station grid in the on bottom trawl survey. The total station coverage has varied between years, for example because of ice. In the winter survey a fixed predetermined grid of bottom trawl stations have been used (Jakobsen *et al*., 1997). Different distance between stations has been used in different strata and different years; 20/30/40 nautical miles in 1993-95, 16/24/32 in 1996 and 20/30 in 1997-2000. In the summer surveys (1995-1998) there has been a system with 20 nautical mile distance between stations in most strata, 40 nautical mile distances in some strata and irregular distance (but still predetermined positions) in some strata. In the Lofoten survey the bottom trawl stations are taken to identify acoustic records and has therefore been taken at irregular distance. Figures 3.2, 3.3 and 3.4 shows only the selected stations, which create the databases for each species in this thesis.

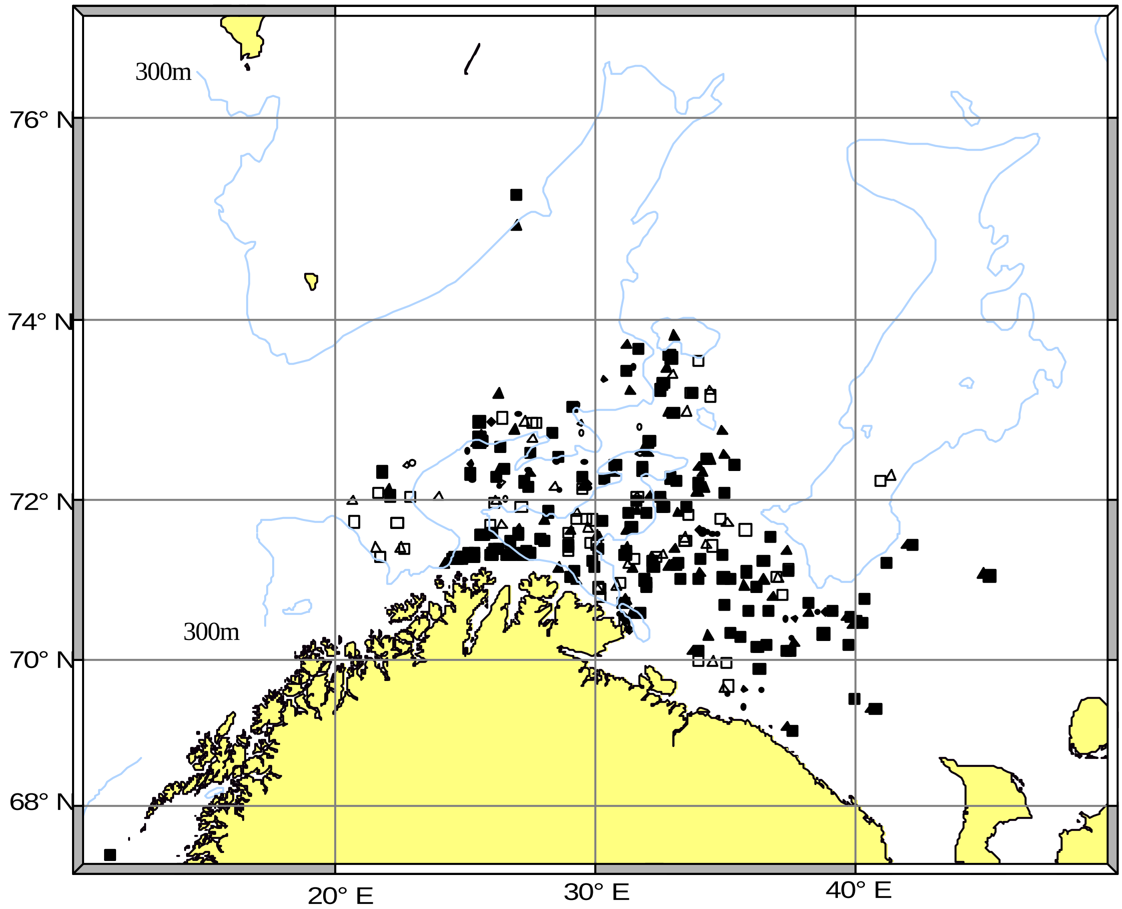

Figure 3.3. Selected stations from the haddock data. For the dependent data base ('93-'98) in the day is pelagic trawl station △ and bottom trawl station □ and the night stations is the marks fill. For the independent database (1999-2000) are the marks smaller and the pelagic trawl station and bottom trawl station O, and the night stations is filled.

In the surveys the IMR research vessels and other rented vessels were used. The data are from seven ships. The four ships with the most of the stations are R/V G.O.Sars, R/V Johan Hjort, F/T Anny Kræmer (freezer trawler) and R/V Jan Mayen. The trawl equipments are best described in Jakobsen *et al*. (1997). The bottom trawl is a Campelen 1800 shrimp trawl with 80 mm mesh size in the front, the codend was 35-40 mm until 1993 and 22 mm in 1994 and later years. The trawl is equipped with a rockhopper ground gear. The length of the sweep wires is 40 m. Doors used for bottom trawling were Vaco combi (1500 kg, 6 m^2), Steinshamn V8 (1500 kg, 6.4 m^2) or Steinshamn W9 (2050 kg, 7.1 m^2). Most of the pelagic hauls were made with the Vaco combi doors. A technique for constraining the spread of bottom trawl doors (Engås and Ona, 1993) was used on most of the bottom tows. This gives an almost constant door spread of 48-52 m. Without this technique the door spread tends to

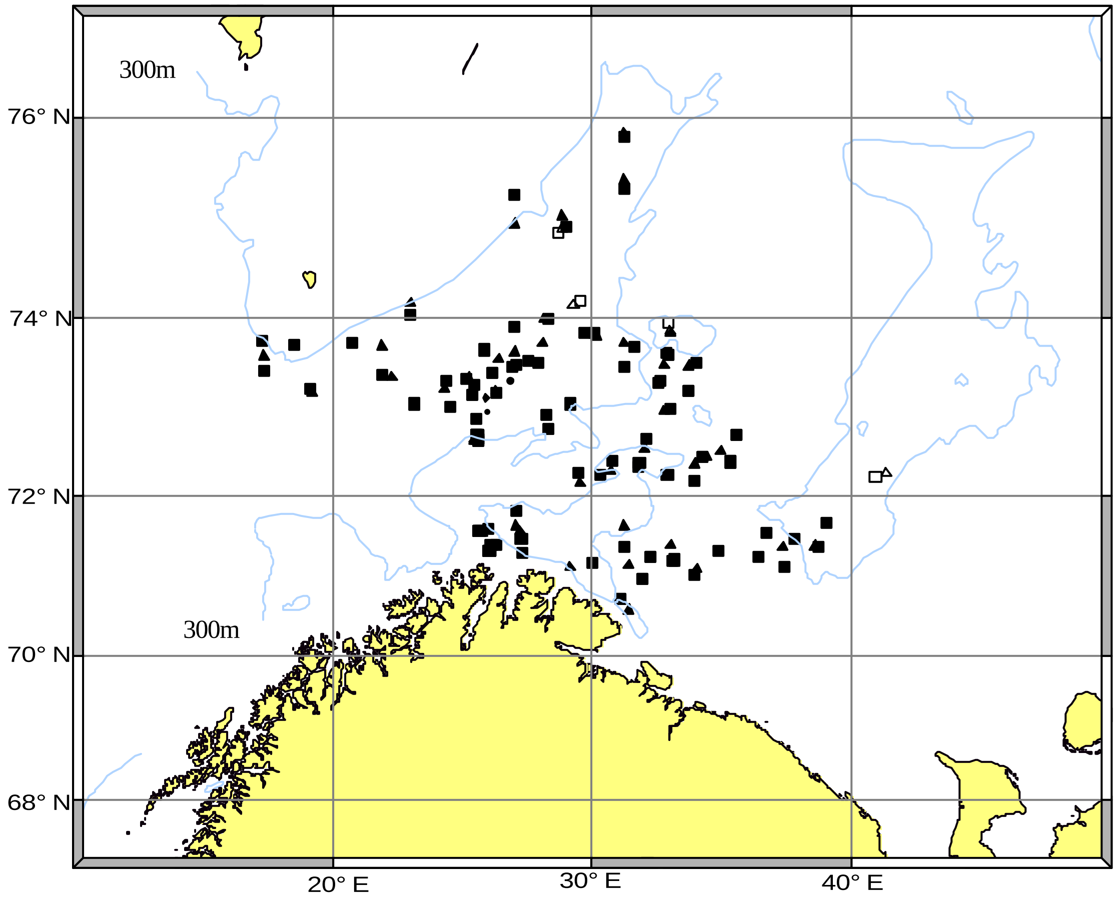

Figure 3.4. Selected stations from the Redfish data. For the dependent data base ('93-'98) in the day is pelagic trawl station △ and bottom trawl station □ and the night stations is the marks fill. For the independent database (1999-2000) are the marks smaller and the pelagic trawl station and bottom trawl station O, and the night stations is filled.

vary between 50 and 60 m, depending on warp lengths used. The standard bottom tow duration was 30 min, and standard speed was 3 knots. The pelagic trawl (Åkra trawl) is made from four identical panels of black coloured nylon netting. The mesh size ranges from 3200 mm in the front to 20 mm in the codend (Valdemarsen and Misund, 1994). The duration of most pelagic tows was near 30 min, but tow duration varied from only a few minutes up to two hours. The distance from bottom was not standard and it varied from very near the bottom to the surface, but in most cases the distance was 25 – 100 m from the bottom.

3.2.Sampling

Each trawl catch is sorted and further measurements are taken according to standard procedures. All fish species are weighed and the total number is calculated. The whole catch or a representative sub-sample of important species is measured for length (1 cm intervals for demersal species and ½ cm intervals for pelagic species). Individual information, i.e. length, weight, age (otoliths), sex and maturity, is collected from a certain number of cod and haddock (Jakobsen *et al*., 1997). In this thesis the data from length measurements was used, and length distribution calculated for the whole catch if sub-sample were taken.

The data was grouped in 5 cm length groups, but the first two groups in cod and haddock (0-4 cm and 5-9 cm) were not used, because of easy escaping through the trawl mesh.

3.3. Analysis

3.3.1.Selection of data

For each survey a rather high number of bottom trawl hauls was taken at fixed distance intervals, while the number of pelagic hauls was low and they had an irregular geographical distribution. Therefore it was most convenient to compare pelagic and bottom stations in pairs.

In the selection of stations to the database used in the calculations, one species in time was selected, which means that the selection process was done three times. The first thing was to select all stations with a catch of 20 fish or more of that particular species. Further were several criteria defined to select the bottom trawl stations that were relevant for comparison with each pelagic haul. Those criteria relate to time of day, total time lag between stations, distance between stations and bottom depth. Time of day was defined by calculating the angle of the sun (relative to the horizon) at the time and position for each trawl haul. A SAS (6.12) program was available at IMR, Bergen for calculating sun angle on the basis of position, date and hour. The same program also listed for each station the catch by 5 cm groups for the selected species. The further analysis was made on a spreadsheet (EXCEL 95 and 97 for windows).

The stations were split in two groups, that is a day group with the sun angel more or equal than –5° under the horizon and a night group with the sun below –5°.
To compare the length distribution from the pelagic station it was important to choose bottom stations which where taken in the same area and at similar light level (day or night) and not too many days between. To do this, pairs of stations were made, which had one pelagic station and one or more bottom stations together. To make this pairs four questions were asked:

- Is the bottom station in the same day or night group as the pelagic station?
- Is the bottom station taken within ten days from the pelagic station?
- Is the bottom station less than 20 (n.miles) from the pelagic station?
- Is the bottom depth at the bottom tow less than 33% different from the bottom depth at the pelagic tow?

A bottom station was only approving with the pelagic station if the answers to these questions was "yes" for every one. If no bottom station was found together with one pelagic station, the pelagic station was not used. Because of this method the data set have some times one specific bottom station in more than one pair, but the pelagic stations is only used once.

As the database for the subject had been made, it was in three groups, one for each fish species i.e. cod, haddock and redfish. For each species the data was split in four groups, day, night and where the pelagic stations was over 300 meters bottom depth or below 300 meters bottom depth, that does one category for each species (day-shallow, day-deep, night-shallow and night-deep) (Table 3.2).

Table 3.1 The number of pair and stations that is pelagic and demersal from each selection in the three species and the four groups in the category.

	Cod Number of			Haddock Number of			Redfish Number of		
Group	Pair	Pelagic trawl	Bottom trawl	Pair	Pelagic trawl	Bottom trawl	Pair	Pelagic trawl	Bottom trawl
Day-shallow	35	35	67	23	23	323	2	2	2
Night-shallow	53	53	148	54	54	303	22	22	104
Day-deep	17	17	37	11	11	30	2	2	2
Night-deep	24	24	74	17	17	65	25	25	48
Sum	129	129	326	105	105	721	51	51	156

3.3.2. Comparisons and test

The pelagic catches are not purposed to relate the fish density in the same way as the bottom trawl catches do; the pelagic tows were in most cases aimed at selected acoustic records, and towing depth, speed and tow duration were not standardized. Comparing absolute catch rates was therefore not considered relevant. The main purpose was to compare relative size distributions. It was expected that the largest dynamics of the size distribution would be associated with small to medium sized fish, since fish in those size groups in most cases are far more numerous than the larger fish. The relative cumulative size distribution was therefore considered to be a convenient basis for comparisons. The cumulative distribution also has the advantage that it is robust against random occurrence of zero observation in some of the length groups. In cases when more than one bottom tow was regarded relevant to compare with the pelagic tow, the bottom trawl catches were added before the cumulative distribution was calculated, so that only one bottom trawl distribution was defined for each pair.

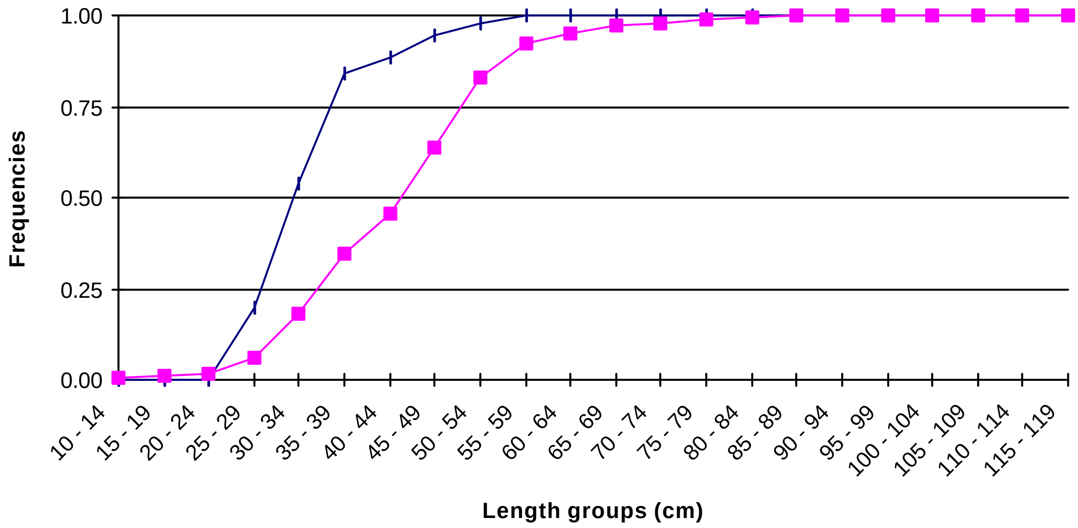

Figure 3.5. Cumulative frequencies in one par. Pelagic (◆) and bottom (■). The three quartile were calculated where 0.25, 0.50 and 0.75 frequencies cross the cumulative distributions.

The lengths corresponding to the 25, 50 and 75 percentiles in the cumulative distributions (Figure 3.2) were calculated by interpolating between the neighbouring observations. Those lengths are later referred to as L25, L50 and L75 respectively.

For each species a Wilcoxon rank test was used to test for pelagic / bottom differences in L25, L50 and L75. The tests were made within each of the category (day shallow, night shallow, day deep, night deep). L25, L50 and L75 were plotted against bottom depth and time of day to examine any pattern in the relationship between pelagic and bottom observations. In the same plot a regression line were drawn to show the mean trends. A total relative length distribution of the three fish species was calculated for each group (day shallow, night shallow, day deep, night deep) for pelagic and bottom hauls separately, and the results were presented as histograms.

The last part of this study was to examine whether the pelagic size distribution could be estimated from bottom trawl catches. If we assume that for a given fish length there is a ratio between pelagic cumulative frequent value ($F_{pelagic}$) and bottom cumulative frequent value (F_{bottom}) and this ratio is with small variation under the same circumstances like day, night or depth. Then the pelagic cumulative frequent value can be estimated where K is the ratio at the actual length group and F_{bottom} is given.

$$\boldsymbol{F_{pelagic}} = \boldsymbol{K} \bullet \boldsymbol{F_{bottom}} \qquad (3.1)$$

To estimate values of K from the observed pairs of cumulative distributions a least sum of square method was used for every length group. A solver in Microsoft excel '97 was used to estimate, for each length group, the value of K which minimised the sum,

$$\sum_{i}^{n}((\boldsymbol{F_{i,bottom}} \bullet \boldsymbol{K}) - \boldsymbol{F_{i,\ pelagic}})^2 \qquad (3.2)$$

$F_{i,\ bottom}$ Observed bottom cumulative frequency at a given length for a given pair (i).

K The estimator (constant) for the actual length group.

$F_{i,\ pelagic}$ Observed pelagic cumulative frequency at the same length for the same pair (i), n is the number of pairs.

The resulting estimates of K were used to estimate the cumulative frequencies for the pelagic layer, which were further compared to the observed pelagic length distribution. That was done for every four groups and species, but for redfish the data was insufficient in the daytime so only night outcome was used.

To further evaluate the prediction potential of this values of K, they were applied to some data that has not been included in the basis for estimating the values of K. This data is from the Barents Sea winter and summer survey in 1999 and winter survey in 2000. It was 1380 stations with 46 pelagic stations and the selection was done the same way as in the main data, but the selection didn't hit each group (see table 3.3).

Table 3.2. Number of the selected stations from winter and summer survey in 1999 and winter survey in 2000. Used to test how god the estimator (K) is.

	Cod Number of			Haddock Number of			Redfish Number of		
Group	Pair	Pelagic trawl	Bottom trawl	Pair	Pelagic trawl	Bottom trawl	Pair	Pelagic trawl	Bottom trawl
Day-shallow	18	18	38	16	16	37			
Night-shallow	2	2	6	7	7	22			
Day-deep				1	1	1			
Night-deep				2	2	2	1	1	2
Sum	20	20	44	26	26	62	1	1	2

At last the results from observed mean cumulative frequencies from each length group in the catch from the pelagic and bottom trawl was plotted and the estimated mean cumulative frequencies in the pelagic was compared with the observed lines.

4. Results

4.1. Cod

4.1.1. Length distributions of cod from pelagic and bottom trawl.

The primary work was to find out if there was any difference at all between length distributions of cod from pelagic trawl and bottom trawl. Table 4.1 shows the results of the Wilcoxon rank test on paired observations (pelagic and bottom) of the quartile length (L25, L50 and L75) of cod.

Table 4.1. Wilcoxon rank test on the quartile lengths from every pair tested in the categories. The ranking reforms to the difference between pelagic length and bottom length.

Cod		Wilcoxon rank test for L.25			Wilcoxon rank test for L.50			Wilcoxon rank test for L.75		
	Number of	Rank value			Rank value			Rank value		
Group	Pairs	+	-	P-Value	+	-	P-Value	+	-	P-Value
Day-shallow	35	597	33	<<0.0005	520	110	<0.0005	432	198	<0.05
Night-shallow	53	300	1131	<0.0005	139	1292	<<0.0005	43	1388	<<0.0005
Day-deep	17	109	44	**>0.05**	75	78	**>0.25**	50	103	**>0.1**
Night-deep	24	44	256	<0.005	12	288	<<0.0005	9	291	<<0.0005

The difference between day and night can also been seen on figure 4.1, were the quartile lengths are plotted against bottom depth. The dots and the trend lines show where cod is larger in the pelagic trawl in the daytime but turns out to be smaller at the night. The biggest difference between pelagic and bottom catch is for L25 in daytime where cod in pelagic catches is about 10 cm larger, and for L75 at nighttimes where most of the deep bottom catches have about 30 cm larger cod than from the pelagic trawl.

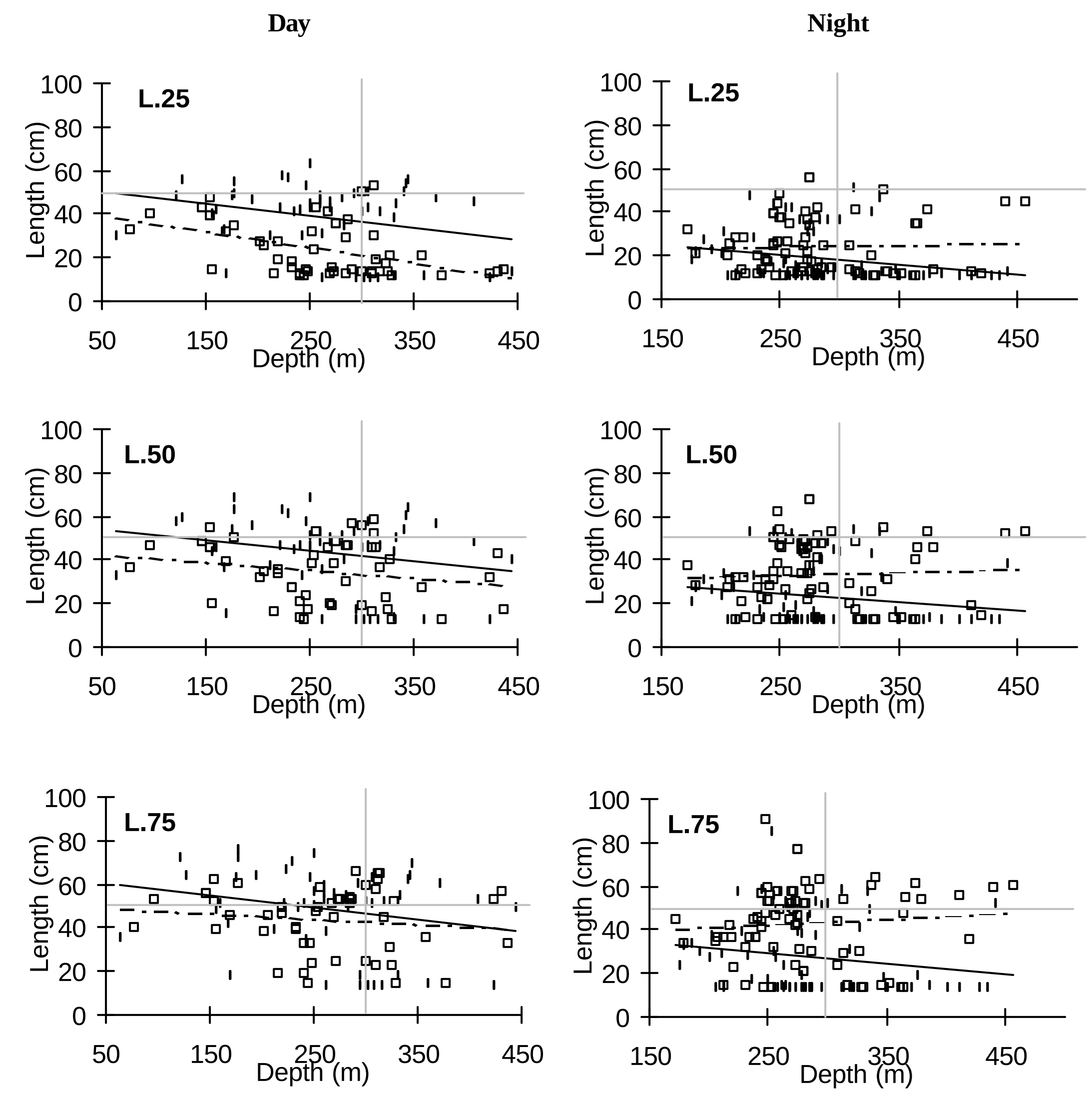

Figure 4.1. Quartile lengths of cod from pelagic (♦) and bottom (□) trawl plotted against bottom depth. The lines are "simple linear regression" and are only to show the mean trends (pelagic full line and bottom is broken line). The vertical line on 300 meters and horizon line on 50 cm is to make the comparisons between plots easier.

Figure 4.2 shows the relative length distribution for the added catches within each of the categories. In all categories except one is the most frequent length group 10-14cm. The exception was the pelagic day-shallow group, the frequency is well below 0.05 in the 10-14cm-length group, while the frequency in the same length group is over 0.4 in the other categories. The same is seen from the bottom frequency but not to the same extreme.

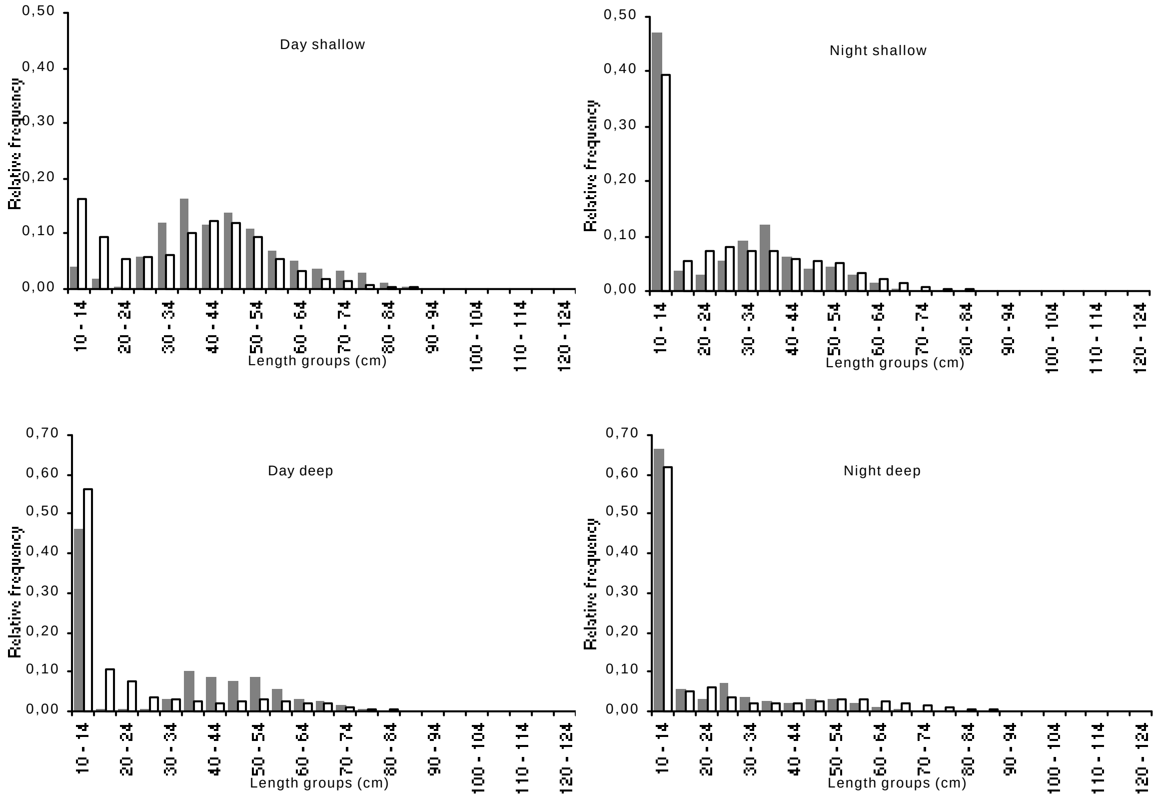

Figure 4.2. The relative length frequency distribution of cod for all catches added within categories. Pelagic is shaded and bottom trawl is open.

4.1.2. Estimated length distribution of cod in the pelagic layer

Results of calculation of least sum of square estimates of K from equation 3.2 is shown it the table 4.2. By multiplying the mean frequency from the bottom catches with K from table 4.2 (equation 3.1), an estimated mean cumulative length distribution for the pelagic layer is the product and is plotted in figure 4.3 with observed length distribution from the pelagic and bottom trawl. With the same methods but using an independent database (winter, summer 1999 and winter 2000) the results from 18 pairs from the day shallow and 2 pairs from the nigh shallow is shown in figure 4.4 with observed cumulative frequencies from the bottom and pelagic trawl in all length groups. More detailed results from these calculations are shown in Appendix IV (Tables IV.1-5).

Table 4.2. Least sum of square estimates of K (equation 3.2) by length for each category.

Length groups	Day-shallow	Night-shallow	Day-deep	Night-deep
10 – 14	0.564	1.632	0.840	1.345
15 – 19	0.482	1.508	0.791	1.291
20 – 24	0.449	1.442	0.735	1.249
25 – 29	0.416	1.372	0.714	1.223
30 – 34	0.484	1.288	0.687	1.219
35 – 39	0.579	1.215	0.678	1.217
40 – 44	0.674	1.171	0.731	1.206
45 – 49	0.761	1.130	0.837	1.160
50 – 54	0.847	1.081	0.934	1.117
55 – 59	0.896	1.056	0.977	1.083
60 – 64	0.941	1.039	1.006	1.057
65 – 69	0.966	1.024	1.016	1.038
70 – 74	0.982	1.015	1.011	1.019
75 – 79	0.995	1.009	1.005	1.007
80 – 84	1.000	1.004	1.003	1.005
85 – 89	1.000	1.003	1.002	1.002
90 – 94	1.000	1.001	1.001	1.002
95 – 99	1.000	1.000	1.000	1.001
100 – 104	1.000	1.000	1.001	1.000
105 – 109	1.000	0.999	1.000	1.000
110 – 114	1.000	1.000	1.000	1.000

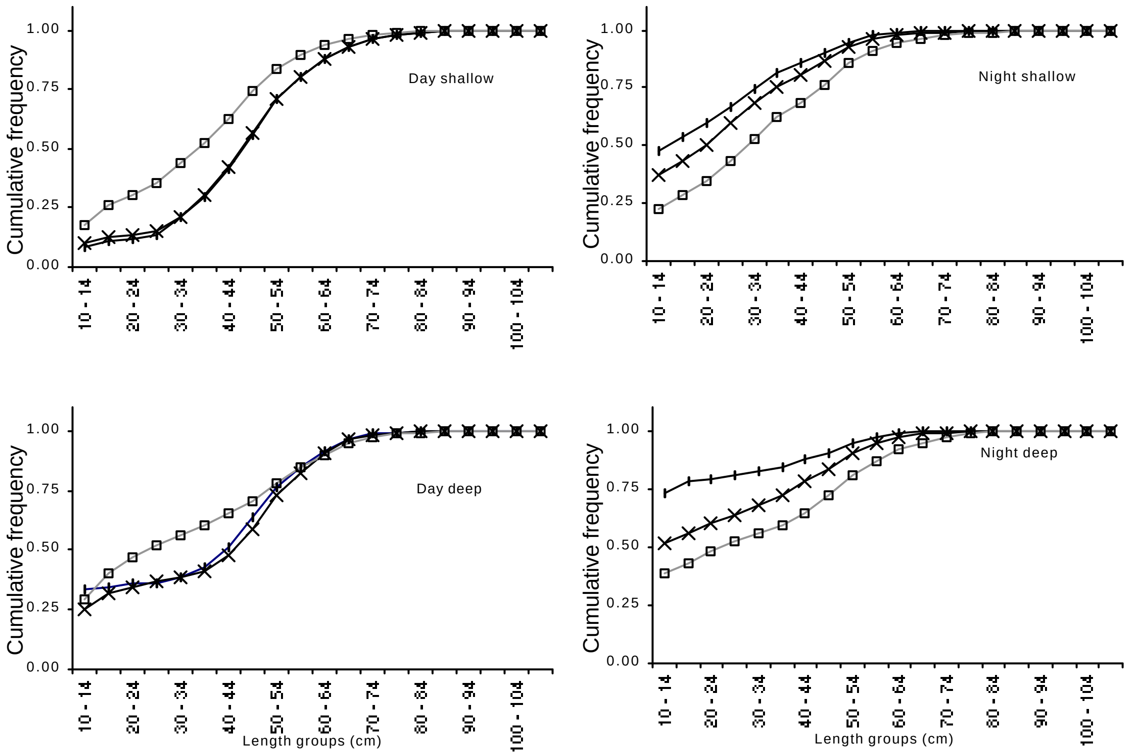

Figure 4.3. Average of cumulative length frequency from cod in the selected database, observed bottom (□) and pelagic trawl (◆) and results of estimated frequency in pelagic trawl (x).

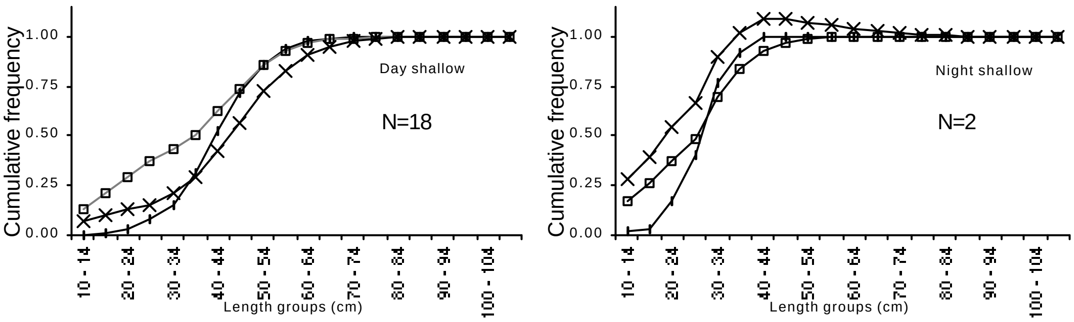

Figure 4.4. Average of cumulative length frequency from cod in the independent database (1999 and 2000), observed bottom (◻) and pelagic trawl (◆) and results of estimated frequency in pelagic trawl (X). Deep stations did not come in the selection to pars in the independence database for cod.

4.2. Haddock

4.2.1. Length distributions of haddock from pelagic and bottom trawl.

The haddock data treatment was same as for the cod data. The primary work was to find out if there was any difference between length distributions of haddock from pelagic and bottom trawl. Table 4.3 shows the results of the Wilcoxon rank test on paired observations (pelagic and bottom) of the quartile length (L25, L50 and L75) of haddock.

Table 4.3. Wilcoxon rank test on the quartile lengths from every pair tested in the categories. The ranking refers to the difference between pelagic length and bottom length.

Haddock		Wilcoxon rank test for L.25			Wilcoxon rank test for L.50			Wilcoxon rank test for L.75		
	Number of	Rank value			Rank value			Rank value		
Group	Pairs	+	-	P-Value	+	-	P-Value	+	-	P-Value
Day-shallow	23	264	12	<<0.0005	261	15	<<0.0005	261	15	<<0.0005
Night-shallow	54	528	957	<0.05	393	1092	<0.0025	264	1221	<0.0005
Day-deep	11	65	1	<0.0025	65	1	<0.0025	62	4	<0.005
Night-deep	17	58	95	**>0.05**	61	92	**>0.05**	52	101	**>0.05**

It is significant difference in all quartile lengths in all of the categories except the night-deep group, which had a non-significant difference between the quartile length from pelagic and bottom trawl. As seen on the rank values the length differences tend to be positive in daytime, meaning that the haddock is larger in the pelagic trawl. The opposite is the case at night.

The difference between day and night can also been seen on figure 4.5, were the quartile lengths are plotted against bottom depth. The dots and the trend lines show where haddock is larger in the pelagic trawl in the daytime and the deeper it gets, but turns out to be smaller at the night. The biggest difference between pelagic and bottom catch is for L25 in daytime were the haddock in pelagic catch is about 20 cm larger, and for L75 in night time group where the bottom catch is about 10 cm bigger than in the pelagic trawl.

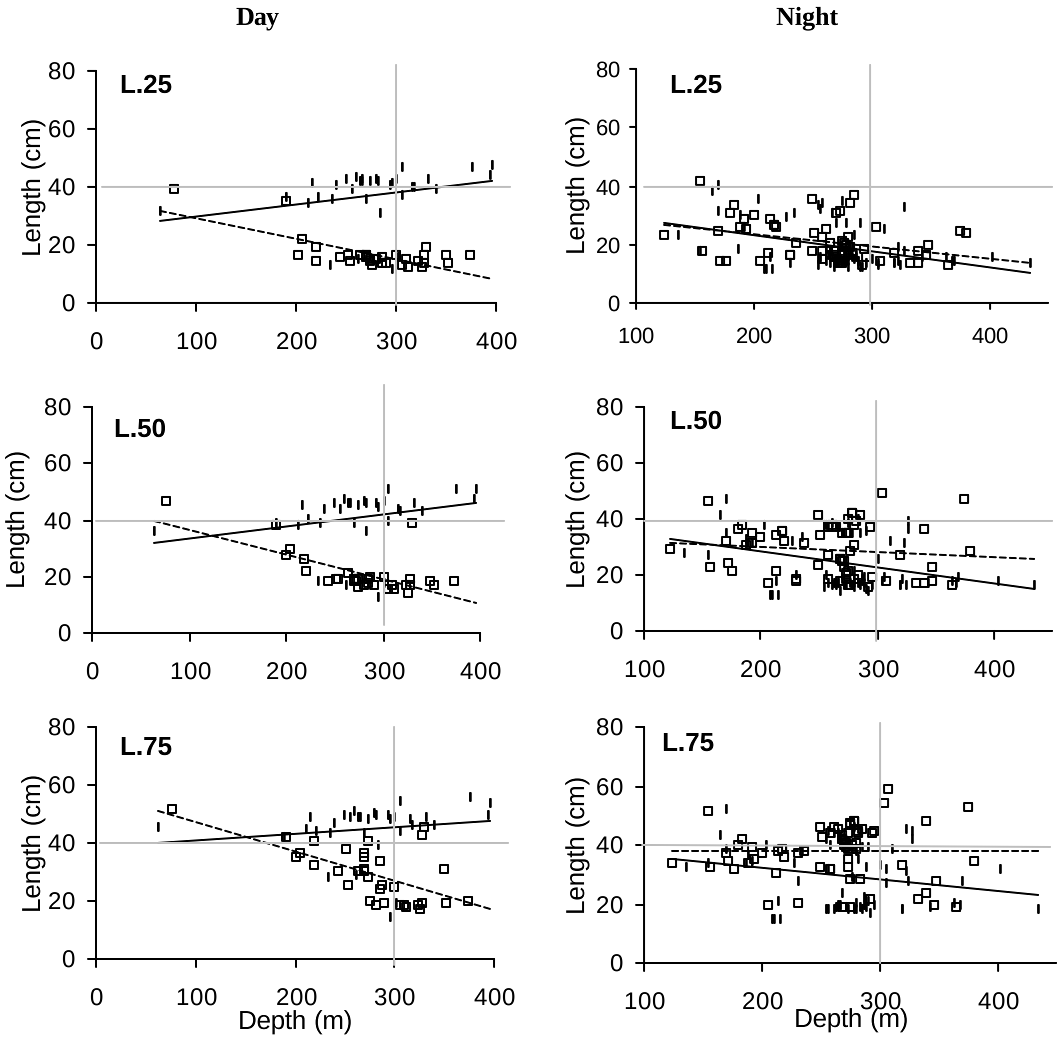

Figure 4.5. Quartile lengths of haddock from pelagic (♦) and bottom (□) trawl plotted against bottom depth. The lines are "simple linear regression" and are only to show the mean trends (pelagic full line and bottom is broken line). The vertical line on 300 meters and horizon line on 40 cm is to make the comparisons between plots easier.

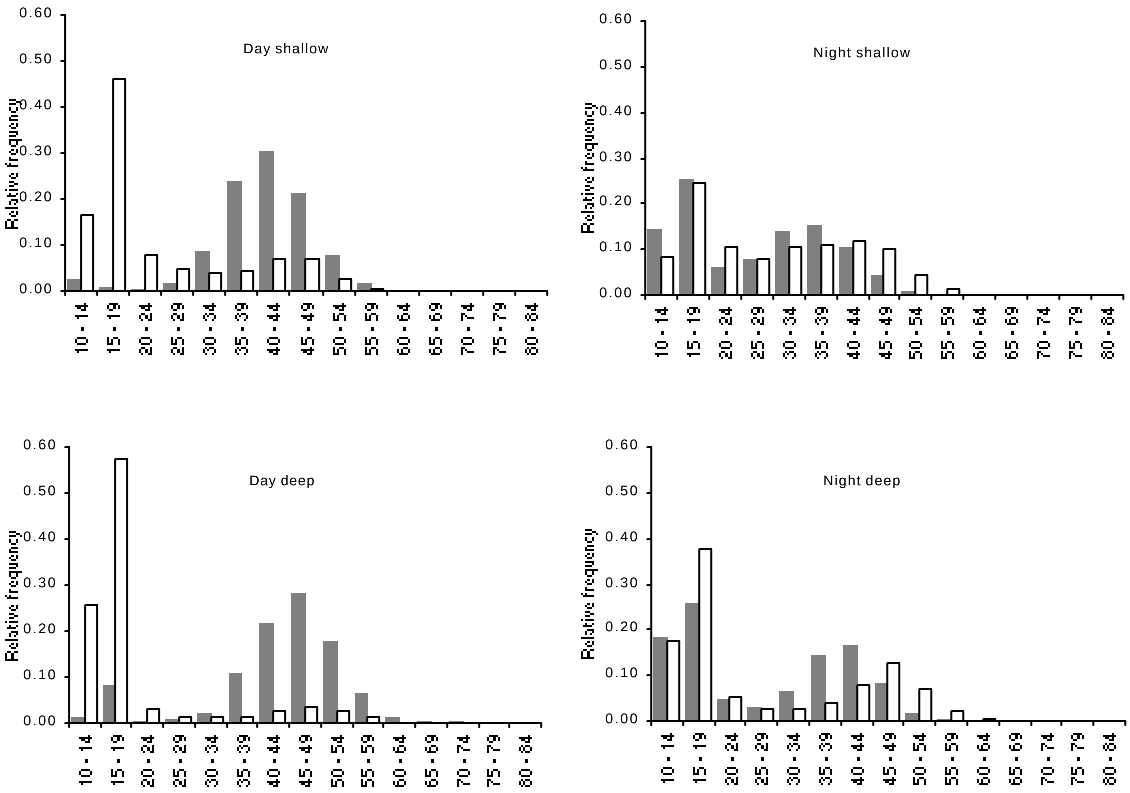

Figure 4.6. The relative length frequency distribution of haddock for all catches added within categories. Pelagic is shaded and bottom trawl is open.

Figure 4.6 shows the relative length distribution for the added catches within each of the categories. In all categories except pelagic daytime is the most frequent length group 15-19cm. The most frequent length in pelagic haddock on daytime is around 45cm. At the same time is a very low frequency of 10–19cm haddock. But the small haddock come in the catch of pelagic trawl at the nighttimes.

4.2.2. Estimated length distribution of haddock in the pelagic layer.

Results of calculation of least sum of square estimates of K from the equation 3.2 is shown it the table 4.4. The mean cumulative frequency from the catch in the bottom trawl was multiplied with the K in the table 4.4 and the results are estimated frequency in the pelagic layer (equation 3.1). The results are shown in the figure 4.7 where the observed frequencies from the bottom and pelagic is plotted with the estimated pelagic frequency at the same chart. Using an independent database (winter, summer 1999 and winter 2000) and K from table 4.4 and the same equation

(3.1) gives the results plotted in figure 4.8. More detailed results from these calculations are shown in Appendix IV (Tables IV.6-12).

Table 4.4. Least sum of square estimates of K (equation 3.2) by length for each category.

Length groups	Day-shallow	Night-shallow	Day-deep	Night-deep
10 - 14	0.429	1.105	0.024	0.911
15 - 19	0.224	1.338	0.097	1.033
20 - 24	0.203	1.229	0.090	1.061
25 - 29	0.203	1.175	0.089	1.077
30 - 34	0.279	1.126	0.109	1.114
35 - 39	0.452	1.105	0.246	1.108
40 - 44	0.693	1.077	0.503	1.103
45 - 49	0.905	1.030	0.809	1.073
50 - 54	0.984	0.999	0.932	1.037
55 - 59	0.994	0.985	0.987	1.012
60 - 64	0.998	1.001	1.000	1.003
65 - 69	0.999	1.000	1.000	1.003
70 - 74	1.000	1.000	1.000	1.002
75 - 79	1.000	1.000	1.000	1.000

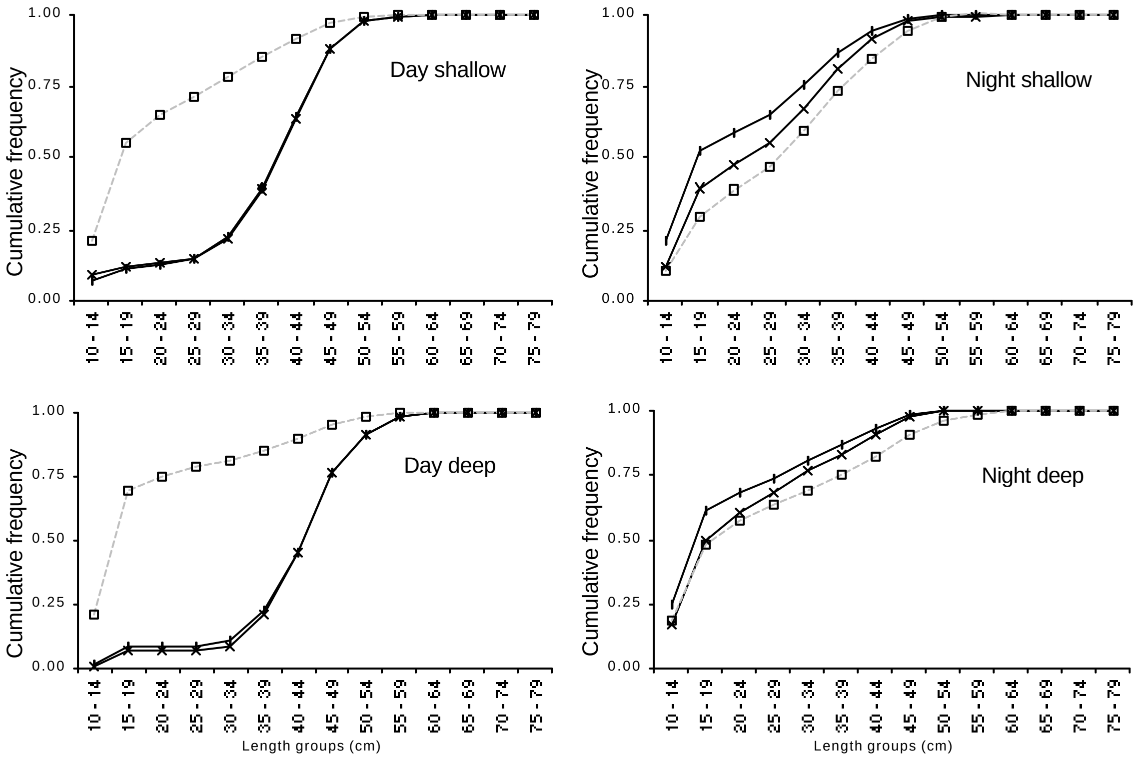

Figure 4.7. Average of cumulative length frequency from haddock in the selected database, observed bottom (□) and pelagic trawl (◆) and results of estimated frequency in pelagic trawl (x).

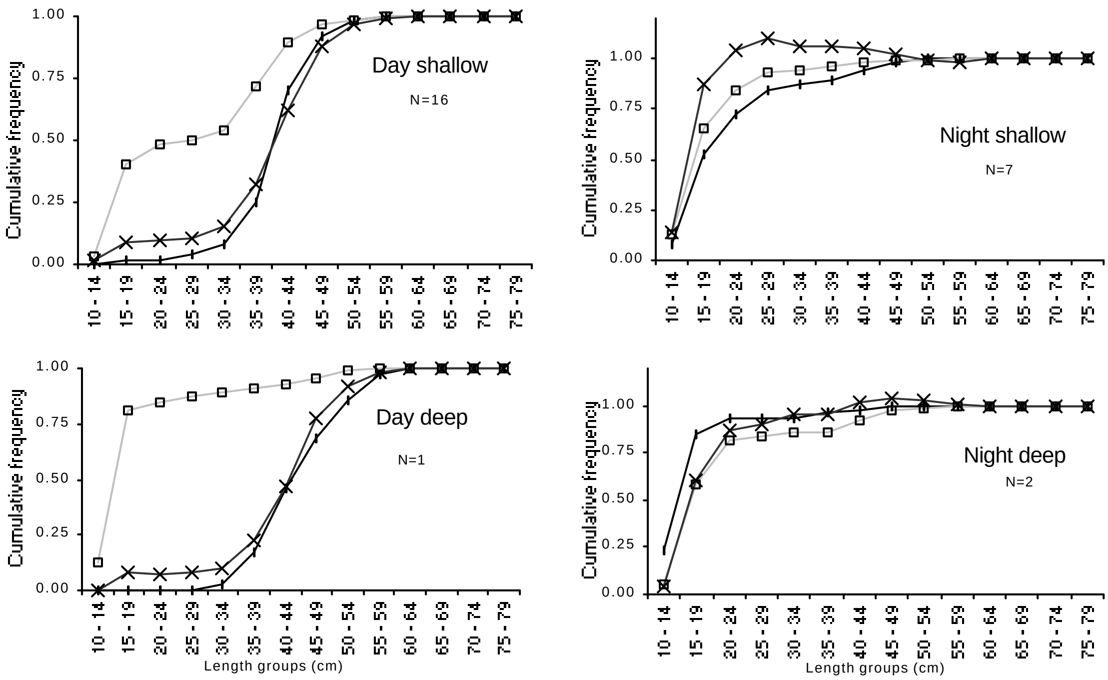

Figure 4.8 Average of cumulative frequency from haddock in the independent database, bottom (□) and observed pelagic trawl (◆) and results of estimated frequency in pelagic trawl (X).

4.3. Redfish

4.3.1.Length distributions of redfish from pelagic and bottom trawl.

The third species is redfish, and as before the primary work was to find out if there were any difference between length distributions from the catch in the pelagic and bottom trawl. Table 4.5 shows the results of the Wilcoxon rank test on paired observations (pelagic and bottom) of the quartile length (L25, L50 and L75) of the redfish.

It is significant difference in all quartile lengths in the night-shallow and night-deep group. The day groups have only 2 pairs each and cannot be used in Wilcoxon rank test. As seen on the rank values the length differences is negative in nighttimes, meaning that the redfish is smaller in the pelagic trawl.

Table 4.5. Wilcoxon rank test on the quartile lengths from every pair tested in the categories. The ranking refers to the difference between pelagic length and bottom length. The day-groups have too few observations for allowing testing.

Redfish		Wilcoxon rank test for L.25			Wilcoxon rank test for L.50			Wilcoxon rank test for L.75		
	Number of	Rank value			Rank value			Rank value		
Group	Pairs	+	-	P-Value	+	-	P-Value	+	-	P-Value
Day-shallow	2	-	-	-	-	-	-	-	-	-
Night-shallow	22	3	250	<<0.0005	1	252	<<0.0005	1	252	<<0.0005
Day-deep	2	-	-	-	-	-	-	-	-	-
Night-deep	25	0	325	<<0.0005	0	325	<<0.0005	0	325	<<0.0005

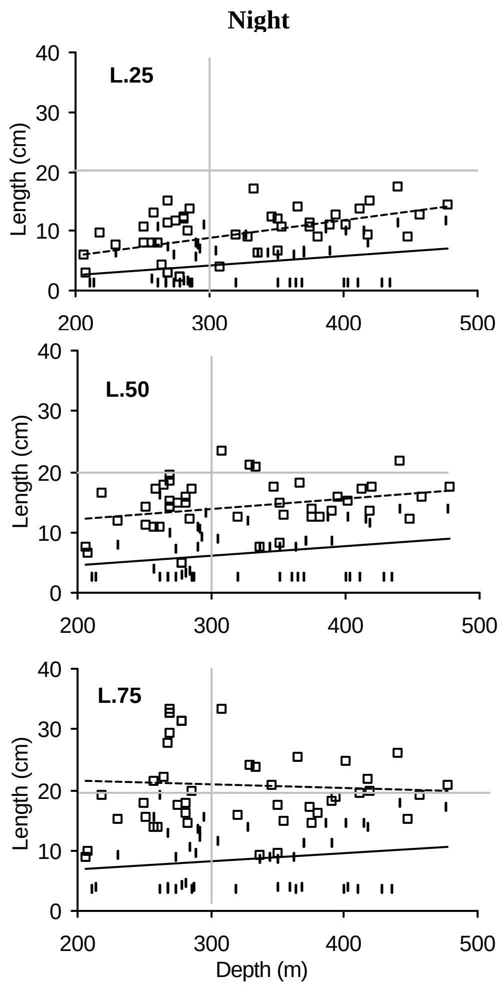

Figure 4.9. Quartile lengths of redfish from pelagic (♦) and bottom (□) trawl plotted against bottom depth. The lines are "simple linear regression" and are only to show the mean trends (pelagic full line and bottom is broken line). The vertical line on 300 meters and horizon line on 20 cm is to make the comparisons between plots easier. Only night results are shown.

The differences between length distribution in pelagic and bottom trawl catches are plotted in figure 4.9, where the quartile lengths are plotted against bottom depth. The dots and the trend lines show where redfish is smaller in the pelagic trawl at night. The largest difference between pelagic and bottom catch is for L75 where the redfish in pelagic catch is about 20 cm smaller. The day results are not plotted because they would only show 2 dots in each plot.

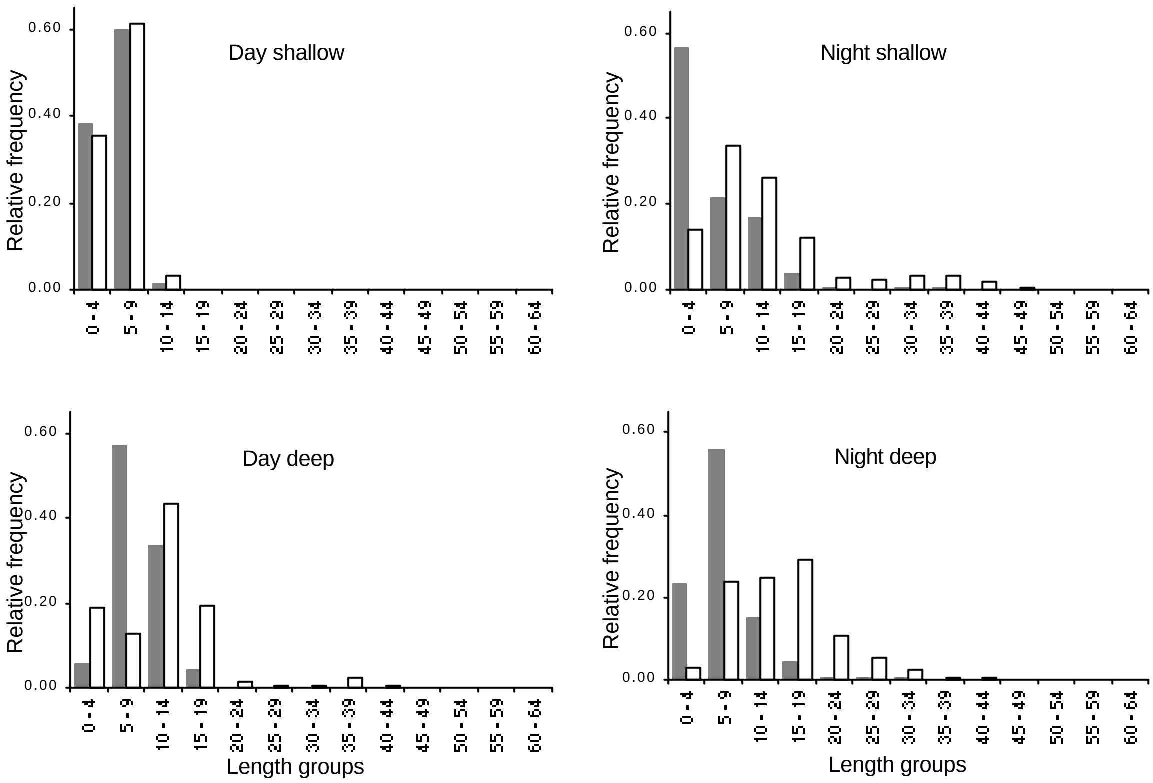

Figure 4.10. The relative length frequency distribution of redfish for all catches added within categories. Pelagic is shaded and bottom trawl is open. Notice that there are few data in the day-categories.

Figure 4.10 show the relative length distribution for the added catches within each of the categories. The figure from the night categories show where the length distribution of redfish from the pelagic trawl is mostly under 10 cm, and the redfish is larger and then are more length distribution variants in the bottom trawl catches. The day distribution is similar as the night categories, but it should be noted that all day station are from a time with very low sun angle and all are at more than 290 m bottom depth.

4.3.2. Estimated length distribution of redfish in the pelagic layer.

Results of calculation of least sum of square estimates of K from the equation 3.2 are displayed in the table 4.6. To estimate the length distribution of redfish in the pelagic layer, the equation 3.1 is used. Both mean observed and estimated cumulative length distributions are plotted on figure 4.11 with the bottom fish length distribution to compare. The independent database (winter, summer 1999 and winter 2000) for the redfish did only give one pair in the night-deep category. The pelagic distribution estimated by using equation 3.1 and K from the table 4.6 is compared to this pair in figure 4.12. More detailed results from these calculations are shown in Appendix IV (Tables IV.13-15).

Table 4.2. Least sum of square estimates of K (equation 3.2) by length for each category.

Length groups	Night-shallow	Night-deep
0 - 4	2.320	4.247
5 - 9	1.682	1.921
10 - 14	1.459	1.507
15 - 19	1.196	1.212
20 - 24	1.129	1.102
25 - 29	1.096	1.040
30 - 34	1.055	1.017
35 - 39	1.022	1.008
40 - 44	1.006	1.004
45 - 49	1.003	1.002
50 - 54	1.000	1.001
55 - 59	1.000	1.000
60 - 64	1.000	1.000

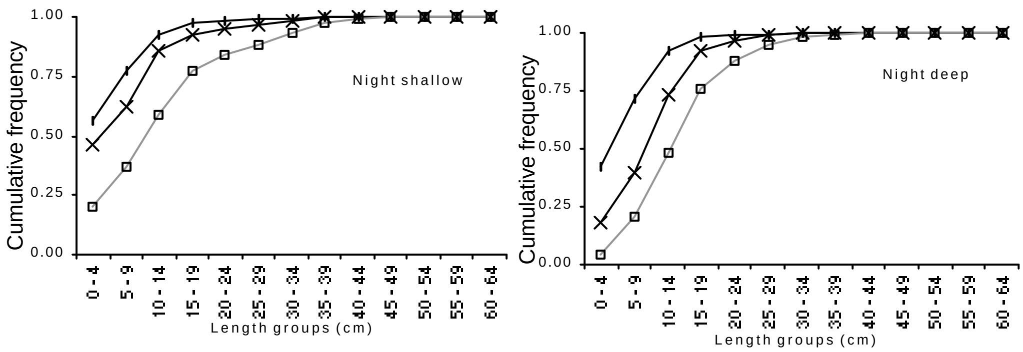

Figure 4.11. Average of cumulative length frequency from redfish in the selected database, observed bottom (□) and pelagic trawl (◆) and results of estimated frequency in pelagic trawl (X).

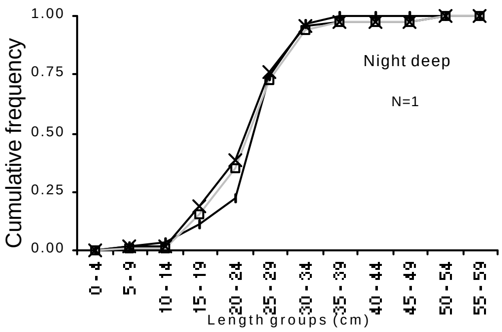

Figure 4.12. Average of cumulative frequency from redfish in the independent database, bottom (□) and observed pelagic trawl (◆) and results of estimated frequency in pelagic trawl (X). Note small data.

5. Discussion

5.1. Data and analysis.

5.1.1. The available data.

The available data were from surveys that were designed for abundance estimation and not designed for comparing the size distribution close to the bottom with the size distribution in the pelagic zone. The number of the pelagic hauls was much lower than the number of demersal hauls and the variance in number hauls per year is big in the pelagic. Comparing catch from pelagic trawl with demersal trawl is in many ways difficult, these gears are technically different and the catches from the bottom trawl has in most cases both larger number of fish and higher total weight. In addition, several different pelagic trawls have been used. In 1993 a new pelagic trawl was introduced as a standard. Therefore, no data before 1993 have been used. The work on this thesis started in 1999, and for that reason the data used was from 1993 to 1998. After the main work was done, it was possible to test the estimators on data from the years 1999 and earliest part of 2000.

5.1.2. The selection of data.

Since the number of pelagic stations was the limiting factor, all data was selected with pelagic trawl station as a first choice and then one or more demersal trawl stations to make pair with that particular pelagic station. As mentioned before in the material and method chapter, the demersal trawl stations were only accepted as a pair to pelagic station under certain conditions.

The decision not including stations that have less than 20 fishes of the actual species might look critical, but because only length frequencies are used, it could have great effect on the data if few fishes in a single station would hit an infrequent length group. A minimum of 20 fishes was chosen to be the critical number in the data analyses to reduce this random noise. If the critical number were set higher, the risk for too few stations in the data would have increased.

When choosing pairs, bottom stations were chosen in same day or night group, with maximum distance 20 nautical miles (n.miles) from the pelagic station, and maximum 33% difference in depth and maximum 10 days between the stations taken. This was done to choose the stations most similar as possible.

If looking at fish distribution by length-classes on maps in rapports from demersal fish survey in the Barents Sea, from IMR-Bergen (e.g. Aglen, 2000), it becomes clear that the length distributions is not the same in all of the Barents Sea. Ren (1993) showed that the vertical density distribution was different between the eastern and western area in the years 1991 and 1992. He also found that the vertical density distribution was different at different bottom depths. Because of this, it is clear that comparable stations should not be to far from each other and 20 n.miles was chosen to be the maximum distance between stations. If the fish is migrating, the time interval between the stations in the same pair could be critical. Aglen *et al*. (1999) describe considerable variation between bottom trawl hauls taken at the same position with about 2 hours intervals, but they did not detect any time trend in the size composition over a 10-day period. Similar findings are reported by Engås and Soldal (1992).

In this thesis it is quite possible that two stations selected as one pair have a big "not recorded" environmental difference; like bottom type, available prey or predators in the area, etc. Here, the critical point of area and time was set to get enough data without risking to much difference in environmental factors.

5.1.3. The categories.

The selected pair for the three species included in the analysis was split to four categories. Most important was the splitting between day and night and then secondly the data was bisected at 300 meters bottom depth.

The vertical range for migration is possibly dependent on the bottom depth. Both physical factors in the sea and the fish behaviour are likely to vary between depths. The depth range of the data was from just below 50 meters to over 450 m depth. The data was divided into two parts: shallow (< 300m bottom depth) and deep (> 300 m bottom depth). Splitting the data into "shallow" and "deep" and especially at 300 meter point is maybe questionable. This depth was chosen because it was near the mean of the depth distribution of the cod-data. It could have influenced the data and the statistical results if another depth had been chosen to separate the data. The same depth was used to separate the data for haddock and redfish. The haddock's stations distribution was found a little shallower in the sea than for the cod, but to make it easier to compare cod and haddock, the same depth was used. On the other hand, the distribution of the selected stations for the redfish were found to be deeper, or from 200 to almost 500 meters. Nevertheless redfish occurs in catches from the bottom trawl below 100 meters bottom depth, but not in the pelagic trawl. The redfish seems to start vertical migration when the bottom depth is more than 200 meters.

In this thesis, the different length distributions of fish from trawling at day and night is compared, but in arctic areas the length of day and night is extremely different between seasons, from almost constant night for several weeks in the winter to the opposite in the summer. Most of the data used is from the winter (January – February) with short or no daytime. Only the cod data have several pairs from the summer and then there are few data from the night. There is no great variation between winter and summer results in the cod data, but then only day-data are comparable. The main results where all seasons are added together (Table 4.1) is that the cod length distribution is different between pelagic and bottom trawl in shallow sea. No length distribution difference is found between layers in day and deep sea.

Here, the separation between day to night is chosen to be when the sun is 5° below the horizon like in other rapports (e.g. Korsbrekke and Nakken, 1997), meaning that the day-data includes dusk and dawn, which is almost the only "day" status at winter, north of Norway. It is quite possible that the vertical migration for these three species is dissimilar between seasons and could then not only be explained by illumination on the surface or amount of light were the fish is in the sea. At so high latitudes, the illumination intensity varies greatly between seasons.

Early in the work of this thesis the plan was to create a model to estimate the light intensity at the fishing depth. It was later concluded that there were insufficient information to make reliable estimates of light intensity. The differences in water transparency are suggested to affect diel vertical migrations to a greater extent than surface illumination (Neilson and Perry, 1990). The information is poor for the water transparency for this type of study. Therefore the data is only separated into two groups of light; day and night.

5.1.4. Using two types of trawl.

The largest source of error in this work is probably using trawl to take a sample, and also comparing catch from two trawl types. The fact is that it is impossible to have trawls that sample all cod (or any fish species) in the length range 10-100 cm with the same efficiency (Jakobsen *et al*., 1997).

The differences between bottom and pelagic trawls are numerous and most of them are technical, but maybe the most important difference is the difference in fishing strategy. The bottom stations are the same year after year, and the time, speed and length of the trawling is standard. On the other hand the pelagic stations are chosen when fish is observed on the echo sounder, and the trawling is not standard in depth, time or length. Therefore, it is not possible to compare the quantity of fish in the catches, but only relative size distributions. The pelagic stations tend to be aimed at the more dense fish concentrations. This leaves the question, whether they are representative for the size compositions in areas were the fish is more scattered.

The connection between fish behaviour and fishing gear is one of the most important factors in a study like this. Both vertical and horizontal distribution can influence fish availability for the trawl, but fish behaviour related to the trawl might also change with time of day (Glass and Wardle, 1989). Bottom trawl probably make more noise than pelagic trawl, but pelagic trawl is nearer the sound source from the ship and the fish can more easily escape under the groundline of the pelagic trawl. Some observations have indicated that large cod can dive some 50-100 m after passage of the vessel (Ona and Godø, 1990 Aglen, 1996). Different fish behaviour connected to the time of the day and different trawl type is likely to influence the results, and the length related swimming speed could as well affect the results strongly. More information is needed, mostly about selection for these fish species in pelagic trawl. For both type of trawl more answers are needed about avoiding behaviour of the fish at night. It should by noted that the stations are taken by many ships which have different sound level and possibly other things different which could affect the data.

5.1.5. Other factors.

Inevitable the light is not the only affecting factor on fish behaviour; the vertical migration is in most cases described as an optimisation of the relation between predation risk and food consumption, triggered by changes in light intensity (Neilson an Perry, 1990). There is some available data for the cod and haddock diet in the database. Since most of it is from the demersal trawl stations, it was not used here. That could be the subject for another thesis. It would be particularly interesting to investigate the diet of cod and haddock from pelagic catches.

Michalsen *et al*. (1996) found that the vertical migration of cod and haddock seemed to follow a semi-diurnal rhythm set by changes in tidal currents. Here, most of the data lack recorded current data, but the tidal currents could maybe explain some of the disordered results, especially those from the night, seen in the quartile lengths plots. Nakken and Raknes (1987) found that the older age groups of cod (ages 6 and 7) were consistently found in warmer water. The vertical temperature gradient of the sea could be a factor that effect vertical migration, but as the results here show, the light factor is very likely the main explanation for vertical migration.

5.2. Vertical migration and how it may influence survey results.

The Barents Sea demersal fish surveys are carried out at all times during the 24 hours. There is no organized time schedule to ensure equal number of day and night trawl stations within each stratum between years and surveys (Engås and Soldal, 1992). From 1981, combined bottom trawl and acoustic surveys for cod and haddock have been carried out in the Barents Sea (Hylen *et al*., 1986). The results for length distribution and species compositions from the bottom trawl stations are used to convert echo abundance from acoustic surveys into estimates of fish density, and the pelagic trawl catch results are used when possible. The number of pelagic trawl stations is usually low. As the results here show, diurnal differences in length distribution are very clear between catches from pelagic trawl and nearby bottom trawl stations. Results about diurnal differences in catch rates and length frequency have been reported (e.g. Engås and Soldal, 1992, Wardle, 1993, Michalsen *et al*., 1996 and Aglen *et al*., 1997). Clearly, the methods to use length distribution from bottom catches bias the estimation of number of fish observed in the pelagic layer with acoustic technique. Engås and Soldal (1992) said that the bias in the size composition of the trawl catches will bias the acoustic stock estimates, and the large quantities of small cod and haddock entering trawl catches by day will greatly influence estimates of target strength (TS) and conversion factor ($CF=10^{(-TS/10)}/4\pi$). They found that only using length frequency from day catches to convert echo abundance to total fish number lead to an estimate over four times higher than obtained when using data from night catches. To improve the accuracy of the stock calculations there is a need for good estimates of the pelagic size distributions. This thesis is suggesting estimators for calculating the pelagic size distribution from bottom trawl catches. This is only based on the length distribution for one species without consideration of the others species. The future work should be focused on possible internal effects, especially between cod and haddock in different density and length distributions, with changes in light intensity.

5.3. Evaluation of results.

5.3.1. Difference in length distributions.

For comparing relative size distributions the cumulative distributions were considered to be convenient. One reason for this was to overcome some problems relating to "random" occurrence of zero observations of some of the rare size classes in the right hand part of the size distribution. Three quartiles of the cumulative distributions were calculated by interpolation and the results were tested with Wilcoxon rank test (Table 4.1, 4.3, 4.5). That is a nonparametric test and fits quite well for comparing in pairs.

The results from the rank test show that the length distributions are different between pelagic and bottom trawl catches, where the small fish is more demersal in the day and occurred pelagic at the night, but the larger fish show reverse length distribution between day and night. The difference in the length distribution is quite clear between the cod and haddock at the day (Figures 4.1. and 4.5.). The haddock show clear difference in length distribution between layers. The big haddock (>30cm) is dominant in the pelagic and the small fish at the bottom, and the difference seems to increase with bottom depth. Even though the cod show clear difference between layers, the picture is less clear than for haddock. A possible explanation is that the cod eat generally more per meal than the haddock. The digestion can then take some days for a big cod and the fish does not go often up to the pelagic after prey, which is mostly capelin (*Mallotus villosus* Müller) in the winter. On the contrary, the haddock eat infrequently so much that the stomach expands out (personal obs.) and is then probably more dependent on having meal every day. That leads to more regular migration to the pelagic were haddock often is preying on capelin or pelagic living crustacean.

Cod in the day-deep and haddock in the night-deep show small or no length difference between layers. The reason for these exceptions for cod and haddock is not unproblematic to explain. One possible explanation is that the small cod does not necessarily migrate to the bottom, only below the light threshold were the predator press is lesser. What is supporting this is that in the category night-deep the same situation occurred as in the night-shallow, but the smallest cod (< 15 cm) is mainly feeding on zooplankton in the pelagic (Torsvik *et al*., 1995). The haddock is more complicated. The smallest haddock is often preying on benthos animals (Burgos and Mehl, 1987, Einarsson, 1997), and therefore possibly not always migrating to the pelagic at night (see figure 4.6.). Anyway the pelagic crustaceans are important for the smallest haddock too, and it is possible that the smallest haddock is sometimes pressed to upper layer by predators. There might be a need to focus on the connection between haddock and cod, as the cod is often the main predator on small haddock. Another explanation is that the larger haddock does not always migrate down at night but wait in the pelagic and spread horizontal and is then less available for the pelagic trawl at the night.

Another explanation why cod do not show as clear picture of vertical migration in the day as haddock could be different feeding behaviour the two species. In the winter, when most of the data is collected, the larger cod is mainly feeding on capelin but sometimes also benthos prey is dominant in the stomach of the cod, which then might stay on the bottom using the light hours to eat. This situation can lead to predator pressure on small fish (cod and haddock), which then leave the bottom. But to confirm this it is necessary to investigate the stomach content of cod from the bottom and pelagic and compare the length distribution at the same time. Still another reason might be that cod and haddock are following a semi-diurnal rhythm, set by changes in tidal currents (Michalsen *et al*., 1996). It seems, however, unlikely that tidal currents should cause systematic difference in a data set collected over several years, since the tide would not follow the day-night cycle.

For redfish there were only four stations with enough redfish in the pelagic catch to make a pair. The redfish behaviour looks simpler, where almost no redfish is observed in the pelagic trawl during the day and only the smallest at night. The redfish is migrating up from the bottom at night probably in pursuit of their prey (Parsons and Parsons, 1976, Pálsson *et al*., 1985, Atkinson, 1989), but the smallest redfish (<20 cm) is dieting on pelagic crustacean (Jónsson, 1992, Pethon, 1994, Torsvik *et al*., 1995). The four pelagic stations, which were found in the day category for the redfish, were all taken with the altitude of sun pretty low, near 5° over the horizon, or even lower. The bottom depth was more than 290 meters in all of them (Appendix I, tables I.16 and I.20), so it could have been night situation on the depth were the pelagic trawl was taken. Since all of the redfish data are from the winter in the Barents Sea, there is hardly any fish larger than 35 cm (<4%), as the redfish migrates from the Barents Sea to west and deeper in the winter (Torsvik *et al*., 1995). Therefore these data are only showing the situation in the winter (January to March) for small redfish.

The amount of light is probably an important factor for fish behaviour, particularly for vertical migration. The steering for the vertical migration can be the prey and predator relationship. If the fish is not under predator pressure, it will probably try to stay in the optimum light level to be able to get its prey. But when the light goes below the visual feeding threshold the fish change its position and sinks down if it is in the pelagic. The steering might also be the predators which force the fish to go to bottom in day time, even if the fish is feeding in the pelagic and when the light goes under the predators feeding threshold the small fish lifts from the bottom and feed for instance on pelagic crustaceans.

5.3.2. Estimating pelagic size distribution from bottom trawl catches.

To be able to understand vertical migration, and to make a model to estimate the pelagic size distribution based on bottom trawl catches, the precision of the indices should be increased (Shepherd and Forrester, 1987). In this thesis a very simple model is tested with only two factors; light on or off (day or night) and shallow or deep sea.

It is maybe no surprise that comparisons between estimators and observed pelagic length distributions look reasonable when only considering the data used for establishing the estimators (Figures 4.3, 4.7 and 4.11). These Figures give only the picture of the average situation. In reality there is of course variance between regions. These Figures show that it is usually no great deviations between the observed and estimated pelagic length distribution. The pair to pair variants is less during day than at night (see the standard deviations in Appendix IV). The estimated pelagic distributions are in most cases an improvement compared to directly using the bottom trawl length distribution. That should be a step to improve the precision in stock abundances estimation. But will it work in reality on independent data?

Two years were used as independent data (summer 1999, winter 1999 and winter 2000), for testing “how good” the estimators were. But these two years (1999 and 2000) were unfortunately “bad” years for the cod and redfish stock and poor for haddock. In addition the length distribution was not the same for these two years compared with the main database (1993-1998) (Table 5.1.). The age groups 1 and 2 of cod were small in the years 1999 and 2000, but above average for haddock. This different distribution in these two databases could be a reason why the model estimates more small cod and less larger cod at daytime in the pelagic layer than the observed catches show, and why the cumulative line starts too high at night (Figure 4.4.). For haddock the estimator is quite good at daytime but is overestimated at night were the line for estimated length distribution is in the wrong direction, and it was greater different in shallow water (Figure 4.8.). This could be explained with lower predation risk these years for small haddock and then less vertical migration than the other years based on data from the main database.

Table 5.1 Abundance indices from bottom trawl surveys in the Barents Sea winter 1993-2000, numbers are in millions. The parentheses are percent of total. The last two columns show the percent of the total numbers from the main database and the independent database (Calculated from tables in Aglen 2000).

		1993	1994	1995	1996	1997[1]	1998[1]	1999	2000	93-98	99-00
Cod	Age 1 and 2	954.9	1571.7	5794.6	6476.1	5860.6	3062.2	824.7	377.1	(85.9)	(55.1)
		(64.9)	(65.7)	(86.9)	(92.1)	(92.7)	(82.1)	(63.7)	(42.5)		
	Age 3+	517	819.3	871.4	556.5	460.5	667.6	469.7	510.4	(14.1)	(44.9)
		(35.1)	(34.3)	(13.1)	(7.9)	(7.3)	(17.9)	(36.3)	(57.5)		
	Total	1471.9	2391	6666	7032.6	6321.1	3729.8	1294.4	887.5		
Haddock	Age 1 and 2	1326.9	831.2	1642.9	573.1	1335.9	350.8	1302.5	1299.3	(67.6)	(94.0)
		(67.9)	(50)	(73.2)	(52.7)	(84.4)	(79.7)	(93.6)	(94.4)		
	Age 3+	626.6	830.3	601.6	514.6	246	89.4	88.8	77	(32.4)	(6.0)
		(32.1)	(50)	(26.8)	(47.3)	(15.6)	(20.3)	(6.4)	(5.6)		
	Total	1953.5	1661.5	2244.5	1087.7	1581.9	440.2	1391.3	1376.3		
Redfish	5 to 14 cm	624.8	272.7	340.7	314	184.6	95.7	10.1	23.3	(27.5)	(4.0)
		(52.9)	(25.8)	(19.3)	(28.6)	(19.5)	(15.3)	(2.5)	(5.4)		
	>15cm	555.6	784.5	1421.2	782.7	763.2	531.3	399.6	412.1	(72.5)	(96.0)
		(47.1)	(74.2)	(80.7)	(71.4)	(80.5)	(84.7)	(97.5)	(94.6)		
	Total	1180.4	1057.2	1761.9	1096.7	947.8	627.0	409.7	435.4		

1) Indices are raised to also represent the Russian EEZ.

Only 4% of the total number of the small redfish (<15cm) is included the independent database (1999 and 2000). From the other data set it seams as if mainly small redfish (<15cm) is migrating to the pelagic at night. That is perhaps the reason why only one pair is observed in the independent database with this data selection technique.

Nevertheless, these estimators can be used, especially for small cod and haddock at daytime. Haddock show quite clear vertical migration behaviour in the daytime, so with some care it should be acceptable to use these estimators in those cases. To improve these estimators more data are needed, where the fish diet, length and predator/prey situations should be observed and maybe more important, the amount of light at the site were the fish is caught should be measured.

Measurement of light on the trawl could give valuable information. Using time of the day or the altitude of the sun is not accurate enough, because of big variation in clearness in the sea between area and seasons, weather and moonlight.

5.4. Conclusion.

From these results it is quite clear that there is a difference between the length distributions of fish in pelagic and demersal catches. It is not possible to exclude or deny that the two types of trawl can cause some of the differences and that difference between catches can change with brightness in the sea. Light in the ocean is very likely to be an important factor in fish behaviour and probably the main trigging factor for vertical migration. It appears that the small fish avoids being at the same place at the same time as the larger fish, probably because of predation risk. Therefore, the small fish tends to show an opposite vertical migration compared to the larger fish. No clear differences were detected between bottom depths.

It is possible to estimate the length distribution of fish in the pelagic layer by using catch data from bottom trawl, especially for haddock and small cod at daytime. But more work has to be done for more accurate estimators. To increase the understanding of the vertical movement of fish and improve the estimators it is necessary to observe stomach content of the fish and measure the light were the fish is caught.

6. References.

Aglen, A. 2000. Results from the winter 2000 demersal fish survey in the Barents Sea. Working Document to the AFWG meeting August 2000. Institute of Marine Research Norway.

Aglen, A., 1996. Impact of fish distribution and species composition on the relationship between acoustic and swept-area estimates of fish density. ICES J. Mar. Sci. 53, 501-505.

Aglen, A., Engås, A., Huse, I., Michalsen, K and Stensholt, B. 1997. Vertical distribution of cod, haddock and redfish; Impact on bottom trawl and acoustic surveys in the Barents Sea. ICES CM 1997/Y:16.

Aglen, A., Engås, A., Huse, I., Michalsen, K. and Stensholt, B. K. 1999. How vertical fish distribution may affect survey results. ICES Journal of Marine Science, 56: 345-360pp.

Atkinson, D.B. 1989. Dial movements of beaked redfish and the implications of these for stratified random bottom trawl estimates of biomass and abundance. N. Am. J. Manage., 9: 163-170.

Burgos, G., and Mehl, S. 1987. Diet overlap between North-East Arctic cod and haddock in the southern part of the Barents Sea in 1984-1986. ICES CM 1987/G: 50. 22pp.

Einarsson, H. A. 1997. Fæða ýsu (*Melanogrammus aeglefinus*) við Ísland. Fjölstofnarannsóknir 1992-1995. Hafrannsóknastofnun Fjölrit Nr. 57. 69-77pp.

Engås, A. and Ona, E. 1993. Experiences using the constraint technique on bottom trwl doors. ICES CM 1993/B: 18, 10pp.

Engås, A. and Soldal, A.V. 1992. Diurnal variations in bottom trawl catches of cod and haddock and their influence on abundance indices. ICES Journal of Marine Science, 49: 89-95.

Glass, C.W. and C.S. Wardle. 1989. Comparison of the reaction of fish to a trawl gear, at high and low light. Fish. Res., 7:249-266.

Godø, O. R. and Michalsen, K. 2000. Migratory behaviour of north-east Arctic cod, studied by use of storage tags. Fish. Res., 48 (2000) 127-140.

Hjellvik, V., Godø, O. R. and Tjøstheim, D. 1999. Modelling Diurnal Variation in Bottom Trawl Catches and Potential Application in Surveys. ICES. CM 1999/J:06.

Hylen, A., Jakobsen, T., Nakken, O., Nedreaas, K. and Sunnanå, K. 1986a. Preliminary report of the Norwegian Investigations on young cod and haddock in the Barents Sea. ICES CM 1986/G: 76, 25pp.

Jakobsen, T., K.Korsbrekke, S.Mehl and O.Nakken. 1997. Norwegian combined acoustic and bottom trawl surveys for demersal fish in the Barents sea during winter. ICES C.M. 1997/Y: 17

Jónsson, G. 1992. Íslenskir fiskar (2.útg.). Fjölvaútgáfan, Reykjavík. pp 568.

Korsbrekke, K., and Nakken, O. 1997. Length and species dependent diurnal variation in catch rates in the Norwegian Barents Sea bottom trawl surveys. ICES CM 1997/W:20, 9 pp

Michalsen, K., Godø, O.R., Fernö, A., 1996. Diel variation in the catchability of gadoids and its influence on the reliability of abundance. ICES J. Mar. Sci. 53, 389-395.

Nakken, O., and Raknes, A. 1987. The distribution and growth of Northeast Arctic cod in relation to bottom temperatures in the Barents Sea, 1978-1984. Fish. Res., 5: 243-252.

Neilson, J. and Perry, R. I. 1990. Diel vertical migration of marine fishes: an obligate or facultative process. Advances in Marine Biology, 26: 115-168.

Ona, E. and Godø, O.R. 1990. Fish reaction to trawling noise: The significance for trawl sampling. Development in fisheries acoustics: A symposium held in Seattle, 22-26 June 1987. Rapp. P. -V. Reun. CIEM. 1990, vol. 189 pp. 159-166.

Pálsson, O. K., E.Jónsson, S.A. Schopka, B. Æ Steinarsson, and G. Thorsteinsson. 1985. Icelandic groundfish survey, 1985. Northwest Atlantic Fisheries Organization Scientific Council Research Document 85/79, Dartmouth, Canada.

Parsons, L. S., and D. G. Parsons. 1976. Effects of diurnal variation in availability upon estimation of redfish numbers and biomass from stratified-random bottom trawl surveys. International Commission for the Northwest Atlantic Fisheries Selected Papers 1:19-29.

Pethon, P. 1994. Aschehougs store Fiskebok. illustratør Bente Olesen Nyström. - 3. utg. Aschehoug, Oslo. pp. 447.

Ren, S., 1993. Changes in catchability of Barents Sea cod (Gadus morhua) and haddock (Melanogrammus aeglefinus) related to varying availability to the bottom trawl survey. M. Phil. Thesis. University of Bergen, Norway, 49 pp.

Sakshaug, E., Bjørge, A., Gulliksen, B., Loeng, H. and Mehlum, F. 1994. Økosystem Barentshavet. Norges forskningsråd Universitetsforlaget, Oslo.

Shepherd, J. G., and Forrester, J. 1987. Diurnal variation in catchability during bottom trawl surveys off the North-eastern United States. 1987/B: 44: 15pp.

Torsvik, N., Motreinsen, S., and Nedreaas, K. H. 1995. Fiskeribiologi. Landbruksforlaget. 275pp.

Turuk, T. N. 1973. Diurnal periodicity in feeding and the vertical movements of the Atlantic cod (*Gadus morhua* L.). Journal of Ichthyology 13, 275-288.

Valdemarsen, J. W. and Misund, O. A. 1994. Trawl designs and techniques used by Norwegian research vessels to sample fish in the pelagic zone. *In* Hylen, A. (ed.) Proceedings of the sixth IMR-PINRO Symposium, Bergen, 14-17 June 1994. pp 135-144.

Wardle, C. S. 1993. Fish Behaviour and fishing gear. *In* The behaviour of teleost fishes, pp. 463-495. Ed. By T. J. Pitcher. Fish and Fisheries Series 7, Chapman and Hall, London.

7 Appendix

Appendix I The selected depended database (1993-1998).

Cod

Table I.1. Selected pelagic stations from “day shallow”. Number of cod from every length group. Vessels codes is: GS = G.O. Sars, JH = Johan Hjort, JM = Jan Mayen, MS = Michael Sars, LIZY = Anny Kræmer, JXWX = Varegg, LADD = Hopen.

Serie no	Year	Month	Vessel	Pairno	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	115 - 119	120 - 124	Total
41055	93	1	GS	1	250	-3.8				3	7	2	3	9	16	10	2	1	3	1	2									59
80221	93	1	JH	2	295	-2.7	46	73	10																					129
80292	93	2	JH	3	212	2.0				1	5	11	3		1	1														22
80293	93	2	JH	4	261	-3.7				244	431	619	75	131		19														1519
80315	93	2	JH	5	300	2.7					2	4	6	6	5	3	1													27
80339	93	2	JH	6	270	1.2					9	33	22	49	48	47	15	2	1		1	1								228
80347	93	2	JH	7	280	0.8						9	15	55	70	33	11	3	2	1										199
80356	93	2	JH	8	260	3.4					1	2	9	18	39	23	3	1												96
80304	94	2	GS	9	235	0.8				1	9	18	43	42	11	10		4	1	1				1						141
80324	94	2	GS	10	250	-2.2					2	22	118	152	74	19	3	1	1											392
80335	94	2	GS	11	270	3.0					2	1	9	22	12	4	6	2												58
80340	94	2	GS	12	222	0.5					6	17	48	75	32	10	10	2	7		1									208
80342	94	2	GS	13	283	-1.1				3	4	7	3	5	3	2		1	1											29
80379	94	2	GS	14	293	1.6							2	6	11	4	2	4	1			1								31
80069	95	2	GS	15	295	2.8	114				2																			116
80474	95	2	JM	16	240	3.0						7	22	20	18	3	2													72
80270	96	2	JH	17	262	0.8	39																							39
81312	95	8	JXWX	18	127	5.1							2	6	17	38	30	12	7	5										117
81061	96	8	JH	19	155	1.9		1	1	5	5	65	132	85	44	15	2	2												357
81063	96	8	JH	20	160	-1.5						12	31	24	19	8	1	1	1											97
81447	96	8	LADD	21	195	1.3				1	5	10	29	25	31	23	37	30	12	3	2	2								210
80839	97	8	MS	22	63	-2.0				80	185	80	21			3														369
80856	97	8	MS	23	250	25.5									3	2		21	21	13	4			1						90
81021	97	7	JH	24	229	6.5								2	3	7	9	1	5	3										30
81024	97	7	JH	25	247	12.5								12	56	57	40	23	5	5	2	1								201
81046	97	7	JH	26	224	2.5							1	1	5	6	13	11		3			1							41
80855	98	8	MS	27	167	10.1				1	14	10	7	3	2				1											38
81108	98	7	GS	28	260	22.6						1	7	10	10	2				1	1									32
81166	98	8	GS	29	243	2.7	3	1	2	4	23	5	5		1															44
81227	98	8	GS	30	169	28.7	36	39	6																					81
80708	94	3	GS	31	260	4.9						1	3	4	4	4	4	1												21
80724	94	3	GS	32	176	-4.4						10	35	25	69	44	49	54	84	118	30	15	5							538
80729	94	3	GS	33	177	1.0					2	8	18	19	26	8	19	23	37	13	10	2		2						187
80733	94	3	GS	34	122	25.7					2		7	10	10	7	4	6	6	3	6	2	2							65
33086	96	3	MS	35	175	23.7							1	6	4	1	6	3												21
						Total	238	114	19	343	716	954	677	822	644	413	294	209	196	170	59	24	8	4						**5904**
						%	4,0	1,9	0,3	5,8	12,1	16,2	11,5	13,9	10,9	7,0	5,0	3,5	3,3	2,9	1,0	0,4	0,1	0,1						

Table I. 2. Selected Bottom stations from “day shallow”. Number of cod from every length group. Vessels codes see table I.1

Serie no	Year	Month	Vessel	Pair no	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	115 - 119	120 - 124	Total
41054	93	1	GS	1	220	-2.0	14	12	7	12	6	6	5	13	8	6	5	1	2			1	1							99
80220	93	1	JH	2	325	-3.1	19	24	10	5	4	2																		64
80291	93	2	JH	3	203	-0.6	3	1	4	3	8	14	13	19	14	6	1	2			1									89
80529	93	1	LIZY	3	235	0.7	15	25	19	31	46	29	22	15	24	5		2		1		1								235
80530	93	1	LIZY	3	165	-1.0	17	28	61	193	275	88	44	22	22	17	6													773
80291	93	2	JH	4	203	-0.6	3	1	4	3	8	14	13	19	14	6	1	2			1									89
80529	93	1	LIZY	4	235	0.7	15	25	19	31	46	29	22	15	24	5		2		1		1								235
80541	93	2	LIZY	4	220	1.7	7	5	2	14	15	12	10	11	9	5	3	1	1		1									96
80314	93	2	JH	5	300	-1.1		1		4	2	9	3	9	2	5	2	3	1											41
80316	93	2	JH	5	273	1.5			1	2	4		4	7	9	2		1				1								31
80606	93	2	LIZY	6	275	-2.6	1	1		3	10	6	4	11	17	6	3		2											64
80606	93	2	LIZY	7	275	-2.6	1	1		3	10	6	4	11	17	6	3		2											64
80355	93	2	JH	8	300	5.1					2		6	12	20	30	10	4	2		2									88
80511	94	2	LIZY	9	221	1.5	135	24	24	15	65	109	144	206	97	41	26	9	9	3										907
80570	94	2	LIZY	9	285	-4.1	98	6	3	5	6	6	15	23	31	15	4	8	4	1										225
80323	94	2	GS	10	240	1.2	306	84	19	14	12	6	16	17	21	4	6	1		2										508
80570	94	2	LIZY	11	285	-4.1	98	6	3	5	6	6	15	23	31	15	4	8	4	1										225
80586	94	2	LIZY	12	205	-3.7	122	33	29	114	114	74	103	98	68	22	8	11	3											799
80341	94	2	GS	13	258	3.5	171	30	15	32	9	10	25	41	42	20	15	19	5	2	2	2								440
80585	94	2	LIZY	13	269	3.1	154	22	13	20	21	6	12	21	13	19	13	18	7	1		1	1	1		1				344
80599	94	2	LIZY	13	295	2.3	199	11	8	29	26	25	64	107	132	80	41	37	27	10	2	1	1							800
80638	94	2	LIZY	14	311	1.2	42		2		1	2	10	23	20	20	26	16	10	3		1								176
80068	95	2	GS	15	318	0.1	62	3	4	1	9	26	23	10	11	6	6	3	4	2	1									171
80473	95	2	JM	16	243	-2.4	29		2	5	16	33	24	30	23	9	9	4		1	2	1								188
80475	95	2	JM	16	260	4.1	17	4	1	16	72	57	24	19	10	15	5		3	4	1									248

Serie no	Year	Month	Vessel	Pair no	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	115 - 119	120 - 124	Total
80058	96	2	GS	17	255	5.1	568	1	1	4	2	2	3	3	5		1	1						1						592
80271	96	2	JH	17	233	7.6	976	29	18	8	15	19	35	49	53	41	26	14				4	3	3						1293
80706	95	8	JH	18	120	1.9	38	65	19	63	151	145	120	57	71	86	109	36	38	17	6	4	2	2						1029
81311	95	8	JXWX	18	121	2.4		2	2			9	19	26	87	137	109	40	19	14	5	5								474
81057	96	8	JH	19	130	12.9		44		44	44	1195	1815	1815	1417	664	310	133	89			44								7614
81064	96	8	JH	19	190	-0.2	5	36	9	23	4	24	21	23	25	16	14	7	4	2										213
81065	96	8	JH	19	150	27.1	14	186	88	151	40	17	21	20	20	39	11	7	2	3										619
81066	96	8	JH	19	145	25.4	7	202	92	173	38	37	21	19	26	14	11	4	3	3	1									651
81057	96	8	JH	20	130	12.9		44		44	44	1195	1815	1815	1417	664	310	133	89			44								7614
81064	96	8	JH	20	190	-0.2	5	36	9	23	4	24	21	23	25	16	14	7	4	2										213
81065	96	8	JH	20	150	27.1	14	186	88	151	40	17	21	20	20	39	11	7	2	3										619
81066	96	8	JH	20	145	25.4	7	202	92	173	38	37	21	19	26	14	11	4	3	3	1									651
81446	96	8	LADD	21	215	3.8	960	1216	64				7	19	44	53	65	51	32	12				2						2525
80840	97	8	MS	22	77	-1.9			7	43	193	200	86	43	14		7			7										600
80857	97	8	MS	23	267	14.8	60	35	10	5	5		7	1	6	15	44	45	29	25	6	6	4		1					304
81449	97	7	LADD	23	265	26.3	324	417	69	62	21	6	1	2	1	2	7	18	19	19	9	4	4	1	1					987
81450	97	7	LADD	23	195	18.3	70	31	2									1												104
81460	97	8	LADD	23	264	19.1	102	90	12	2			1							1										208
81020	97	7	JH	24	213	19.0	78	24	56	27	20	16	17	22	34	30	13	5	3	2	3	1			1	1				353
81022	97	7	JH	24	254	2.4	72	10	32	55	56	26	6	2	1	3	2		1		1	2								269
81019	97	7	JH	25	218	31.0	337	110	165	39	19	7	7	6	5	6	3	1	2	4	2	1	2		1	1			1	719
81023	97	7	JH	25	254	7.0	302	35	85	126	227	127	97	48	27	19	13	8	7	7	5	1	1		1					1136
81025	97	7	JH	25	233	15.4	854	133	108	92	42	92	96	72	36	38	32	20	14	8	6	2	6	6	2	2				1661
81033	97	7	JH	25	256	36.7	38	47	132	101	38	2	2								1									361
81040	97	7	JH	26	274	25.7	198	74	186	161	190	81	54	50	19	10	7	12	9	2	4	2	1			1				1061
81045	97	7	JH	26	219	4.2	240	186	177	89	56	20	4	3	6	9	10	7	7	2	4									820
81047	97	7	JH	26	222	5.0	159	143	185	175	159	153	99	48	48	64	45	14	14	3		2	1	1				1		1314
81054	97	7	JH	26	215	3.0	48	10	6	6	5	1	3	3	11	40	73	66	50	44	32	9	5	3	2					417
80854	98	8	MS	27	162	4.9			4	67	165	116	97	97	22	22	7	4	7											608
80856	98	8	MS	27	177	20.1	27	38	189	38	108	265	265	140	97	70	22	11	5		11									1286
81109	98	7	GS	28	270	12.4	95	28	23	5	5	9	17	23	9	6	7	9	6			1								243
81165	98	8	GS	29	248	0.4	425	285	175	105	95	40	15	13	2	1	2	1			1	1								1161
81167	98	8	GS	29	246	11.1	85	55	86	122	267	137	101	16	1	3	6	7	8	4	4	4	1							907
80870	98	8	MS	30	156	4.8	79	77	47	5	4	31	15	12	9	11	9	10	8	5	1									323
80707	94	3	GS	31	267	17.1		1		1	9	8	26	28	10	10	2	1	1	1	1			1						100
80736	94	4	GS	32	147	7.1				1	3	25	49	77	35	8	9	14	15	11	3	3	2							255
80736	94	4	GS	33	147	7.1				1	3	25	49	77	35	8	9	14	15	11	3	3	2							255
80734	94	3	GS	34	84	22.8		1	3	8	4	9	10	5	1	2	3	1	1	1			1							50
80744	94	4	GS	34	110	15.3			1		3	11	23	30	23	7	2	5	2	4	4			2						117
33073	96	3	MS	35	160	15.7						1	1	2	5	6	8	4		1		1								29
33085	96	3	MS	35	180	19.0					1	2	3		8	6	3	1	2	1										27
33088	96	3	MS	35	120	-2.3					4	4	40	104	56	60	72	20	16	4	16		4							400
						Total	7715	4426	2492	2753	2915	4710	5756	5614	4436	2604	1616	895	612	258	143	154	42	23	9	6		1	1	**47181**
						%	16.4	9.4	5.3	5.8	6.2	10.0	12.2	11.9	9.4	5.5	3.4	1.9	1.3	0.5	0.3	0.3	0.1							

Table I.3. Selected pelagic stations from “night shallow”. Number of cod from every length group. Vessels codes see table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
41067	93	1	GS	36	289	-30.2	1			1	6	5	5	3	14	2	2		1									40
41071	93	2	GS	37	227	-5.1		2	12	56	47	31	12	17	7	4	2	3	1	2								196
41074	93	2	GS	38	273	-7.8				4	10		3	3	2			1	1									24
41085	93	2	GS	39	203	-31.4		1	4	11	58	32	10	3							1							120
80218	93	1	JH	40	262	-26.2	21	36	21	16	3																	97
80233	93	1	JH	41	210	-15.1	1	10	23	69	26	4																133
80271	93	1	JH	42	175	-10.7		8	11	1	2																	22
80274	93	1	JH	43	178	-36.6	1	3	4	7	4	4																23
80283	93	2	JH	44	192	-33.0		1	12	12	7			2														34
80312	93	2	JH	45	278	-25.8				17	30	26	4	5	3	2												87
80350	93	2	JH	46	266	-9.2				2	3	7	3	6	5	2	1											29
80358	93	2	JH	47	300	-23.9				2	2	6	3	3	5	3		1										25
80399	93	3	JH	48	200	-14.0		3	14	9	2																	28
80401	93	3	JH	49	185	-14.7		1	1	15	15	6		1														39
80421	93	3	JH	50	224	-5.6					7	19	22	44	83	62	39	2	3									281
80430	93	3	JH	51	260	-19.8					1	12	12	15	14	23	11	1	1	1								91
80431	93	3	JH	52	255	-16.2					4	7	18	9	20	9	8	4										79
80438	93	3	JH	53	245	-10.5						17	30	17	39	38	17	8	2	3								171
80460	93	3	JH	54	275	-5.3				18	204	402	150	30	6	6												816
80114	94	2	JH	55	232	-11.4	14	5	1	6	5	1																32
80121	94	2	JH	56	278	-15.9	14	14	4	2	1																	35
80130	94	2	JH	57	235	-30.4	170	19	15	19	10	4																237
80133	94	2	JH	58	212	-29.9	36	1		1	1	1	4	1	1													46
80315	94	2	GS	59	250	-28.5	44	12	2	7		2																67
80326	94	2	GS	60	267	-29.6	24																					24
80329	94	2	GS	61	255	-12.5	3	6	6	6	4	2		1														28
80333	94	2	GS	62	265	-31.0	78	9		1	6	2	2	1		1												100
80337	94	2	GS	63	285	-13.0	10	2	1		5	3	6	9	5	1	1											43
80338	94	2	GS	64	290	-31.1	22	7	2	5	8	9	7	4	1													65
80344	94	2	GS	65	256	-10.7	22			1	1		1	4		1												30

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80346	94	2	GS	66	265	-23.4	7				1		3	4	8	3	1											27
80350	94	2	GS	67	295	-29.8	10	1	1	1	1		4	8	4	3	3											36
80058	95	2	GS	68	261	-10.4	109	2	2	2	2	8	2	4	4	4	2			2			1					144
80062	95	2	GS	69	257	-19.1	131	2	3	5				1	2													144
80066	95	2	GS	70	284	-16.9	45		2	1																		48
80235	95	2	JH	71	285	-22.8	107	2																				109
80243	95	2	JH	72	273	-32.6	28																					28
80470	95	2	JM	73	283	-31.4	7			2	8	37	25	22	9	1												111
86219	95	4	GS	74	267	-7.3	25	1																				26
80025	96	2	GS	75	286	-31.3	58	3	4																			65
80245	96	2	JH	76	206	-23.7	139																					139
80253	96	2	JH	77	213	-19.9	100	1																				101
80289	96	2	JH	78	281	-12.2	104	6	3		3				1													117
80443	96	2	JM	79	250	-11.6	71	1																				72
80452	96	2	JM	80	268	-29.7	71	4	3																			78
80656	96	3	GS	81	287	-16.4	183		1		1																	185
80646	96	3	GS	82	287	-20.5	216	7																				223
80617	96	3	GS	83	278	-11.6	212	3	1	1	1																	218
80220	97	2	JH	84	255	-31.2	76																					76
80242	97	2	JH	85	294	-10.3	86	1	3																			90
80251	97	2	JH	86	263	-6.6	50				1																	51
81862	97	4	JH	87	280	-6.2	231	3	3																			237
156	93	9	JH	88	253	-7.7		15														1	1	1	1		1	20
						Total	2527	192	159	300	490	647	326	217	233	165	87	20	9	8	1	1	2	1	1		1	**5387**
						%	46.9	3.6	3.0	5.6	9.1	12.0	6.1	4.0	4.3	3.1	1.6	0.4	0.2	0.1								

Table I.4. Selected bottom stations from "night shallow". Number of cod from every length group. Vessels codes see table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80317	93	2	JH	36	250	-22.4				1	4	1	1	4	10	9	5	1	2	1	1							40
80311	93	2	JH	37	276	-31.5	2	3		5	5	2	4	11	6	5		1	1		1							46
80551	93	2	LIZY	37	227	-21.4	18	11	4	10	17	6	8	4	6		2		1									87
80553	93	2	LIZY	37	210	-31.7	21	17	4	6	3	1	2		4													58
41052	93	1	GS	38	273	-23.5	2	2	3	8	13	9	4	9	21	1	2		1									75
80559	93	2	LIZY	38	295	-11.3	4	8	8	11	16	10	6	3	2	1	1											70
80560	93	2	LIZY	38	243	-22.9	9	18	13	17	19	8	8	6	9	1		1										109
80561	93	2	LIZY	38	197	-30.9	15	12	13	15	10	7	8	14	8	4	1	3		2								112
80562	93	2	LIZY	38	268	-31.7	3	6	6	22	51	38	23	27	37	11	3	4	2	2								235
80300	93	2	JH	39	165	-7.0	2	4	7	23	52	55	32	29	17	5	1	2										229
80540	93	2	LIZY	39	179	-5.1	1	1	3	12	22	29	8	8	10		3				2		2					101
80217	93	1	JH	40	270	-35.2	12		6	14	19	4	1															56
80219	93	1	JH	40	282	-17.1	14	13	11	22	10	1	2															73
80232	93	1	JH	41	201	-7.9	12	9	15	48	55	29	17	3	2	2												192
80237	93	1	JH	41	238	-34.1	1	2	9	71	131	74	17	14	7	1					2		1					330
80251	93	1	JH	42	183	-19.9	1	7	10	9	7	5	1							2								42
80272	93	1	JH	42	175	-20.2	3	7	8	9	12	5	4	1	1						2							52
80273	93	1	JH	43	198	-32.0	7	9	10	14	18	17	8	3			1											87
80275	93	1	JH	43	216	-36.4	2	1	5	17	23	11	2	1	1	1	2											66
80275	93	1	JH	44	216	-36.4	2	1	5	17	23	11	2	1	1	1	2											66
80282	93	2	JH	44	210	-36.5	1	7	13	42	90	38	12	7	4	3	1						1					219
80311	93	2	JH	45	276	-31.5	2	3		5	5	2	4	11	6	5		1	1		1							46
80313	93	2	JH	45	270	-14.9				4	22	44	31	57	55	22	9	4		4								252
80550	93	2	LIZY	45	269	-10.5	4	4	4	14	14	23	20	67	81	48	15	13	8	3	2	5						325
80597	93	2	LIZY	45	273	-26.9			1	22	81	95	53	52	48	20	3	3	1	2	2	1						384
80351	93	2	JH	46	230	-17.6	1	2		4	6	10	1	8	14	9	1											56
80357	93	2	JH	46	244	-8.9			1	1	17	12	6	25	17	13	3	2		1								98
80593	93	2	LIZY	46	300	-8.0	3	3		1	1	2	5	5	4	2	1		1		1	1	1					31
80608	93	2	LIZY	46	223	-25.1	1		3	6	18	27	25	45	53	17	1	1		1		1	1					200
80635	93	2	LIZY	47	280	-28.5		1		4	17	8	9	24	25	14	1	3	1									107
80400	93	3	JH	48	239	-21.2	6	28	11	7	3	6	3	4	5	2		1										76
80400	93	3	JH	49	239	-21.2	6	28	11	7	3	6	3	4	5	2		1										76
80445	93	3	JH	50	245	-12.8	2		2	1	13	44	22	20	49	31	23	9	2	1								219
80445	93	3	JH	51	245	-12.8	2		2	1	13	44	22	20	49	31	23	9	2	1								219
80445	93	3	JH	52	245	-12.8	2		2	1	13	44	22	20	49	31	23	9	2	1								219
80445	93	3	JH	53	245	-12.8	2		2	1	13	44	22	20	49	31	23	9	2	1								219
80461	93	3	JH	54	274	-13.4		1		54	310	406	117	33	39	16	1	1	2									980
80462	93	3	JH	54	274	-16.5				4	26	42	26	14	8	4	5											129
80463	93	3	JH	54	276	-15.2	2	2	1	10	94	138	54	28	44	16	8	1	1									399
80464	93	3	JH	54	274	-11.4			2	7	47	64	20	41	61	35	12	1	2	1								293
80103	94	2	JH	55	180	-9.7	31	523	708	277																		1539
80117	94	2	JH	55	295	-24.1	11	5	50	75	24	26	58	69	47	16	3	2	1									387
80547	94	2	LIZY	55	236	-33.9	42	14	44	401	442	160	87	62	28	14	5											1299
80548	94	2	LIZY	55	304	-31.3	4	7	31	171	54	25	15	10	3	1												321
80549	94	2	LIZY	56	261	-17.9	40	43	134	387	120	15	5	7	2	1												754
80550	94	2	LIZY	56	313	-6.8	15	7	38	242	100	8	27	13	7	1	1											459
80129	94	2	JH	57	170	-28.0	39	155	194	92	5	5	5		5													500
80131	94	2	JH	57	229	-27.4	49	25	27	104	145	77	63	52	19	8	8		5									582

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80132	94	2	JH	57	220	-23.6	20	14	8	29	31	12	24	19	5	1	3		4									170
80125	94	2	JH	58	268	-11.2	19	16	62	99	37	28	34	34	43	9			3		3							387
80132	94	2	JH	58	220	-23.6	20	14	8	29	31	12	24	19	5	1	3		4									170
80314	94	2	GS	59	245	-12.2	4	1	13	10	14	16	9	11	3													81
80325	94	2	GS	60	260	-29.3	23		3	2		2	2	2	5	1	2	1	1				1					45
80330	94	2	GS	61	257	-30.8	21	10	12	14	23	22	30	40	16	7	3	2		1	2							203
80593	94	2	LIZY	61	245	-24.1	18	11	19	24	27	17	19	22	13	8			2									180
80594	94	2	LIZY	61	239	-28.5	11	6	12	23	19	15	29	25	14	3	6	2	2									167
80596	94	2	LIZY	61	248	-15.7	23	4	5	16	5	9	24	27	25	7	3	3	2	1	2							156
80566	94	2	LIZY	62	265	-17.1	9	5	5	9	10	7	10	17	12	5		2	2	1								94
80588	94	2	LIZY	62	218	-27.9	88	32	11	18	14	14	17	22	12	8	1	5	1	1								244
80588	94	2	LIZY	63	218	-27.9	88	32	11	18	14	14	17	22	12	8	1	5	1	1								244
80566	94	2	LIZY	64	265	-17.1	9	5	5	9	10	7	10	17	12	5		2	2	1								94
80567	94	2	LIZY	64	275	-5.4	60	1	1	6	6	9	22	38	35	18	10	11	9	1								227
80581	94	2	LIZY	65	281	-30.6	14		1		1	1	5	12	15	4	6	8	6	2								75
80582	94	2	LIZY	65	260	-22.0	23	5	4	4	4	7	24	40	25	13	16	8	4	2	2		1			1		183
80572	94	2	LIZY	66	324	-31.5	11	1	2		1	1	4	12	11	2		10	4	3								62
80573	94	2	LIZY	66	256	-31.6	33		1		1	1	5	10	19	20	18	11	4	3	1	2						129
80574	94	2	LIZY	66	300	-20.6	38	2		1	1		1	6	9	11	23	14	7	5	3							121
80581	94	2	LIZY	67	281	-30.6	14		1		1	1	5	12	15	4	6	8	6	2								75
80242	95	2	JH	68	244	-22.2	53		1	4	3	18	21	27	47	20	24	7	10	6	2	2	1	1				247
80244	95	2	JH	68	271	-30.6	57	2			2	13	18	29	42	28	28	10	6	1	4	1						241
80061	95	2	GS	69	296	-8.1	61	1		1	4	5	14	14	12	18	7	2	2		1							142
80063	95	2	GS	69	261	-26.7	72	3	1	9	10	11	13	14	18	10	3	2		2	1	2						171
80256	95	2	JH	69	287	-31.4	59				1	9	22	29	41	28	8	3	1									201
80065	95	2	GS	70	270	-24.4	120	12	10	20	69	86	32	18	17	4	2	3	2	1								396
80067	95	2	GS	70	296	-9.9	95	5	15	43	58	63	43	24	24	17	7	3	1			1						399
80487	95	2	JM	70	255	-7.5			7	24	26	39	21	14	22	14	3	5			1							176
80236	95	2	JH	71	231	-32.1	101	15	74	105	100	34	6	1	2	1			1									440
80476	95	2	JM	71	240	-6.1	74	12	32	61	27	2	1	1	1	3												214
80477	95	2	JM	71	220	-21.3	17	4	11	61	71	57	5	5	2	1	2											236
80241	95	2	JH	72	253	-6.0	84	2		3	9	8	25	46	46	34	10	1	5	1	1	1	2					278
80242	95	2	JH	72	244	-22.2	53		1	4	3	18	21	27	47	20	24	7	10	6	2	2	1	1				247
80244	95	2	JH	72	271	-30.6	57	2			2	13	18	29	42	28	28	10	6	1	4	1						241
80245	95	2	JH	72	308	-7.1	89					3	3	9	34	55	33	23	11	3	4		1					268
80469	95	2	JM	73	238	-26.5	14		1	1	8	15	8	10	10	6	3			1								77
80471	95	2	JM	73	264	-30.2	20		1		22	48	58	61	68	36	13	3	1	2	2	1	1					337
86112	95	3	GS	74	267	-15.8	114	8	3	2	8	21	22	14	17	13	6	3	3	2	1		1					238
86116	95	3	GS	74	266	-13.5	70	8	2	2	6	24	33	11	14	11	3	3	1			1		1				190
86132	95	3	GS	74	265	-9.6	100	2	1	4	7	20	18	7	5	6	1	1	1		1							174
86136	95	3	GS	74	270	-13.9	49		2	2	5	30	43	23	20	9		1			1	1		1	1			188
86140	95	3	GS	74	265	-15.2	46	2		3	8	35	47	31	18	14	5	2	3	3	1	1	2	2				223
86150	95	4	GS	74	268	-9.7	54	4	3	4	5	16	26	8	10	6	1	1	1	1								140
86168	95	4	GS	74	268	-9.4	6	2	2	3	3	17	20	5	7	3	3											71
86172	95	4	GS	74	269	-12.3	19	1	1	3	8	22	22	13	7	6	2	1										105
86200	95	4	GS	74	272	-8.2	88	8	3	3	7	8	10	8	6	3	1	1										146
86217	95	4	GS	74	268	-10.1	220	14	19	9	9	32	49	26	8	17	2	2			1	1						409
86236	95	4	GS	74	268	-8.7	123	6	9	7	10	24	21	16	17	11	8	3	3	1	1							260
86241	95	4	GS	74	268	-5.3	303	34	11	12	9	29	41	20	13	14	5	4	1		1							497
86259	95	4	GS	74	268	-8.4	111	7	16	15	14	56	51	27	19	5	3	1		3	3	1						332
86263	95	4	GS	74	268	-10.9	60	4	5	5	12	48	37	29	24	2	2	1	1	2	2	1						235
86282	95	4	GS	74	268	-6.1	132	9	12	5	4	18	34	24	22	11	7	1		2	3	1	1					286
86286	95	4	GS	74	270	-9.8	97	5	5	4	3	17	14	4	9	10	3	2	1	2								176
86290	95	4	GS	74	275	-9.5	52	6	6	6	7	34	52	33	37	27	14	4	2	1	2				1			284
86294	95	4	GS	74	270	-5.5	92	3	2	5	11	54	65	38	43	35	14	10	5	2	4	1						384
80024	96	2	GS	75	320	-25.1	38	9	73	57	34	14	5	1														231
80026	96	2	GS	75	225	-30.7	131	213	651	66	5																	1066
80244	96	2	JH	76	199	-12.0	311	12	17	10	9	10	9	13	8	1	2	1	1					1				405
80246	96	2	JH	76	212	-30.0	250	30	39	22	26	28	26	15	6	3	2	2		1								450
80480	96	2	JM	76	250	-26.1	172	19	10	7	8	4	7	10	5	1	3	1			1							248
80252	96	2	JH	77	238	-9.9	89	5	5	7	8	8	5	8			1				1			1				138
80254	96	2	JH	77	214	-30.5	1173	34	8	10	8	5	4	2	5	1	1	1			2	1	1					1256
80454	96	2	JM	77	200	-19.7	498	21	5	16	14	28	36	28	11	5	1	1	1	1								666
80459	96	2	JM	77	180	-5.6	819	46	29	22	7	8	12	12	4	2	1	1		2		3	1	3	2			974
80473	96	2	JM	77	231	-15.5	128	3		1	5		2	1	1			1								1		143
80281	96	2	JH	78	295	-10.3	58	3	4	3	4	10	8	12	15	3	3	1	2	2								128
80290	96	2	JH	78	275	-23.3	93	8	3		8		35	28	58	41	51	35	18			5						383
80444	96	2	JM	79	252	-28.4	412	31	6																			449
80451	96	2	JM	80	255	-24.2	377	67	96	75	79	62	34	28	14	16	10		2		1							861
80453	96	2	JM	80	213	-28.0	150	23	34	49	62	43	64	64	30	9	10	2	1	1								542
80669	96	3	GS	81	282	-14.6	305	18	16	11	12	9	6	8	6	8	13	8	6	3	2		1					432
80615	96	3	GS	81	275	-18.9	163	18	12	9	32	45	21	25	25	33	34	17	12	5	3	3	1		1			459
80627	96	3	GS	81	272	-20.3	197	12	3	4	6	5	10	10	11	23	15	11	2		3							312
80633	96	3	GS	81	273	-19.6	158	7	2	3	7	16	14	16	12	13	7	4	2	1				1				263
80645	96	3	GS	81	284	-14.9	310	8	10	4	5	6	5	6	3	4	8	7	2	3	2	1			1			385
80650	96	3	GS	81	283	-10.7	160	8	2	5	3	3	4	2	3	5	2	3	3	1	1							205
80660	96	3	GS	81	283	-8.9	1025	58	17	16	15	24	14	16	14	9	7	5	2	1								1223
80669	96	3	GS	82	282	-14.6	305	18	16	11	12	9	6	8	6	8	13	8	6	3	2		1					432
80615	96	3	GS	82	275	-18.9	163	18	12	9	32	45	21	25	25	33	34	17	12	5	3	3	1		1			459
80627	96	3	GS	82	272	-20.3	197	12	3	4	6	5	10	10	11	23	15	11	2		3							312
80633	96	3	GS	82	273	-19.6	158	7	2	3	7	16	14	16	12	13	7	4	2	1				1				263
80645	96	3	GS	82	284	-14.9	310	8	10	4	5	6	5	6	3	4	8	7	2	3	2	1			1			385
80650	96	3	GS	82	283	-10.7	160	8	2	5	3	3	4	2	3	5	2	3	3	1	1							205
80660	96	3	GS	82	283	-8.9	1025	58	17	16	15	24	14	16	14	9	7	5	2	1								1223
80669	96	3	GS	83	282	-14.6	305	18	16	11	12	9	6	8	6	8	13	8	6	3	2		1					432
80615	96	3	GS	83	275	-18.9	163	18	12	9	32	45	21	25	25	33	34	17	12	5	3	3	1		1			459
80627	96	3	GS	83	272	-20.3	197	12	3	4	6	5	10	10	11	23	15	11	2		3							312
80633	96	3	GS	83	273	-19.6	158	7	2	3	7	16	14	16	12	13	7	4	2	1				1				263
80645	96	3	GS	83	284	-14.9	310	8	10	4	5	6	5	6	3	4	8	7	2	3	2	1			1			385
80650	96	3	GS	83	283	-10.7	160	8	2	5	3	3	4	2	3	5	2	3	3	1	1							205
80660	96	3	GS	83	283	-8.9	1025	58	17	16	15	24	14	16	14	9	7	5	2	1								1223

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80219	97	2	JH	84	230	-21.5	235	8	6	15	7	3	6	7	3	3	3	1	2	2	1				1	1		304
80243	97	2	JH	85	309	-19.5	51	17	37	75	91	29	17	11	10	10	6	2	1		1		1					359
80246	97	2	JH	85	318	-25.3	44	6	8	3	6	2	3	2	2	3	2	3	1	2		1						88
80435	97	2	JM	85	314	-10.6	281	110	26	3																		420
80021	97	2	GS	86	245	-27.6	205	9	9	8	11	3	2	2	5	4	2	1	3									264
80228	97	2	JH	86	274	-25.6	53	16	15	37	40	24	14	26	24	15	9	3										276
80252	97	2	JH	86	307	-19.1	59	10	11	8	4	13	11	26	23	35	22	12	2	1	1							238
81859	97	4	JH	87	275	-11.2	30	3	1	5	3	3	2	5	23	16	32	56	42	52	25	12	3	2	1	1		317
82116	93	9	LIZY	88	247	-7.5	1	6				1	1		2	5	3	2		2	1	2	2	5		2		35
						Total	16178	2280	2982	3254	2964	2977	2391	2176	2130	1414	940	552	326	182	124	59	28	21	12	6		**40996**
						%	39.5	5.6	7.3	7.9	7.2	7.3	5.8	5.3	5.2	3.4	2.3	1.3	0.8	0.4	0.3	0.1	0.1	0.1				

Table.I.5. Selected pelagic stations from "day-deep". Number of cod from every length group. Vessels codes see table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80452	93	3	JH	89	331	0.6				1	99	365	277	201	210	141	50	11	5	3		1						1364
80356	94	2	GS	90	305	4.2						2	6	6	7													21
80368	94	2	GS	91	340	7.6							3	9	18	8	6	8	1	2								55
80375	94	2	GS	92	408	-0.5						1	6	18	8	2	2	4										41
80060	95	2	GS	93	318	3.2					1	12	13	12	17	4	1	1										61
80079	95	2	GS	94	360	3.0	146	5	11	7	5	5	1	3	1	2		1	1									188
80086	95	2	GS	95	332	3.6						2	6	9	9	4	1	1	1	1								34
80094	95	2	GS	96	444	5.2	18	1	1		6	2	11	6	7	7												59
80109	95	2	GS	97	305	7.4							3	4	6	5	7	4	2									31
80295	96	2	JH	98	372	5.6							3	6	1	7	5	2										24
80257	97	2	JH	99	301	5.4	40																		1			41
81	93	9	JH	100	307	18.3	58																					58
166	93	9	JH	101	315	15.0	800															1	1					802
80790	95	8	JH	102	423	24.7	579								1													580
81436	96	8	LADD	103	344	1.1	2	1				2	1	18	39	43	50	63	45	18	8	3	1					294
81081	97	7	JH	104	331	5.6	141	19	9	11	9	5	3	1					1	1	1	3						204
81095	97	8	JH	105	343	21.0			1		1				2	2	5	2	1									14
						Total	1784	26	22	19	121	396	333	293	326	225	127	97	57	25	9	8	2		1			**3871**
						%	46.1	0.7	0.6	0.5	3.1	10.2	8.6	7.6	8.4	5.8	3.3	2.5	1.5	0.6	0.2	0.2	0.1					

Table I.6. Selected bottom stations from "day-deep". Number of cod from every length group. Vessels codes see table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80432	93	3	JH	89	256	-4.6		1	3	5	14	42	23	33	61	66	29	17	11	5	4	1						315
80609	94	2	LIZY	90	285	5.3	84	27	7	14	24	25	48	94	73	39	34	27	15		1	1	1	1	1			516
80369	94	2	GS	91	270	-1.2	12	1					7	9	15	15	27	32	14	5		1					1	139
80616	94	2	LIZY	91	312	0.8	66	4				2	3	12	19	17	15	13	9	2	2	1				1		166
80617	94	2	LIZY	91	288	7.3	107	10	1	1			1	15	33	44	65	58	33	12	2	1		1				384
80608	94	2	LIZY	92	430	-4.1	9				1		2		3	1		1	1	2			1					21
80644	94	2	LIZY	92	428	6.2	21	1	3	1	2	3	4	3	3	3	4	11	4		1							64
80645	94	2	LIZY	92	411	7.3	67	11	2	5	15	2	16	15	9	4	11	9	3		1	1						171
80059	95	2	GS	93	309	4.8	53	1		2	8	10	6	8	23	24	13	6	2	5		2				1		164
80080	95	2	GS	94	358	2.0	80	11	64	94	55	52	22	8	7	12	7	5	1	1								419
80085	95	2	GS	95	286	-0.4	105	2	5	10	22	59	77	41	53	46	13	7	2	1								443
80087	95	2	GS	95	368	5.5	62	4	12	15	13	42	17	13	24	28	18	8	9	3	2							270
80093	95	2	GS	96	431	1.6	69	2	1	4	4	12	19	13	24	21	13	9	9	6		1		1				208
80110	95	2	GS	97	311	5.6						4	4	7	30	26	26	15	10	7	1		1					131
80073	96	2	GS	98	380	2.1	2610	96	83	41	18	22	7	14	16	17	21	10	3	4	6	2						2970
80074	96	2	GS	98	395	2.1	3328	208	237	53	24	26	18	12	21	7	6	9	5	3	2							3959
80294	96	2	JH	98	377	5.8	519	25	19	18	15	13	14	19	23	12	2			2	2				1			684
80296	96	2	JH	98	376	-3.4	240	30	11	5	2	6	4	18	16	16	5	10	2	2	2		1					370
80303	96	2	JH	98	359	4.4	976	51	22	4	10	11	15	39	34	27	24	20	6		1							1240
80256	97	2	JH	99	334	1.5	206	14	5	5	2				7	1	6	7	1	1								255
80258	97	2	JH	99	293	-3.5	105	1	7	12	8	3	3	1	4	8	1	3	3		2	2				1		164
80278	97	2	JH	99	358	1.7	96	1	2	1	1			1	3		3			1								109
80	93	9	JH	100	270	24.1	9	1	5	9	1		6	8	5	5	7	14	7	2	2			1				82
82013	93	9	LIZY	100	356	22.9	8	10	2	2							2	1		1								26
82198	93	9	LIZY	101	271	9.2	55	85	47	13	5	1	1	3	2	6	15	8	3	1			1	1				247

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80789	95	8	JH	102	437	29.7	17	22	2	1	4	1	3	4	1		1	1	1	1								59
81425	96	8	LADD	103	294	1.4		85	209	129	140	30	2	3	2	1	3	2	7	6	5	3	2		1			630
81435	96	8	LADD	103	280	3.0	940	736	13	5	5	3			5	5	3		8	3	5	8		3				1742
81437	96	8	LADD	103	352	2.1	124	38	58	19	11	14	11	24	29	21	29	25	14	3	5	1	1	2		1		430
81072	97	7	JH	104	308	5.6	91	169	246	84										1	2	1		2	1			597
81080	97	7	JH	104	283	2.8	265	114	73	47	36	35	15	8	4	11	7	5	10	4	1		1					636
81082	97	7	JH	104	270	13.5	236	36	46	36	26	10	11	4	9	9	9	6	8	11	1	1						459
81085	97	7	JH	104	338	33.1	12		30		8	10	5	1										2	1			69
81085	97	7	JH	105	338	33.1	12		30		8	10	5	1										2	1			69
81094	97	8	JH	105	343	29.9	3	8	2	1	7																	21
81096	97	8	JH	105	358	8.8	4	1	2	6	6	6				2	2											29
81097	97	8	JH	105	252	1.8	79	159	159	68	68	63	18	5	1	1	1	1	2	1		1						627
						Total	10670	1965	1408	710	563	517	387	436	559	495	422	340	203	96	50	28	9	16	6	4	1	**18885**
						%	56.5	10.4	7.5	3.8	3.0	2.7	2.0	2.3	3.0	2.6	2.2	1.8	1.1	0.5	0.3	0.1		0.1				

Table I.7. . Selected pelagic stations from "night deep". Number of cod from every length group. Vessels codes see table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80278	93	1	JH	106	347	-31.8	8	17																				25
80335	93	2	JH	107	334	-14.0					1	5	3	7	12	12	2	2	1		1	1						47
80345	93	2	JH	108	311	-17.3						1	1	1	8	5	3	1										20
80038	94	1	JH	109	327	-29.3			1		1	3	9	2	1	1	2				1							21
80049	94	2	JH	110	313	-20.1	28																					28
80123	94	2	JH	111	318	-29.9	74	33	44	101	41	25	8	11	3	5												345
80354	94	2	GS	112	335	-24.6	22	2		2	2	1	4	10	6	1	2	1					1					54
80082	95	2	GS	113	386	-28.0	38	2		1		1		2		1					1							46
80218	95	2	JH	114	322	-16.0	24																					24
80287	95	2	JH	115	441	-25.3	42	4			3	3	6	12	16	4	8	2	2									102
80350	95	2	JH	116	400	-15.2	29	3																				32
80420	95	2	JM	117	370	-30.4	74	1																				75
80070	96	2	GS	118	350	-21.7	100		3																			103
80112	96	3	GS	119	428	-23.7	26	2																				28
80299	96	2	JH	120	364	-25.3	60	2	1																			63
80306	96	2	JH	121	435	-25.8	52	2																				54
80313	96	2	JH	122	410	-25.0	42	1																				43
80327	96	2	JH	123	319	-23.4	69																					69
80334	96	3	JH	124	359	-26.0	40																					40
80434	96	2	JM	125	348	-25.3	24																					24
80486	96	2	JM	126	322	-10.7	27																					27
80266	97	2	JH	127	311	-31.5	103																					103
81867	97	4	JH	128	320	-6.8	111	5			2																	118
80251	98	2	JH	129	375	-10.3	45	11	2	7	3	2	2															72
						Total	1038	85	51	111	53	41	33	45	46	29	17	6	3		3	1	1					**1563**
						%	66.4	5.4	3.3	7.1	3.4	2.6	2.1	2.9	2.9	1.9	1.1	0.4	0.2		0.2	0.1	0.1					

Table I.8. . Selected bottom stations from "night deep". Number of cod from every length group. Vessels codes see table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80234	93	1	JH	106	319	-23.9	27	19	43	56	34	12	3			1												195
80235	93	1	JH	106	322	-36.4	19	13	39	60	33	10	3	1														178
80277	93	1	JH	106	340	-25.3	10	5	8	5	3	1																32
80599	93	2	LIZY	107	314	-7.0	1		1		5	20	16	23	32	14	6	1	2	1								122
80344	93	2	JH	108	375	-26.9	1	1				1	3	5	3	12	3	4	4	1		1	1					40
80346	93	2	JH	108	285	-9.9					1	1		11	10	12	5	5	1	2								48
80352	93	2	JH	108	352	-30.1				1		1		4	3	10	3											22
80610	93	2	LIZY	108	293	-29.2	3	1			1	1	3	7	14	19	6	2		3								60
80611	93	2	LIZY	108	374	-19.9	3							5	12	11	5	3	5									44
80615	93	2	LIZY	108	339	-16.7	1	2		1		1		7	24	7	5	7	3			1						59
80039	94	1	JH	109	268	-36.4	107		1	2	3	4	21	55	34	17	16	8	3	3	1	1						276
80080	94	2	JH	110	250	-23.9	2	2	4	13	12	10	23	39	20	7	6	3	1						1			143
80555	94	2	LIZY	110	291	-30.3	17	5	4	1																		27
80117	94	2	JH	111	295	-24.1	11	5	50	75	24	26	58	69	47	16	3	2	1									387
80124	94	2	JH	111	320	-26.9	2	13	155	155	36	24	49	40	16	3	1	1										495

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	110 - 114	Total
80355	94	2	GS	112	340	-11.5	49	3	1	1	2	2	7	13	14	10	4	3	4									113
80604	94	2	LIZY	112	419	-21.8	14			1		2	6	14	16	9	6	3	5									76
80083	95	2	GS	113	374	-24.2	27	2	1		4	8	15	17	28	29	14	10	17	5	2							179
80419	95	2	JM	114	363	-22.4	58	1	1	2																		62
80288	95	2	JH	115	456	-28.4	20	1	1	3	3	4	13	23	41	27	20	10	10	5	1	2		1				185
80105	95	2	GS	116	288	-21.5	17	1	6	13	43	56	41	44	37	46	13	3	4	2	1			1				328
80349	95	2	JH	116	450	-6.9	4	1		1	1	1	2	4	12	8	9	2	2	3								50
80351	95	2	JH	116	358	-22.5	18	5	5	3		6	9	14	13	18	4	1	3	1	1							101
80220	95	2	JH	117	341	-17.7	18	25	3																			46
80419	95	2	JM	117	363	-22.4	58	1	1	2																		62
80071	96	2	GS	118	360	-25.8	99	7	2	2		1			1	3		2	2	1	2							122
80072	96	2	GS	118	340	-22.0	335	69	59	31	8	22	24	36	21	17	33	23	14	3	3	1	1					700
80026	96	2	GS	118	225	-30.7	131	213	651	66	5																	1066
80113	96	3	GS	119	440	-24.5	26	8	4		4	7	14	33	56	41	31	13	5	3	3	2						250
80292	96	2	JH	120	330	-14.9	189	27	7	4	2	7	4	6	6	3	12	4	2									273
80298	96	2	JH	120	342	-25.9	162	8	4			2	2	2	4	4		1										189
80300	96	2	JH	120	365	-18.6	81			3	6	3	1	3	4	4	3	2		1		1		1				113
80304	96	2	JH	121	417	-6.7	187	16	17	9	5	8	9	21	25	19	28	15	5	5	4	1						374
80305	96	2	JH	121	431	-21.8	35	3	3		2	3	1	3	2	1	1	1	3		1							59
80307	96	2	JH	121	431	-20.4	23	8	9	2	3	3	3	1	2	7	10	6		1								78
80311	96	2	JH	121	375	-6.6	121	11	6	4	4	3	3	6	17	21	39	25	19		4	2	2					287
80312	96	2	JH	121	403	-19.2	49	13	16	4	2	2	7	10	6	7	6	2	1			1						126
80075	96	2	GS	122	432	-21.6	114	16	10	9	8	5	7	12	9	9	3	3	1	1		1						208
80305	96	2	JH	122	431	-21.8	35	3	3		2	3	1	3	2	1	1	1	3		1							59
80312	96	2	JH	122	403	-19.2	49	13	16	4	2	2	7	10	6	7	6	2	1			1						126
80314	96	2	JH	122	420	-23.1	63	7	11	1	1	2	3	5	5	2	6		2	1								109
80316	96	2	JH	122	408	-18.7	74	11	17		3	1	4	6	3	4	4	2		1								130
80268	96	2	JH	123	333	-22.6	420		3	5	5	3	3	3	7	6	6	4	5	2	2	1	1		1	1		478
80326	96	2	JH	123	346	-10.8	72	4			5	7	7	7	32	69	110	103	62	32	11	11	2					534
80333	96	3	JH	124	330	-20.1	171	4	2	3		2	1	2		2	1		1									189
80335	96	3	JH	124	368	-25.1	170	5	2	3			3		3	4	6	6	2	5		2						211
80336	96	3	JH	124	288	-17.4	644	13		2	1	5		2	5	8	7	3	2									692
80432	96	2	JM	125	315	-27.1	1110	50	55																			1215
80433	96	2	JM	125	346	-29.8	2627	188	94																			2909
80487	96	2	JM	126	246	-20.3	279	18										1										298
80022	97	2	GS	127	272	-16.0	128	2	5		4	3	3	2	2	4	2	2	1	1								159
80259	97	2	JH	127	337	-22.0	99	4	1	4	1		1	1		1	2	3	2		1							120
80260	97	2	JH	127	313	-24.0	96	8		5	4	2		1		1		2			1	1		2				123
80261	97	2	JH	127	310	-8.9	185	24	8	5	7	5	4	1	2	1	1				2	1	1		2			249
80264	97	2	JH	127	309	-5.8	278	22	2	14	6	3		2	5	7	7	6	4	5			1	1				363
80265	97	2	JH	127	310	-27.0	150	10	5	5	5	5	4	5	6	5	4	4		3	1							212
80267	97	2	JH	127	311	-28.1	368	19	8	12	7	3	1	3	3	8	9	10	3	7	1	4					1	467
80268	97	2	JH	127	307	-8.6	1892	126	1	33	16	7	4	2	8	9	1	9	3	3	1		4	1	1	2	1	2124
80271	97	2	JH	127	309	-7.7	553	31	22	50	39	22	11	3	8	7	30	20	22	10	9	7	3	4	7	3		861
80272	97	2	JH	127	309	-25.8	87	7	3	8	2	5	4	1	8	8	12	8	9	7	3	1						173
80273	97	2	JH	127	311	-31.2	423	14	7	19	7	2	5	1	8	16	24	12	7	8	6	2	2	4		1		568
80274	97	2	JH	127	312	-27.2	721	77	39	31	23	5	4	4	6	4	8	5	7	6	1		3					944
80275	97	2	JH	127	309	-15.9	662	29	11	35	25	20	8	3	8	11	12	7	13	5	3	2		1	2	2		859
80450	97	2	JM	127	339	-25.7	241			2	5	2	1	1	1	2	4		3		1	1	1					265
80451	97	2	JM	127	346	-32.1	188		1	3	3	3	1		2	2	1	4	1		1		1				1	212
80452	97	2	JM	127	346	-25.8	70	8	2	7	6	5	1		3	4	1	2	3	1				1				114
80453	97	2	JM	127	346	-11.7	76	9	1	2	3	2	2	1	2	3	1	3	1	1	3			1				111
80457	97	2	JM	127	343	-10.7	60	4	2	4				5	11	19	27	14	33	30	22		3		3			237
80458	97	2	JM	127	305	-26.2	30	1		8	1		1	2	4	6	3	2	3	1		3		1	1			67
80459	97	2	JM	127	311	-31.2	116	12		5		2	3	2	3	8	7	4	4	2		1	1		1			171
80460	97	2	JM	127	310	-26.9	187	16		11	5	4	2	3	6	6	8	4	7	5	2	1						267
80461	97	2	JM	127	310	-15.8	387	14	5	18	16	6	2	1	1	3	7	2	1		4	2	1			1		471
81859	97	4	JH	128	275	-11.2	30	3	1	5	3	3	2	5	23	16	32	56	42	52	25	12	3	2	1	1		317
80252	98	2	JH	129	363	-19.8	16		2	15	49	90	69	41	22	16	17	4		3	1	2				1		348
						Total	14796	1261	1441	848	510	481	509	656	734	682	662	470	364	232	125	69	31	21	20	12	3	**23927**
						%	61.8	5.3	6.0	3.5	2.1	2.0	2.1	2.7	3.1	2.9	2.8	2.0	1.5	1.0	0.5	0.3	0.1	0.1	0.1	0.1		

Haddock

Table I.9. Selected pelagic stations from “day shallow”. Number of haddock in every length group. Vessels codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
41053	93	1	GS	1	233	-2.7	14	3	5	3	7										32
80221	93	1	JH	2	295	-2.7	129	16	5	2											152
80292	93	2	JH	3	212	2.0					7	9	3	6							25
80327	93	2	JH	4	255	2.8				1	5	10	16	14	10		1				57
80347	93	2	JH	5	280	0.8						6	17	24	11	3	2		1		64
80356	93	2	JH	6	260	3.4						2	7	9	6	2					26
80041	94	2	JH	7	189	0.6					4	24	12	3							43
80304	94	2	GS	8	235	0.8				60	315	855	645	195	75	45					2190
80335	94	2	GS	9	270	3.0			8	23	90	203	152	74	31						581
80340	94	2	GS	10	222	0.5				7	36	137	126	40	11	7	4				368
80342	94	2	GS	11	283	-1.1	1	1	2	6	11	16	10								47
80379	94	2	GS	12	293	1.6					2	3	4	8	5						22
80247	95	2	JH	13	295	3.3	17	29	4		4	17	205	197	71	4					548
80265	95	2	JH	14	250	3.9					1	4	25	33	11	3	1				78
80474	95	2	JM	15	240	3.0					7	53	134	106	14	4					318
86209	95	4	GS	16	266	21.7	2				9	18	91	120	40	9	2	1	1		293
86246	95	4	GS	17	274	19.3					3	29	94	110	29	5					270
86251	95	4	GS	18	266	21.9		1	1			16	43	63	23	3			1		151
86266	95	4	GS	19	264	19.7						51	153	159	69	18		3			453
80204	96	2	JH	20	216	4.4				1	5	50	124	129	59	3	2				373
80270	96	2	JH	21	262	0.8	4	16													20
80661	96	3	GS	22	282	14.5		1			1	17	57	63	34	8					181
80839	97	8	MS	23	63	-2.0			7	7	40	11	18	18	11			2			114
						Total	167	67	32	110	547	1531	1936	1371	510	114	12	6	3		**6406**
						%	2.6	1.0	0.5	1.7	8.5	23.9	30.2	21.4	8.0	1.8	0.2	0.1			

Table I.10. Selected bottom stations from “day shallow”. Number of haddock in every length group. Vessels codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
41054	93	1	GS	1	220	-2.0	158	89	96	28	99	65	11	13	2						561
80220	93	1	JH	2	325	-3.1	14	9	1												24
80291	93	2	JH	3	203	-0.6	12	39	50	31	14	11	7	7	1						172
80529	93	1	LIZY	3	235	0.7	275	54	20	2	2										353
80530	93	1	LIZY	3	165	-1.0	195	181	249	176	469	322	142	78	5						1817
80326	93	2	JH	4	263	2.2	15	31	26	5	19	5	2	3							106
80606	93	2	LIZY	5	275	-2.6	324	281	143	27	22	3		1	1	1					803
80355	93	2	JH	6	300	5.1	11	69	30	11	5	6	3	7	3	1					146
80518	94	2	LIZY	7	190	1.0	3	9	27	57	115	373	237	60	32						913
80511	94	2	LIZY	8	221	1.5	433	442	353	275	110	60	18	14	5			1			1711
80570	94	2	LIZY	8	285	-4.1	284	261	119	127	15	31	10	9	2	1					859
80570	94	2	LIZY	9	285	-4.1	284	261	119	127	15	31	10	9	2	1					859
80586	94	2	LIZY	10	205	-3.7	71	42	62	107	116	89	44	19	9		2				561
80341	94	2	GS	11	258	3.5	76	168	77	94	60	64	31	12							582
80585	94	2	LIZY	11	269	3.1	205	161	81	54	36	29	7	2			1				576
80599	94	2	LIZY	11	295	2.3	252	188	59	76	59	47	20	6	1					1	709
80638	94	2	LIZY	12	311	1.2	280	251	3	8	13	8	11	10	3	1					588
80246	95	2	JH	13	273	4.3	327	594	13	22	16	95	152	149	70	3					1441
80266	95	2	JH	14	305	1.6	844	899	58	17	13	17	35	48	14	7					1952
80473	95	2	JM	15	243	-2.4	8	421	34	27	34	47	68	32	5						676
80475	95	2	JM	15	260	4.1	39	273	10	10	7	27	74	82	15						537
86101	95	3	GS	16	267	18.9	125	219	44	12	21	9	34	27	14	2	1			1	509
86105	95	3	GS	16	266	4.4	186	359	40	18	50	98	260	290	126	27	4	1			1459
86117	95	3	GS	16	270	11.6	85	186	62	15	16	28	53	75	27	2	1			1	551
86118	95	3	GS	16	270	11.6	4	16	1												21
86119	95	3	GS	16	270	11.6	5	17		2	2	2	3	2							33
86121	95	3	GS	16	271	17.1	82	137	16	19	40	53	123	120	36	5	2				633
86122	95	3	GS	16	271	17.1	7	10					1	2							20
86125	95	3	GS	16	273	19.3	102	134	42	30	44	102	257	289	102	7	2				1111
86126	95	3	GS	16	273	19.3	6	15	1	2	1	3	2	5	2	1					38
86127	95	3	GS	16	273	19.3	8	17	7		1	2	2	1							38
86128	95	3	GS	16	273	19.3	9	8	2			1			1						21
86143	95	4	GS	16	269	11.1	100	209	77	36	30	28	57	50	14	3	1				605
86151	95	4	GS	16	268	8.1	198	311	57	30	27	30	59	47	15	3	3				780
86153	95	4	GS	16	268	8.1	1	12	1	2		3	2	1	3						25
86157	95	4	GS	16	269	10.9	138	306	63	46	51	59	71	62	14	2	1				813
86159	95	4	GS	16	269	10.9	8	11	2	1			1								23
86161	95	4	GS	16	270	2.6	115	227	78	26	36	33	72	53	15	5					660
86174	95	4	GS	16	272	6.8	137	228	78	33	24	33	33	21	10		1				598
86178	95	4	GS	16	269	16.0	119	319	68	32	29	14	26	38	18	1					664
86182	95	4	GS	16	272	20.4	105	247	92	32	27	13	29	30	5	2	1	1			584
86183	95	4	GS	16	272	20.4	4	19	5	1	2	1		1							33
86184	95	4	GS	16	272	20.4	8	14	5	5	2	2	1	2							39

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
86186	95	4	GS	16	274	21.2	62	238	82	37	36	28	44	61	16	5	1				610
86187	95	4	GS	16	274	21.2	4	19	1	1		1	1	2							29
86188	95	4	GS	16	274	21.2	11	22	7	4	2		3	1							50
86190	95	4	GS	16	272	17.4	75	479	113	71	47	32	49	59	19	11	1				956
86191	95	4	GS	16	272	17.4	11	22	4	1	4	2		6	2						52
86192	95	4	GS	16	272	17.4	16	28	4	6			3	1							58
86193	95	4	GS	16	272	17.4	4	16	3	2	1		1	1							28
86201	95	4	GS	16	269	8.1	183	272	63	29	27	35	108	124	42	8	2		1		894
86202	95	4	GS	16	269	8.1	5	6	4	2			2	3	1						23
86203	95	4	GS	16	269	8.1	6	19	2		1		5	3							36
86205	95	4	GS	16	269	16.4	170	473	79	17	13	33	105	106	45	6					1047
86206	95	4	GS	16	269	16.4	5	15	3	1				1	2						27
86207	95	4	GS	16	269	16.4	5	8	2		1		2	4							22
86208	95	4	GS	16	269	16.4	2	21	1		2		2	1							29
86210	95	4	GS	16	269	21.2	46	558	93	50	44	41	75	116	51	10	1	1			1086
86220	95	4	GS	16	271	12.7	181	411	145	53	47	30	36	28	7	2					940
86221	95	4	GS	16	271	12.7	4	26	4				1	1							36
86222	95	4	GS	16	271	12.7	6	14	2	1	2		2								27
86223	95	4	GS	16	271	12.7	2	10	7	1				1							21
86224	95	4	GS	16	268	18.3	160	489	85	59	19	17	26	15	4						874
86225	95	4	GS	16	268	18.3	9	49	4	1											63
86226	95	4	GS	16	268	18.3	12	30	7	2	2	1									54
86227	95	4	GS	16	268	18.3	14	12	7	1	1										35
86229	95	4	GS	16	268	20.0	108	649	67	64	35	10	25	29	4	1	1				993
86230	95	4	GS	16	268	20.0	22	51	7	2											82
86231	95	4	GS	16	268	20.0	17	63	5	2		1									88
86232	95	4	GS	16	268	20.0	4	17	1												22
86242	95	4	GS	16	269	13.3	257	735	155	76	55	26	37	42	16	3					1402
86243	95	4	GS	16	269	13.3	7	22	3		2										34
86244	95	4	GS	16	269	13.3	6	34	3	1	1										45
86245	95	4	GS	16	269	13.3	8	16	3	2			1								30
86247	95	4	GS	16	268	23.4	67	235	35	13	6	5	21	21	9	1					413
86249	95	4	GS	16	268	23.4		23		1	2										26
86250	95	4	GS	16	268	23.4	7	39	4	14	1		2	1							68
86252	95	4	GS	16	270	9.6	166	360	67	48	50	68	166	134	51	8					1118
86253	95	4	GS	16	270	9.6	8	22	3	2	1		1	1							38
86254	95	4	GS	16	270	9.6	10	30	6	1	1		1	1							50
86255	95	4	GS	16	270	9.6	7	12	1	4	1		3								28
86267	95	4	GS	16	268	23.4	167	441	71	69	36	39	79	75	26	4					1007
86268	95	4	GS	16	268	23.4	9	22	1	1				1							34
86269	95	4	GS	16	268	23.4	8	22	6	2	1		1								40
86271	95	4	GS	16	268	16.4	69	378	62	46	37	22	65	59	15	5					758
86272	95	4	GS	16	268	16.4	4	13	1		3	2		1							24
86273	95	4	GS	16	268	16.4	9	21	6	6	4	5	2								53
86274	95	4	GS	16	268	16.4	5	13	4	2	2	1	4	2							33
86275	95	4	GS	16	271	9.2	74	176	43	35	42	68	140	104	28	1					711
86277	95	4	GS	16	271	9.2	7	11	3		4	1	1	2							29
86295	95	4	GS	16	270	10.7	17	52	36	29	56	59	74	73	36	7	2	2			443
86296	95	4	GS	16	270	10.7	4	8	2		3		1	2							20
86299	95	4	GS	16	272	22.8	178	988	174	148	112	94	174	224	73	3					2168
86300	95	4	GS	16	272	22.8	4	23	5	1	2		3	2	1						41
86301	95	4	GS	16	272	22.8	15	33	8	3	2	2	4	1	1	2					71
86302	95	4	GS	16	272	22.8	4	25	4	2	1		1								37
86117	95	3	GS	17	270	11.6	85	186	62	15	16	28	53	75	27	2	1			1	551
86118	95	3	GS	17	270	11.6	4	16	1												21
86119	95	3	GS	17	270	11.6	5	17		2	2	2	3	2							33
86121	95	3	GS	17	271	17.1	82	137	16	19	40	53	123	120	36	5	2				633
86122	95	3	GS	17	271	17.1	7	10					1	2							20
86125	95	3	GS	17	273	19.3	102	134	42	30	44	102	257	289	102	7	2				1111
86126	95	3	GS	17	273	19.3	6	15	1	2	1	3	2	5	2	1					38
86127	95	3	GS	17	273	19.3	8	17	7		1	2	2	1							38
86128	95	3	GS	17	273	19.3	9	8	2			1			1						21
86143	95	4	GS	17	269	11.1	100	209	77	36	30	28	57	50	14	3	1				605
86151	95	4	GS	17	268	8.1	198	311	57	30	27	30	59	47	15	3	3				780
86153	95	4	GS	17	268	8.1	1	12	1	2		3	2	1	3						25
86157	95	4	GS	17	269	10.9	138	306	63	46	51	59	71	62	14	2	1				813
86159	95	4	GS	17	269	10.9	8	11	2	1			1								23
86161	95	4	GS	17	270	2.6	115	227	78	26	36	33	72	53	15	5					660
86174	95	4	GS	17	272	6.8	137	228	78	33	24	33	33	21	10		1				598
86178	95	4	GS	17	269	16.0	119	319	68	32	29	14	26	38	18	1					664
86182	95	4	GS	17	272	20.4	105	247	92	32	27	13	29	30	5	2	1	1			584
86183	95	4	GS	17	272	20.4	4	19	5	1	2	1		1							33
86184	95	4	GS	17	272	20.4	8	14	5	5	2	2	1	2							39
86186	95	4	GS	17	274	21.2	62	238	82	37	36	28	44	61	16	5	1				610
86187	95	4	GS	17	274	21.2	4	19	1	1		1	1	2							29
86188	95	4	GS	17	274	21.2	11	22	7	4	2		3	1							50
86190	95	4	GS	17	272	17.4	75	479	113	71	47	32	49	59	19	11	1				956
86191	95	4	GS	17	272	17.4	11	22	4	1	4	2		6	2						52
86192	95	4	GS	17	272	17.4	16	28	4	6			3	1							58
86193	95	4	GS	17	272	17.4	4	16	3	2	1		1	1							28
86201	95	4	GS	17	269	8.1	183	272	63	29	27	35	108	124	42	8	2		1		894
86202	95	4	GS	17	269	8.1	5	6	4	2			2	3	1						23
86203	95	4	GS	17	269	8.1	6	19	2		1		5	3							36
86205	95	4	GS	17	269	16.4	170	473	79	17	13	33	105	106	45	6					1047
86206	95	4	GS	17	269	16.4	5	15	3	1				1	2						27
86207	95	4	GS	17	269	16.4	5	8	2		1		2	4							22
86208	95	4	GS	17	269	16.4	2	21	1		2		2	1							29
86210	95	4	GS	17	269	21.2	46	558	93	50	44	41	75	116	51	10	1	1			1086
86220	95	4	GS	17	271	12.7	181	411	145	53	47	30	36	28	7	2					940
86221	95	4	GS	17	271	12.7	4	26	4				1	1							36
86222	95	4	GS	17	271	12.7	6	14	2	1	2		2								27
86223	95	4	GS	17	271	12.7	2	10	7	1				1							21

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
86224	95	4	GS	17	268	18.3	160	489	85	59	19	17	26	15	4						874
86225	95	4	GS	17	268	18.3	9	49	4	1											63
86226	95	4	GS	17	268	18.3	12	30	7	2	2	1									54
86227	95	4	GS	17	268	18.3	14	12	7	1	1										35
86229	95	4	GS	17	268	20.0	108	649	67	64	35	10	25	29	4	1	1				993
86230	95	4	GS	17	268	20.0	22	51	7	2											82
86231	95	4	GS	17	268	20.0	17	63	5	2		1									88
86232	95	4	GS	17	268	20.0	4	17	1												22
86242	95	4	GS	17	269	13.3	257	735	155	76	55	26	37	42	16	3					1402
86243	95	4	GS	17	269	13.3	7	22	3		2										34
86244	95	4	GS	17	269	13.3	6	34	3	1	1										45
86245	95	4	GS	17	269	13.3	8	16	3	2			1								30
86247	95	4	GS	17	268	23.4	67	235	35	13	6	5	21	21	9	1					413
86249	95	4	GS	17	268	23.4		23		1	2										26
86250	95	4	GS	17	268	23.4	7	39	4	14	1		2	1							68
86252	95	4	GS	17	270	9.6	166	360	67	48	50	68	166	134	51	8					1118
86253	95	4	GS	17	270	9.6	8	22	3	2	1		1	1							38
86254	95	4	GS	17	270	9.6	10	30	6	1	1		1	1							50
86255	95	4	GS	17	270	9.6	7	12	1	4	1		3								28
86267	95	4	GS	17	268	23.4	167	441	71	69	36	39	79	75	26	4					1007
86268	95	4	GS	17	268	23.4	9	22	1	1				1							34
86269	95	4	GS	17	268	23.4	8	22	6	2	1		1								40
86271	95	4	GS	17	268	16.4	69	378	62	46	37	22	65	59	15	5					758
86272	95	4	GS	17	268	16.4	4	13	1		3	2		1							24
86273	95	4	GS	17	268	16.4	9	21	6	6	4	5	2								53
86274	95	4	GS	17	268	16.4	5	13	4	2	2	1	4	2							33
86275	95	4	GS	17	271	9.2	74	176	43	35	42	68	140	104	28	1					711
86277	95	4	GS	17	271	9.2	7	11	3		4	1	1	2							29
86295	95	4	GS	17	270	10.7	17	52	36	29	56	59	74	73	36	7	2	2			443
86296	95	4	GS	17	270	10.7	4	8	2		3		1	2							20
86299	95	4	GS	17	272	22.8	178	988	174	148	112	94	174	224	73	3					2168
86300	95	4	GS	17	272	22.8	4	23	5	1	2		3	2	1						41
86301	95	4	GS	17	272	22.8	15	33	8	3	2	2	4	1	1	2					71
86302	95	4	GS	17	272	22.8	4	25	4	2	1		1								37
86117	95	3	GS	18	270	11.6	85	186	62	15	16	28	53	75	27	2	1			1	551
86118	95	3	GS	18	270	11.6	4	16	1												21
86119	95	3	GS	18	270	11.6	5	17		2	2	2	3	2							33
86121	95	3	GS	18	271	17.1	82	137	16	19	40	53	123	120	36	5	2				633
86122	95	3	GS	18	271	17.1	7	10					1	2							20
86125	95	3	GS	18	273	19.3	102	134	42	30	44	102	257	289	102	7	2				1111
86126	95	3	GS	18	273	19.3	6	15	1	2	1	3	2	5	2	1					38
86127	95	3	GS	18	273	19.3	8	17	7		1	2	2	1							38
86128	95	3	GS	18	273	19.3	9	8	2			1			1						21
86143	95	4	GS	18	269	11.1	100	209	77	36	30	28	57	50	14	3	1				605
86151	95	4	GS	18	268	8.1	198	311	57	30	27	30	59	47	15	3	3				780
86153	95	4	GS	18	268	8.1	1	12	1	2		3	2	1	3						25
86157	95	4	GS	18	269	10.9	138	306	63	46	51	59	71	62	14	2	1				813
86159	95	4	GS	18	269	10.9	8	11	2	1			1								23
86161	95	4	GS	18	270	2.6	115	227	78	26	36	33	72	53	15	5					660
86174	95	4	GS	18	272	6.8	137	228	78	33	24	33	33	21	10		1				598
86178	95	4	GS	18	269	16.0	119	319	68	32	29	14	26	38	18	1					664
86182	95	4	GS	18	272	20.4	105	247	92	32	27	13	29	30	5	2	1	1			584
86183	95	4	GS	18	272	20.4	4	19	5	1	2	1		1							33
86184	95	4	GS	18	272	20.4	8	14	5	5	2	2	1	2							39
86186	95	4	GS	18	274	21.2	62	238	82	37	36	28	44	61	16	5	1				610
86187	95	4	GS	18	274	21.2	4	19	1	1		1	1	2							29
86188	95	4	GS	18	274	21.2	11	22	7	4	2		3	1							50
86190	95	4	GS	18	272	17.4	75	479	113	71	47	32	49	59	19	11	1				956
86191	95	4	GS	18	272	17.4	11	22	4	1	4	2		6	2						52
86192	95	4	GS	18	272	17.4	16	28	4	6			3	1							58
86193	95	4	GS	18	272	17.4	4	16	3	2	1		1	1							28
86201	95	4	GS	18	269	8.1	183	272	63	29	27	35	108	124	42	8	2		1		894
86202	95	4	GS	18	269	8.1	5	6	4	2			2	3	1						23
86203	95	4	GS	18	269	8.1	6	19	2		1		5	3							36
86205	95	4	GS	18	269	16.4	170	473	79	17	13	33	105	106	45	6					1047
86206	95	4	GS	18	269	16.4	5	15	3	1				1	2						27
86207	95	4	GS	18	269	16.4	5	8	2		1		2	4							22
86208	95	4	GS	18	269	16.4	2	21	1		2		2	1							29
86210	95	4	GS	18	269	21.2	46	558	93	50	44	41	75	116	51	10	1	1			1086
86220	95	4	GS	18	271	12.7	181	411	145	53	47	30	36	28	7	2					940
86221	95	4	GS	18	271	12.7	4	26	4				1	1							36
86222	95	4	GS	18	271	12.7	6	14	2	1	2		2								27
86223	95	4	GS	18	271	12.7	2	10	7	1				1							21
86224	95	4	GS	18	268	18.3	160	489	85	59	19	17	26	15	4						874
86225	95	4	GS	18	268	18.3	9	49	4	1											63
86226	95	4	GS	18	268	18.3	12	30	7	2	2	1									54
86227	95	4	GS	18	268	18.3	14	12	7	1	1										35
86229	95	4	GS	18	268	20.0	108	649	67	64	35	10	25	29	4	1	1				993
86230	95	4	GS	18	268	20.0	22	51	7	2											82
86231	95	4	GS	18	268	20.0	17	63	5	2		1									88
86232	95	4	GS	18	268	20.0	4	17	1												22
86242	95	4	GS	18	269	13.3	257	735	155	76	55	26	37	42	16	3					1402
86243	95	4	GS	18	269	13.3	7	22	3		2										34
86244	95	4	GS	18	269	13.3	6	34	3	1	1										45
86245	95	4	GS	18	269	13.3	8	16	3	2			1								30
86247	95	4	GS	18	268	23.4	67	235	35	13	6	5	21	21	9	1					413
86249	95	4	GS	18	268	23.4		23		1	2										26
86250	95	4	GS	18	268	23.4	7	39	4	14	1		2	1							68
86252	95	4	GS	18	270	9.6	166	360	67	48	50	68	166	134	51	8					1118
86253	95	4	GS	18	270	9.6	8	22	3	2	1		1	1							38
86254	95	4	GS	18	270	9.6	10	30	6	1	1		1	1							50
86255	95	4	GS	18	270	9.6	7	12	1	4	1		3								28

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
86267	95	4	GS	18	268	23.4	167	441	71	69	36	39	79	75	26	4					1007
86268	95	4	GS	18	268	23.4	9	22	1	1				1							34
86269	95	4	GS	18	268	23.4	8	22	6	2	1		1								40
86271	95	4	GS	18	268	16.4	69	378	62	46	37	22	65	59	15	5					758
86272	95	4	GS	18	268	16.4	4	13	1		3	2		1							24
86273	95	4	GS	18	268	16.4	9	21	6	6	4	5	2								53
86274	95	4	GS	18	268	16.4	5	13	4	2	2	1	4	2							33
86275	95	4	GS	18	271	9.2	74	176	43	35	42	68	140	104	28	1					711
86277	95	4	GS	18	271	9.2	7	11	3		4	1	1	2							29
86295	95	4	GS	18	270	10.7	17	52	36	29	56	59	74	73	36	7	2	2			443
86296	95	4	GS	18	270	10.7	4	8	2		3		1	2							20
86299	95	4	GS	18	272	22.8	178	988	174	148	112	94	174	224	73	3					2168
86300	95	4	GS	18	272	22.8	4	23	5	1	2		3	2	1						41
86301	95	4	GS	18	272	22.8	15	33	8	3	2	2	4	1	1	2					71
86302	95	4	GS	18	272	22.8	4	25	4	2	1		1								37
86143	95	4	GS	19	269	11.1	100	209	77	36	30	28	57	50	14	3	1				605
86151	95	4	GS	19	268	8.1	198	311	57	30	27	30	59	47	15	3	3				780
86153	95	4	GS	19	268	8.1	1	12	1	2		3	2	1	3						25
86157	95	4	GS	19	269	10.9	138	306	63	46	51	59	71	62	14	2	1				813
86159	95	4	GS	19	269	10.9	8	11	2	1			1								23
86161	95	4	GS	19	270	2.6	115	227	78	26	36	33	72	53	15	5					660
86174	95	4	GS	19	272	6.8	137	228	78	33	24	33	33	21	10		1				598
86178	95	4	GS	19	269	16.0	119	319	68	32	29	14	26	38	18	1					664
86182	95	4	GS	19	272	20.4	105	247	92	32	27	13	29	30	5	2	1	1			584
86183	95	4	GS	19	272	20.4	4	19	5	1	2	1		1							33
86184	95	4	GS	19	272	20.4	8	14	5	5	2	2	1	2							39
86186	95	4	GS	19	274	21.2	62	238	82	37	36	28	44	61	16	5	1				610
86187	95	4	GS	19	274	21.2	4	19	1	1		1	1	2							29
86188	95	4	GS	19	274	21.2	11	22	7	4	2		3	1							50
86190	95	4	GS	19	272	17.4	75	479	113	71	47	32	49	59	19	11	1				956
86191	95	4	GS	19	272	17.4	11	22	4	1	4	2		6	2						52
86192	95	4	GS	19	272	17.4	16	28	4	6			3	1							58
86193	95	4	GS	19	272	17.4	4	16	3	2	1		1	1							28
86201	95	4	GS	19	269	8.1	183	272	63	29	27	35	108	124	42	8	2		1		894
86202	95	4	GS	19	269	8.1	5	6	4	2			2	3	1						23
86203	95	4	GS	19	269	8.1	6	19	2		1		5	3							36
86205	95	4	GS	19	269	16.4	170	473	79	17	13	33	105	106	45	6					1047
86206	95	4	GS	19	269	16.4	5	15	3	1				1	2						27
86207	95	4	GS	19	269	16.4	5	8	2		1		2	4							22
86208	95	4	GS	19	269	16.4	2	21	1		2		2	1							29
86210	95	4	GS	19	269	21.2	46	558	93	50	44	41	75	116	51	10	1	1			1086
86220	95	4	GS	19	271	12.7	181	411	145	53	47	30	36	28	7	2					940
86221	95	4	GS	19	271	12.7	4	26	4				1	1							36
86222	95	4	GS	19	271	12.7	6	14	2	1	2		2								27
86223	95	4	GS	19	271	12.7	2	10	7	1				1							21
86224	95	4	GS	19	268	18.3	160	489	85	59	19	17	26	15	4						874
86225	95	4	GS	19	268	18.3	9	49	4	1											63
86226	95	4	GS	19	268	18.3	12	30	7	2	2	1									54
86227	95	4	GS	19	268	18.3	14	12	7	1	1										35
86229	95	4	GS	19	268	20.0	108	649	67	64	35	10	25	29	4	1	1				993
86230	95	4	GS	19	268	20.0	22	51	7	2											82
86231	95	4	GS	19	268	20.0	17	63	5	2		1									88
86232	95	4	GS	19	268	20.0	4	17	1												22
86242	95	4	GS	19	269	13.3	257	735	155	76	55	26	37	42	16	3					1402
86243	95	4	GS	19	269	13.3	7	22	3		2										34
86244	95	4	GS	19	269	13.3	6	34	3	1	1										45
86245	95	4	GS	19	269	13.3	8	16	3	2			1								30
86247	95	4	GS	19	268	23.4	67	235	35	13	6	5	21	21	9	1					413
86249	95	4	GS	19	268	23.4		23		1	2										26
86250	95	4	GS	19	268	23.4	7	39	4	14	1		2	1							68
86252	95	4	GS	19	270	9.6	166	360	67	48	50	68	166	134	51	8					1118
86253	95	4	GS	19	270	9.6	8	22	3	2	1		1	1							38
86254	95	4	GS	19	270	9.6	10	30	6	1	1		1	1							50
86255	95	4	GS	19	270	9.6	7	12	1	4	1		3								28
86267	95	4	GS	19	268	23.4	167	441	71	69	36	39	79	75	26	4					1007
86268	95	4	GS	19	268	23.4	9	22	1	1				1							34
86269	95	4	GS	19	268	23.4	8	22	6	2	1		1								40
86271	95	4	GS	19	268	16.4	69	378	62	46	37	22	65	59	15	5					758
86272	95	4	GS	19	268	16.4	4	13	1		3	2		1							24
86273	95	4	GS	19	268	16.4	9	21	6	6	4	5	2								53
86274	95	4	GS	19	268	16.4	5	13	4	2	2	1	4	2							33
86275	95	4	GS	19	271	9.2	74	176	43	35	42	68	140	104	28	1					711
86277	95	4	GS	19	271	9.2	7	11	3		4	1	1	2							29
86295	95	4	GS	19	270	10.7	17	52	36	29	56	59	74	73	36	7	2	2			443
86296	95	4	GS	19	270	10.7	4	8	2		3		1	2							20
86299	95	4	GS	19	272	22.8	178	988	174	148	112	94	174	224	73	3					2168
86300	95	4	GS	19	272	22.8	4	23	5	1	2		3	2	1						41
86301	95	4	GS	19	272	22.8	15	33	8	3	2	2	4	1	1	2					71
86302	95	4	GS	19	272	22.8	4	25	4	2	1		1								37
80203	96	2	JH	20	215	-1.6	20	119	84	59	13	33	37	47	20	8					440
80205	96	2	JH	20	224	-0.3		4	22	15	6	19	19	7							92
80058	96	2	GS	21	255	5.1	50	174	27	21	11	12	11	1	3						310
80271	96	2	JH	21	233	7.6	151	420	46	56	153	97	35	7							965
80618	96	3	GS	22	277	15.0	170	429	8	7	7	4	24	15	8	4	1				677
80619	96	3	GS	22	277	15.0	10	50	1		1	1									63
80621	96	3	GS	22	277	15.0	16	27					1	1							45
80622	96	3	GS	22	272	7.0	234	347	2	5	1	10	48	77	37	4	1	1			767
80634	96	3	GS	22	283	11.1	98	130	21	9	7	5	7	17	8		1				303
80638	96	3	GS	22	284	3.0	65	62	15	9	6	17	32	26	12	5					249
80652	96	3	GS	22	282	-0.4	438	714	164	62	21	30	43	59	27	4		1			1563
80662	96	3	GS	22	283	16.8	283	1297	27	7	6	11	15	16	22	8					1692
80663	96	3	GS	22	283	16.8	18	57	12	2	1					1					91

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80664	96	3	GS	22	283	16.8	19	33	5	1	1										59
80665	96	3	GS	22	283	16.8	15	13	5												33
80670	96	3	GS	22	283	-1.6	3289	15074	309	81	70	128	174	186	256	93					19660
80840	97	8	MS	23	77	-1.9		7	36	36	71	114	129	271	221	86					971
						Total	22997	64574	11027	6513	5745	5847	9562	9546	3600	674	86	20	4	5	**140200**
						%	16.4	46.1	7.9	4.6	4.1	4.2	6.8	6.8	2.6	0.5	0.1				

Table I.11. Selected pelagic stations from "night shallow". Number of haddock in every length group. Vessel codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
41025	93	1	GS	24	292	-6,1	26	12	3												41
41051	93	1	GS	25	280	-35,8	203	106	77	39											425
41057	93	1	GS	26	230	-29,3	97	53	47	42	45	10	2		1						297
41067	93	1	GS	27	289	-30,2	132	110	42	38	46	52	24	17	1						462
41070	93	2	GS	28	291	-5,5	48	22	14	5	4	5									98
41071	93	2	GS	29	227	-5,1	1		3	7	25	5									41
41085	93	2	GS	30	203	-31,4				13	77	227	79	31							427
41095	93	2	GS	31	270	-13,4	7	9	5	5	22	27	13	6							94
80230	93	1	JH	32	208	-15,1	57	15	1												73
80233	93	1	JH	33	210	-15,1	32	7	1												40
80250	93	1	JH	34	215	-32,5	23	5	1												29
80255	93	1	JH	35	135	-15,4	4	23	155	147	132	53	4								518
80283	93	2	JH	36	192	-33,0	82	31	154	247	504	247	31								1296
80285	93	2	JH	37	187	-16,5	28	14	9	22	51	22	5	3							154
80287	93	2	JH	38	155	-36,4	34	20	26	23	41	26	7								177
80290	93	2	JH	39	170	-13,4	1		3	11	31	32	7	8							93
80310	93	2	JH	40	268	-33,5	56	14	9	3	13	6	1								102
80312	93	2	JH	41	278	-25,8	1	1	2	2	4	3	1	6							20
80321	93	2	JH	42	280	-9,4	98	79	14	5	18	41	45	18	2						320
80324	93	2	JH	43	256	-21,5	18	3	5	1	21	36	22	22	11						139
80350	93	2	JH	44	266	-9,2	5	2		2	7	8	9	4	2						39
80460	93	3	JH	45	275	-5,3			8	8		24		24							64
80043	94	2	JH	46	188	-17,7			28	184	396	286	28								922
80088	94	2	JH	47	165	-8,4					27	135	230	37	12						441
80130	94	2	JH	48	235	-30,4	4	9	13	223	432	332	135	9							1157
80148	94	2	JH	49	258	-26,8				2	19	29	17	1							68
80149	94	2	JH	50	254	-26,9		11	15	80	144	273	243	68	15						849
80333	94	2	GS	51	265	-31,0	39	54	6	5	6	4	2								116
80337	94	2	GS	52	285	-13,0	67	80	18	31	124	173	115	13	9	4					634
80338	94	2	GS	53	290	-31,1	16	39	12	28	43	112	47	15	3						315
80344	94	2	GS	54	256	-10,7	101	92	33	48	31	41	31	1	1	1					380
80346	94	2	GS	55	265	-23,4	153	115	20	19	53	127	214	124	40						865
80350	94	2	GS	56	295	-29,8	234	335	41	23	15	20	18	12	3						701
80370	94	2	GS	57	276	-21,9	122	85	23	18	15	33	15	11	5	1					328
80058	95	2	GS	58	261	-10,4	98	431	6	8	47	212	377	267	47						1493
80062	95	2	GS	59	257	-19,1	168	744	1	3	2	4	5	7	1				1		936
80066	95	2	GS	60	284	-16,9	19	73	6	1	1										100
80235	95	2	JH	61	285	-22,8	16	51													67
80243	95	2	JH	62	273	-32,6	66	209	4	1		1									281
80470	95	2	JM	63	283	-31,4	10	80		12	16	37	84	60	14						313
86196	95	4	GS	64	289	-12,1	79	167	22	7	1	2	1	3	2						284
86219	95	4	GS	65	267	-7,3	28	255	5	2											290
86237	95	4	GS	66	261	-11,5	38	91	6	2	1	1									139
86264	95	4	GS	67	267	-10,6	24	143	25	5	2	2		1							202
80253	96	2	JH	68	213	-19,9	82	222	85	34			1								424
80289	96	2	JH	69	281	-12,2	46	177	64	38	32	45	45	20	8	1					476
80617	96	3	GS	70	278	-11,6	90	151	19			1	1	1	2						265
80646	96	3	GS	71	287	-20,5	6	38	16	8	1										69
80656	96	3	GS	72	287	-16,4	17	107	23	7	1										155
80077	97	3	GS	73	170	-22,5	2	2				1	3	6	4	2	1				21
80220	97	2	JH	74	255	-31,2	69	98		3		1			1						172
80251	97	2	JH	75	263	-6,6	2	28	1	1											32
80002	98	2	GS	76	272	-6,2	14	19	5				1								39
81862	97	4	JH	77	280	-11,0	7	35		1											43
						Total	2570	4467	1076	1414	2450	2696	1863	795	184	9	1		1		**17526**
						%	14,7	25,5	6,1	8,1	14,0	15,4	10,6	4,5	1,0	0,1					

Table I.12. Selected bottom stations from "night shallow". Number of haddock in every length group. Vessel codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
41024	93	1	GS	24	206	-13,3	13	21	7	1	1										43
41052	93	1	GS	25	273	-23,5			5	6	29	9	11	8	6	3					77
41052	93	1	GS	26	273	-23,5			5	6	29	9	11	8	6	3					77
41056	93	1	GS	26	240	-22,0	8	8	13	13	41	39	23	15	3	3		2			168
80561	93	2	LIZY	26	197	-30,9	61	31	36	24	35	15	10	6	3	2					223
80317	93	2	JH	27	250	-22,4	1	6	6	4	24	39	52	43	11	5					191
80311	93	2	JH	28	276	-31,5	6	10	10	12	5	8	7	5	5						68
80550	93	2	LIZY	28	269	-10,5	93	25	7	4	9	15	20	20	4						197
80311	93	2	JH	29	276	-31,5	6	10	10	12	5	8	7	5	5						68
80300	93	2	JH	30	165	-7,0		5	15	32	72	98	35	8	2						267
80540	93	2	LIZY	30	179	-5,1	251	105	83	52	63	37	14	7	2						614
80313	93	2	JH	31	270	-14,9		9	5	3	10	8	6	6		2					49
80598	93	2	LIZY	31	277	-16,5	31	17	4	2	7	1	2	3	1						68
80229	93	1	JH	32	258	-24,3	4	22	92	63	78	25	2								286
80232	93	1	JH	33	201	-7,9	46	25	22	33	96	32	10			2					266
80237	93	1	JH	33	238	-34,1	1	22	42	74	154	102	52	13							460
80248	93	1	JH	34	191	-37,3		6	14	22	45	43	12	4	2						148
80249	93	1	JH	34	200	-37,0	3	15	24	33	77	28	4	4							188
80251	93	1	JH	34	183	-19,9	12	23	98	62	110	37	6	1							349
80273	93	1	JH	34	198	-32,0	6	29	41	64	189	111	26	9							475
80254	93	1	JH	35	120	-9,5	4	86	229	194	337	169	26	4							1049
80256	93	1	JH	35	126	-28,5	10	37	319	162	241	131	16	5	1						922
80275	93	1	JH	36	216	-36,4	2	5	6	2	5	8	3								31
80282	93	2	JH	36	210	-36,5		15	40	37	101	120	34	9							356
80273	93	1	JH	37	198	-32,0	6	29	41	64	189	111	26	9							475
80286	93	2	JH	37	167	-30,3		47	193	90	199	178	76	61	15	10					869
80522	93	1	LIZY	37	145	-10,8	45	83	75	60	142	108	51	34	4						602
80288	93	2	JH	38	156	-35,2	10	24	20	17	24	34	27	34	10						200
80520	93	1	LIZY	38	142	-34,2	95	225	364	149	171	111	44	22	10						1191
80532	93	1	LIZY	38	160	-29,5	112	306	175	72	96	88	42	52	14						957
80533	93	2	LIZY	38	167	-15,8	153	251	130	93	87	65	45	29	6						859
80289	93	2	JH	39	179	-24,2	13	13	46	40	86	66	23	17	3						307
80539	93	2	LIZY	39	171	-16,7	324	279	149	98	209	100	31	10	5	2					1207
80540	93	2	LIZY	39	179	-5,1	251	105	83	52	63	37	14	7	2						614
80311	93	2	JH	40	276	-31,5	6	10	10	12	5	8	7	5	5						68
80313	93	2	JH	40	270	-14,9		9	5	3	10	8	6	6		2					49
80550	93	2	LIZY	40	269	-10,5	93	25	7	4	9	15	20	20	4						197
80311	93	2	JH	41	276	-31,5	6	10	10	12	5	8	7	5	5						68
80313	93	2	JH	41	270	-14,9		9	5	3	10	8	6	6		2					49
80550	93	2	LIZY	41	269	-10,5	93	25	7	4	9	15	20	20	4						197
80597	93	2	LIZY	41	273	-26,9	22	7	14	4	4	14	12	15	7	1					100
80323	93	2	JH	42	270	-32,1	15	26	6	2	8	3	3	4	1						68
80508	93	1	LIZY	42	259	-20,5	12	32	6	7	28	49	19	19	8	1					181
80509	93	1	LIZY	42	265	-31,6	36	46	18	12	34	79	59	78	50	7	6		2	1	428
80323	93	2	JH	43	270	-32,1	15	26	6	2	8	3	3	4	1						68
80603	93	2	LIZY	43	247	-12,5	50	62	16	4	10	12	15	10	4						183
80351	93	2	JH	44	230	-17,6	1	33	18	16	15	6	10	4	4	1	1	1	1	1	112
80357	93	2	JH	44	244	-8,9	7	76	62	38	29	12	3	3	7						237
80593	93	2	LIZY	44	300	-8,0	52	78	56	36	25	13	4	4	2	2					272
80608	93	2	LIZY	44	223	-25,1	28	26	29	25	36	30	18	20	5	1	1				219
80462	93	3	JH	45	274	-16,5	6	20	7	2	2	1	1	2	1	1					43
80463	93	3	JH	45	276	-15,2	15	22	20	4	4	3	4	7	4	1	1				85
80464	93	3	JH	45	274	-11,4	23	28	40	12	13	5		5	3						129
80533	94	2	LIZY	46	188	-8,2		6	125	210	273	108	11	6							739
80513	94	2	LIZY	47	162	-19,3		9	33	108	245	509	330	104	14	9					1361
80514	94	2	LIZY	47	207	-30,3	3	15	29	18	71	102	105	58	31	3					435
80523	94	2	LIZY	47	183	-29,2	4	11	36	80	127	321	173	48	10	2					812
80129	94	2	JH	48	170	-28,0	21	20	10	6	1										58
80131	94	2	JH	48	229	-27,4			16	213	562	349	115	5							1260
80147	94	2	JH	49	205	-16,9	4	14	61	142	128	142	82	18	11						602
80150	94	2	JH	49	180	-22,0	19	35	17	83	132	248	130	43	7	2					716
80150	94	2	JH	50	180	-22,0	19	35	17	83	132	248	130	43	7	2					716
80588	94	2	LIZY	51	218	-27,9	4	5	3	6	4	26	7								55
80588	94	2	LIZY	52	218	-27,9	4	5	3	6	4	26	7								55
80567	94	2	LIZY	53	275	-5,4	38	61	18	23	18	45	78	78	45	6					410
80581	94	2	LIZY	54	281	-30,6	1		2	2	9	19	7	7	4						51
80582	94	2	LIZY	54	260	-22,0	8	8	19	26	72	58	13	21	9	6		1			241
80572	94	2	LIZY	55	324	-31,5	3	8			1	2	4	1	1						20
80573	94	2	LIZY	55	256	-31,6	50	74	14	5	35	89	100	40	23	4		1			435
80574	94	2	LIZY	55	300	-20,6	23	41	7	3	4	15	31	36	14	6	2				182
80581	94	2	LIZY	56	281	-30,6	1		2	2	9	19	7	7	4						51
80614	94	2	LIZY	57	294	-25,3	21	32	13	7	5	14	11	4	2	3	2				114
80641	94	2	LIZY	57	259	-26,4	58	60	12	10	10	13	13	9	6	2		2			195
80642	94	2	LIZY	57	259	-18,0	69	68	17	12	17	13	14	4	2		1				217
80643	94	2	LIZY	57	284	-5,5	62	24	10	8	15	9	4	3	7	2		1	1		146
80242	95	2	JH	58	244	-22,2	51	124	4	8	12	54	76	40	12	4					385
80244	95	2	JH	58	271	-30,6	7	28			9	5	49	31	18	1	1	2			151
80061	95	2	GS	59	296	-8,1	15	71	4	5	4	9	10	19	9	3					149
80063	95	2	GS	59	261	-26,7	28	154	17	22	17	11									249
80256	95	2	JH	59	287	-31,4	13	32	3	11	28	123	239	160	63	13	3			3	691
80065	95	2	GS	60	270	-24,4	13	41	12	11	10	8	9	8	1						113
80067	95	2	GS	60	296	-9,9		41	23		2	3	2								71
80236	95	2	JH	61	231	-32,1	6	29	4												39
80476	95	2	JM	61	240	-6,1	10	44	2												56
80477	95	2	JM	61	220	-21,3	3	60	22	12	6	3	5								111
80241	95	2	JH	62	253	-6,0	15	71	1	4	2	7	19	11	2						132
80242	95	2	JH	62	244	-22,2	51	124	4	8	12	54	76	40	12	4					385

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80244	95	2	JH	62	271	-30,6	7	28			9	5	49	31	18	1	1	2			151
80245	95	2	JH	62	308	-7,1	41	67	1		1	1	16	16	7	3					153
80469	95	2	JM	63	238	-26,5	10	34	9	49	74	30	22	9	1	1					239
80471	95	2	JM	63	264	-30,2	20	64	4	4	21	35	85	72	8	4					317
86109	95	3	GS	64	267	-15,8	37	124	31	11	13	48	95	92	42	5	2				500
86111	95	3	GS	64	267	-15,8	3	13	1			1	1		1						20
86113	95	3	GS	64	266	-13,5	1	47	9	4	15	17	44	64	25	7	1				234
86129	95	3	GS	64	265	-9,6	57	120	22	22	13	16	10	9							269
86133	95	3	GS	64	270	-13,9	4	21	7	5	13	14	16	25	5	1					111
86137	95	3	GS	64	265	-15,2	14	20	3	4	18	33	68	51	9		1				221
86147	95	4	GS	64	268	-9,7	11	141	21	21	18	25	27	22	7						293
86149	95	4	GS	64	268	-9,7	2	17		2	2			2	3						28
86165	95	4	GS	64	268	-9,4	11	39	24	11	27	26	41	34	10	1					224
86169	95	4	GS	64	269	-12,3	3	21	14	8	14	14	33	33	8	1					149
86197	95	4	GS	64	272	-8,2	31	301	51	41	21	21	54	58	22	2					602
86198	95	4	GS	64	272	-8,2	8	13	6	2	1		2	3							35
86199	95	4	GS	64	272	-8,2	15	20	5	1	1		2	1	1	2					48
86200	95	4	GS	64	272	-8,2	1	11	3		1	3	2	3	1						25
86214	95	4	GS	64	268	-10,1	21	347	95	107	73	52	54	45	11	7					812
86215	95	4	GS	64	268	-10,1	2	21	9	4	2		3	2	1						44
86216	95	4	GS	64	268	-10,1	18	36	9	5	3	1	2	1	2						77
86217	95	4	GS	64	268	-10,1	4	14	1	2	5	2	3								31
86233	95	4	GS	64	268	-8,7	31	152	67	30	19	24	24	17	3						367
86235	95	4	GS	64	268	-8,7	6	14	4	1	2	1		1							29
86238	95	4	GS	64	268	-5,3	130	555	79	31	19	11	28	24	6	3					886
86240	95	4	GS	64	268	-5,3	7	14	1	1											23
86256	95	4	GS	64	268	-8,4	14	136	70	51	57	67	123	100	23	5					646
86257	95	4	GS	64	268	-8,4	4	9	7	4		2	4	6							36
86258	95	4	GS	64	268	-8,4	4	6	2	2	1	2	4	3							24
86260	95	4	GS	64	268	-10,9	3	75	25	22	32	57	107	108	47	4					480
86261	95	4	GS	64	268	-10,9	1	9	1		2	4	6	7		1					31
86262	95	4	GS	64	268	-10,9	1	7	3	1		2	3	2	2						21
86279	95	4	GS	64	268	-6,1	34	122	83	63	32	41	73	62	17	4	1		1		533
86280	95	4	GS	64	268	-6,1	2	8	7	2	2	1	2	3		1					28
86281	95	4	GS	64	268	-6,1	6	16	5		2	2	4	2							37
86282	95	4	GS	64	268	-6,1	4	12	5	2	1	1		2	1	1					29
86283	95	4	GS	64	270	-9,8	12	51	17	16	17	23	45	24	12	1		1			219
86285	95	4	GS	64	270	-9,8	3	11	2	3		1	2	1		1					24
86287	95	4	GS	64	275	-9,5	3	66	22	27	30	35	66	52	22	5					328
86288	95	4	GS	64	275	-9,5		5	2	4	2	1	8		2						24
86289	95	4	GS	64	275	-9,5		9	1		1	1	3	9	2						26
86291	95	4	GS	64	270	-5,5	22	115	31	27	34	51	108	115	38	10	2	1	1	2	557
86109	95	3	GS	65	267	-15,8	37	124	31	11	13	48	95	92	42	5	2				500
86111	95	3	GS	65	267	-15,8	3	13	1			1	1		1						20
86113	95	3	GS	65	266	-13,5	1	47	9	4	15	17	44	64	25	7	1				234
86129	95	3	GS	65	265	-9,6	57	120	22	22	13	16	10	9							269
86133	95	3	GS	65	270	-13,9	4	21	7	5	13	14	16	25	5	1					111
86137	95	3	GS	65	265	-15,2	14	20	3	4	18	33	68	51	9		1				221
86147	95	4	GS	65	268	-9,7	11	141	21	21	18	25	27	22	7						293
86149	95	4	GS	65	268	-9,7	2	17		2	2			2	3						28
86165	95	4	GS	65	268	-9,4	11	39	24	11	27	26	41	34	10	1					224
86169	95	4	GS	65	269	-12,3	3	21	14	8	14	14	33	33	8	1					149
86197	95	4	GS	65	272	-8,2	31	301	51	41	21	21	54	58	22	2					602
86198	95	4	GS	65	272	-8,2	8	13	6	2	1		2	3							35
86199	95	4	GS	65	272	-8,2	15	20	5	1	1		2	1	1	2					48
86200	95	4	GS	65	272	-8,2	1	11	3		1	3	2	3	1						25
86214	95	4	GS	65	268	-10,1	21	347	95	107	73	52	54	45	11	7					812
86215	95	4	GS	65	268	-10,1	2	21	9	4	2		3	2	1						44
86216	95	4	GS	65	268	-10,1	18	36	9	5	3	1	2	1	2						77
86217	95	4	GS	65	268	-10,1	4	14	1	2	5	2	3								31
86233	95	4	GS	65	268	-8,7	31	152	67	30	19	24	24	17	3						367
86235	95	4	GS	65	268	-8,7	6	14	4	1	2	1		1							29
86238	95	4	GS	65	268	-5,3	130	555	79	31	19	11	28	24	6	3					886
86240	95	4	GS	65	268	-5,3	7	14	1	1											23
86256	95	4	GS	65	268	-8,4	14	136	70	51	57	67	123	100	23	5					646
86257	95	4	GS	65	268	-8,4	4	9	7	4		2	4	6							36
86258	95	4	GS	65	268	-8,4	4	6	2	2	1	2	4	3							24
86260	95	4	GS	65	268	-10,9	3	75	25	22	32	57	107	108	47	4					480
86261	95	4	GS	65	268	-10,9	1	9	1		2	4	6	7		1					31
86262	95	4	GS	65	268	-10,9	1	7	3	1		2	3	2	2						21
86279	95	4	GS	65	268	-6,1	34	122	83	63	32	41	73	62	17	4	1		1		533
86280	95	4	GS	65	268	-6,1	2	8	7	2	2	1	2	3		1					28
86281	95	4	GS	65	268	-6,1	6	16	5		2	2	4	2							37
86282	95	4	GS	65	268	-6,1	4	12	5	2	1	1		2	1	1					29
86283	95	4	GS	65	270	-9,8	12	51	17	16	17	23	45	24	12	1		1			219
86285	95	4	GS	65	270	-9,8	3	11	2	3		1	2	1		1					24
86287	95	4	GS	65	275	-9,5	3	66	22	27	30	35	66	52	22	5					328
86288	95	4	GS	65	275	-9,5		5	2	4	2	1	8		2						24
86289	95	4	GS	65	275	-9,5		9	1		1	1	3	9	2						26
86291	95	4	GS	65	270	-5,5	22	115	31	27	34	51	108	115	38	10	2	1	1	2	557
86109	95	3	GS	66	267	-15,8	37	124	31	11	13	48	95	92	42	5	2				500
86111	95	3	GS	66	267	-15,8	3	13	1			1	1		1						20
86113	95	3	GS	66	266	-13,5	1	47	9	4	15	17	44	64	25	7	1				234
86129	95	3	GS	66	265	-9,6	57	120	22	22	13	16	10	9							269
86133	95	3	GS	66	270	-13,9	4	21	7	5	13	14	16	25	5	1					111
86137	95	3	GS	66	265	-15,2	14	20	3	4	18	33	68	51	9		1				221
86147	95	4	GS	66	268	-9,7	11	141	21	21	18	25	27	22	7						293
86149	95	4	GS	66	268	-9,7	2	17		2	2			2	3						28
86165	95	4	GS	66	268	-9,4	11	39	24	11	27	26	41	34	10	1					224
86169	95	4	GS	66	269	-12,3	3	21	14	8	14	14	33	33	8	1					149
86197	95	4	GS	66	272	-8,2	31	301	51	41	21	21	54	58	22	2					602
86198	95	4	GS	66	272	-8,2	8	13	6	2	1		2	3							35

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
86199	95	4	GS	66	272	-8,2	15	20	5	1	1		2	1	1	2					48
86200	95	4	GS	66	272	-8,2	1	11	3		1	3	2	3	1						25
86214	95	4	GS	66	268	-10,1	21	347	95	107	73	52	54	45	11	7					812
86215	95	4	GS	66	268	-10,1	2	21	9	4	2		3	2	1						44
86216	95	4	GS	66	268	-10,1	18	36	9	5	3	1	2	1	2						77
86217	95	4	GS	66	268	-10,1	4	14	1	2	5	2	3								31
86233	95	4	GS	66	268	-8,7	31	152	67	30	19	24	24	17	3						367
86235	95	4	GS	66	268	-8,7	6	14	4	1	2	1		1							29
86238	95	4	GS	66	268	-5,3	130	555	79	31	19	11	28	24	6	3					886
86240	95	4	GS	66	268	-5,3	7	14	1	1											23
86256	95	4	GS	66	268	-8,4	14	136	70	51	57	67	123	100	23	5					646
86257	95	4	GS	66	268	-8,4	4	9	7	4		2	4	6							36
86258	95	4	GS	66	268	-8,4	4	6	2	2	1	2	4	3							24
86260	95	4	GS	66	268	-10,9	3	75	25	22	32	57	107	108	47	4					480
86261	95	4	GS	66	268	-10,9	1	9	1		2	4	6	7		1					31
86262	95	4	GS	66	268	-10,9	1	7	3	1		2	3	2	2						21
86279	95	4	GS	66	268	-6,1	34	122	83	63	32	41	73	62	17	4	1		1		533
86280	95	4	GS	66	268	-6,1	2	8	7	2	2	1	2	3		1					28
86281	95	4	GS	66	268	-6,1	6	16	5		2	2	4	2							37
86282	95	4	GS	66	268	-6,1	4	12	5	2	1	1		2	1	1					29
86283	95	4	GS	66	270	-9,8	12	51	17	16	17	23	45	24	12	1		1			219
86285	95	4	GS	66	270	-9,8	3	11	2	3		1	2	1		1					24
86287	95	4	GS	66	275	-9,5	3	66	22	27	30	35	66	52	22	5					328
86288	95	4	GS	66	275	-9,5		5	2	4	2	1	8		2						24
86289	95	4	GS	66	275	-9,5		9	1		1	1	3	9	2						26
86291	95	4	GS	66	270	-5,5	22	115	31	27	34	51	108	115	38	10	2	1	1	2	557
86113	95	3	GS	67	266	-13,5	1	47	9	4	15	17	44	64	25	7	1				234
86129	95	3	GS	67	265	-9,6	57	120	22	22	13	16	10	9							269
86133	95	3	GS	67	270	-13,9	4	21	7	5	13	14	16	25	5	1					111
86137	95	3	GS	67	265	-15,2	14	20	3	4	18	33	68	51	9		1				221
86147	95	4	GS	67	268	-9,7	11	141	21	21	18	25	27	22	7						293
86149	95	4	GS	67	268	-9,7	2	17		2	2			2	3						28
86165	95	4	GS	67	268	-9,4	11	39	24	11	27	26	41	34	10	1					224
86169	95	4	GS	67	269	-12,3	3	21	14	8	14	14	33	33	8	1					149
86197	95	4	GS	67	272	-8,2	31	301	51	41	21	21	54	58	22	2					602
86198	95	4	GS	67	272	-8,2	8	13	6	2	1		2	3							35
86199	95	4	GS	67	272	-8,2	15	20	5	1	1		2	1	1	2					48
86200	95	4	GS	67	272	-8,2	1	11	3		1	3	2	3	1						25
86214	95	4	GS	67	268	-10,1	21	347	95	107	73	52	54	45	11	7					812
86215	95	4	GS	67	268	-10,1	2	21	9	4	2		3	2	1						44
86216	95	4	GS	67	268	-10,1	18	36	9	5	3	1	2	1	2						77
86217	95	4	GS	67	268	-10,1	4	14	1	2	5	2	3								31
86233	95	4	GS	67	268	-8,7	31	152	67	30	19	24	24	17	3						367
86235	95	4	GS	67	268	-8,7	6	14	4	1	2	1		1							29
86238	95	4	GS	67	268	-5,3	130	555	79	31	19	11	28	24	6	3					886
86240	95	4	GS	67	268	-5,3	7	14	1	1											23
86256	95	4	GS	67	268	-8,4	14	136	70	51	57	67	123	100	23	5					646
86257	95	4	GS	67	268	-8,4	4	9	7	4		2	4	6							36
86258	95	4	GS	67	268	-8,4	4	6	2	2	1	2	4	3							24
86260	95	4	GS	67	268	-10,9	3	75	25	22	32	57	107	108	47	4					480
86261	95	4	GS	67	268	-10,9	1	9	1		2	4	6	7		1					31
86262	95	4	GS	67	268	-10,9	1	7	3	1		2	3	2	2						21
86279	95	4	GS	67	268	-6,1	34	122	83	63	32	41	73	62	17	4	1		1		533
86280	95	4	GS	67	268	-6,1	2	8	7	2	2	1	2	3		1					28
86281	95	4	GS	67	268	-6,1	6	16	5		2	2	4	2							37
86282	95	4	GS	67	268	-6,1	4	12	5	2	1	1		2	1	1					29
86283	95	4	GS	67	270	-9,8	12	51	17	16	17	23	45	24	12	1		1			219
86285	95	4	GS	67	270	-9,8	3	11	2	3		1	2	1		1					24
86287	95	4	GS	67	275	-9,5	3	66	22	27	30	35	66	52	22	5					328
86288	95	4	GS	67	275	-9,5		5	2	4	2	1	8		2						24
86289	95	4	GS	67	275	-9,5		9	1		1	1	3	9	2						26
86291	95	4	GS	67	270	-5,5	22	115	31	27	34	51	108	115	38	10	2	1	1	2	557
80252	96	2	JH	68	238	-9,9	1	14	33	34	35	36	51	19	7	3					233
80254	96	2	JH	68	214	-30,5	27	237	106	44	32	51	79	37	9	2					624
80454	96	2	JM	68	200	-19,7	12	41	48	53	60	109	80	51	23						477
80459	96	2	JM	68	180	-5,6	186	930	565	93	5	10	24	7							1820
80473	96	2	JM	68	231	-15,5	21	31	28	17	11	17	36	43	11						215
80281	96	2	JH	69	295	-10,3			4	5	15	19	24	4	3						74
80290	96	2	JH	69	275	-23,3	3	13	7	19	39	92	194	97	39	5	5				513
80613	96	3	GS	70	275	-18,9	3	16	3	2		11	101	176	84	25	2				423
80614	96	3	GS	70	275	-18,9		2				1	6	11	2	3					25
80615	96	3	GS	70	275	-18,9		2				3	9	6	2	1					23
80616	96	3	GS	70	275	-18,9	1	4		1			5	11							22
80626	96	3	GS	70	272	-20,3	21	46	8	1	3	8	33	73	51	11					255
80630	96	3	GS	70	273	-19,6	8	44	2	7	5	8	51	104	61	23					313
80642	96	3	GS	70	284	-14,9	4	12	10	9	2	17	35	35	21	5					150
80647	96	3	GS	70	283	-10,7	8	21	12	5	2	1	1	2	2						54
80657	96	3	GS	70	283	-8,9	66	146	109	35	11	6	21	22	9	5					430
80659	96	3	GS	70	283	-8,9	4	10	4	1		1	1		1						22
80666	96	3	GS	70	282	-14,6	13	43	18	13	4	7	14	20	10	6					148
80613	96	3	GS	71	275	-18,9	3	16	3	2		11	101	176	84	25	2				423
80614	96	3	GS	71	275	-18,9		2				1	6	11	2	3					25
80615	96	3	GS	71	275	-18,9		2				3	9	6	2	1					23
80616	96	3	GS	71	275	-18,9	1	4		1			5	11							22
80626	96	3	GS	71	272	-20,3	21	46	8	1	3	8	33	73	51	11					255
80630	96	3	GS	71	273	-19,6	8	44	2	7	5	8	51	104	61	23					313
80642	96	3	GS	71	284	-14,9	4	12	10	9	2	17	35	35	21	5					150
80647	96	3	GS	71	283	-10,7	8	21	12	5	2	1	1	2	2						54
80657	96	3	GS	71	283	-8,9	66	146	109	35	11	6	21	22	9	5					430
80659	96	3	GS	71	283	-8,9	4	10	4	1		1	1		1						22
80666	96	3	GS	71	282	-14,6	13	43	18	13	4	7	14	20	10	6					148
80613	96	3	GS	72	275	-18,9	3	16	3	2		11	101	176	84	25	2				423

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80614	96	3	GS	72	275	-18,9		2				1	6	11	2	3					25
80615	96	3	GS	72	275	-18,9		2				3	9	6	2	1					23
80616	96	3	GS	72	275	-18,9	1	4		1			5	11							22
80626	96	3	GS	72	272	-20,3	21	46	8	1	3	8	33	73	51	11					255
80630	96	3	GS	72	273	-19,6	8	44	2	7	5	8	51	104	61	23					313
80642	96	3	GS	72	284	-14,9	4	12	10	9	2	17	35	35	21	5					150
80647	96	3	GS	72	283	-10,7	8	21	12	5	2	1	1	2	2						54
80657	96	3	GS	72	283	-8,9	66	146	109	35	11	6	21	22	9	5					430
80659	96	3	GS	72	283	-8,9	4	10	4	1		1	1		1						22
80666	96	3	GS	72	282	-14,6	13	43	18	13	4	7	14	20	10	6					148
80078	97	3	GS	73	155	-28,0	2	5		2		4	20	23	11	11	2				80
80219	97	2	JH	74	230	-21,5	128	374	26	33	51	30	52	77	43	20	2				836
80021	97	2	GS	75	245	-27,6	297	385	5	7	5	3	5	13	17	12					749
80228	97	2	JH	75	274	-25,6	1	17	2	5	5	2									32
80252	97	2	JH	75	307	-19,1	2	13	3	9	8	7	8	13							63
80003	98	2	GS	76	272	-11,2	4	9	1	2	2	3	3	7	10	7	2				50
80004	98	2	GS	76	272	-35,6	3	5	4	2	3	1	3	6	7	2					36
80005	98	2	GS	76	280	-34,8	4	3	3	3	1	2	4	10	12	3	1				46
80006	98	2	GS	76	342	-29,7	1	3		3	5	5	5	15	25	7	4	1			74
80007	98	2	GS	76	360	-22,9	4	5	6	1		2	2	22	29	24	1				96
80008	98	2	GS	76	300	-14,6	14	33	2	6	2	1	9	21	33	33	7	2			163
80012	98	2	GS	76	355	-8,2	34	23	1	6	1	1	2	12	11	6					97
80201	98	2	JH	76	268	-5,3	5	2	4	5	2	5		8	3	2	1				37
80202	98	2	JH	76	284	-34,9	1	2		1			1	4	11	7	4				31
80203	98	2	JH	76	330	-29,4		6	4	3		1	3	11	30	21	8	1			88
80204	98	2	JH	76	350	-23,2	1	6	2	2		5	9	26	47	22	6				126
80205	98	2	JH	76	297	-14,7	19	22	3	2		1	1	18	40	25	5				136
80401	98	2	JM	76	273	-8,2	2	2	4		1	2	4	9	19	9					52
80402	98	2	JM	76	269	-35,5	3	6	7	4	3	4	4	7	4	8	1	1			52
80403	98	2	JM	76	277	-35,1	3	5	7	4	2	4	7	8	29	13	2	2		1	87
80404	98	2	JM	76	328	-29,7	4	2	2	5	1	1	4	28	22	16	1				86
80406	98	2	JM	76	304	-23,3	25	23	8	5	2		6	17	40	17	11	2			156
81859	997	4	JH	77	275	-8,1	25	42	3	7	3	4	15	38	14	7	2				160
						Total	6045	18039	7659	5782	7708	7967	8672	7538	3110	894	116	29	12	14	**73585**
						%	8,2	24,5	10,4	7,9	10,5	10,8	11,8	10,2	4,2	1,2	0,2				

Table I.13. Selected pelagic stations from "Day deep". Number of haddock in every length group. Vessel codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	Total
80315	93	2	JH	78	300	2,7						4	9	18	4	1	1					37
80356	94	2	GS	79	305	4,2				1	7	41	30	11	4	1	1					96
80368	94	2	GS	80	340	7,6					2	7	14	9	1		1					34
80060	95	2	GS	81	318	3,2					5	51	100	65	11							232
80086	95	2	GS	82	332	3,6						8	22	41	9	1	1					82
80296	95	2	JH	83	393	6,5						1	8	13	4	3						29
80286	96	2	JH	84	315	6,6	2	5	3	8	15	56	111	104	46	8						358
80257	97	2	JH	85	301	5,4	21	131	1	3	1	2	3	5			1	1		1		170
80269	97	2	JH	86	306	6,4					2	7	49	176	189	78	16	4	4			525
80287	97	2	JH	87	395	8,9							2	10	13	3	1					29
80295	97	2	JH	88	376	5,5						1	4	12	9	12						38
						Total	23	136	4	12	32	178	352	464	290	107	22	5	4	1		**1630**
						%	1,4	8,3	0,2	0,7	2,0	10,9	21,6	28,5	17,8	6,6	1,3	0,3	0,2	0,1		

Table I.14. Selected bottom stations from "Day deep". Number of haddock in every length group. Vessel codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	Total
80314	93	2	JH	78	300	-1,1	72	84	57	15	9		3		2		1					243
80316	93	2	JH	78	273	1,5	45	95	68	39	31	23	12	8	4			2				327
80609	94	2	LIZY	79	285	5,3	170	89	24	41	44	58	30	12	6	2		2	1			479
80369	94	2	GS	80	270	-1,2	26	37	6	7	2	7	17	10	1							113
80616	94	2	LIZY	80	312	0,8	211	180	15	4			5	4	1	1					1	422
80617	94	2	LIZY	80	288	7,3	247	565	64	23	15	30	53	18	13	3						1031
80059	95	2	GS	81	309	4,8	293	986	4	2	4	2	5	2	1	1	1					1301
80085	95	2	GS	82	286	-0,4	220	392	28	7	15	24	27	27	5							745
80087	95	2	GS	82	368	5,5	148	195	10	8	9	21	11	14	4		1					421

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	Total
80295	95	2	JH	83	377	-0,7	136	248	20	5	5	5	10	5	2			1				437
80297	95	2	JH	83	327	4,3	117	162	14	4	4	2	18	42	14	8		1				386
80285	96	2	JH	84	313	-3,5	11	25	12	1		7	19	24	19	8						126
80287	96	2	JH	84	309	6,2	38	64	18	11	1	2	7	9	3	2						155
80324	96	2	JH	84	329	8,7	20	76	66	14	12	30	76	50	62	8	4					418
80325	96	2	JH	84	370	1,4	5	14	2	6	13	45	90	58	7							240
80256	97	2	JH	85	334	1,5	15	178	5	3	10	4	10	4	6							235
80258	97	2	JH	85	293	-3,5	81	189	15	9	27	16	46	121	63	15	2	1				585
80278	97	2	JH	85	358	1,7	33	185	4	4	2	3	9	20	9	7	1					277
80262	97	2	JH	86	310	4,9	258	819	6	6	15	13	47	126	87	40	8		2			1427
80263	97	2	JH	86	311	4,8	205	898	5	14	16	22	46	131	104	48	14	3				1506
80270	97	2	JH	86	309	4,3	2584	6890	299	63	52	32	66	184	161	89	9	3				10432
80276	97	2	JH	86	310	4,7	1990	2076	10	15	11	4	12	20	38	7	2	1				4186
80454	97	2	JM	86	333	1,1	83	103		2	6	5	8	24	11	9	4					255
80455	97	2	JM	86	340	6,7	310	507	1	5	8	3	9	16	13	13						885
80456	97	2	JM	86	347	1,7	105	182		7	4	4	15	13	12	4						346
80286	97	2	JH	87	423	6,9	38	405	8	2	3		1			1						458
80288	97	2	JH	87	370	3,5	49	446	1	16	2	2	3	11	17	9						556
80296	97	2	JH	87	328	9,4	9	233	38	40	24	15	29	65	64	37	4	1				559
80288	97	2	JH	88	370	3,5	49	446	1	16	2	2	3	11	17	9						556
80296	97	2	JH	88	328	9,4	9	233	38	40	24	15	29	65	64	37	4	1				559
						Total	7577	17002	839	429	370	396	716	1094	810	358	55	16	3		1	**29666**
						%	25,5	57,3	2,8	1,4	1,2	1,3	2,4	3,7	2,7	1,2	0,2	0,1				

Table I.15. Selected pelagic stations from “Night deep”. Number of haddock in every length group. Vessel codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
41049	93	1	GS	2	370	-20,9	24	24	11	14	12	3									88
41075	93	2	GS	9	305	-25,6	30	8	12	7	8	3	2								70
80322	93	2	JH	26	327	-32,2	13	25	9	11	16	69	61	53	8	7					272
80328	93	2	JH	29	322	-8,89	28	29	9	3	13	7	3	3							95
80333	93	2	JH	30	306	-29,1	31	21	8	11	7	7	6	6	1						98
80341	93	2	JH	31	325	-7,2	25	17	4	1	6	3	1	5							62
80345	93	2	JH	32	311	-17,3	2	1	2	2	6	3	3	1							20
80358	93	2	JH	36	300	-23,9	23	12	8	15	16	9	5	1	1						90
80038	94	1	JH	38	327	-29,3	266	295	52	15	125	347	421	162	22		7				1712
80057	95	2	GS	59	403	-31,4	24	92	1		2	3	11	15	9						157
80275	95	2	JH	69	368	-24,4	69	114	8	3	3	8	13	15	4	1					238
80345	95	2	JH	71	323	-28,1	9	11	8	8	2	3	12	12	8						73
80299	96	2	JH	87	364	-25,3	15	47	22												84
80306	96	2	JH	88	435	-25,8	8	13	1												22
80327	96	2	JH	89	319	-23,4	18	32													50
80290	97	2	JH	100	343	-14,9	7	84		3											94
81867	97	4	JH	103	320	-6,8	10	18													28
						Total	602	843	155	93	216	465	538	273	53	8	7				**3253**
						%	18,5	25,9	4,8	2,9	6,6	14,3	16,5	8,4	1,6	0,2	0,2				

Table I.15. Selected bottom stations from “Night deep”. Number of haddock in every length group. Vessel codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
41050	93	1	GS	2	380	-30,8	3	1	3	8	5	2	1			1	2				26
80559	93	2	LIZY	9	295	-11,3	32	15	16	31	52	23	12	7	1	1					190
80564	93	2	LIZY	9	345	-7,58	21	25	19	12	16	3		1	1	1					99
80508	93	1	LIZY	26	259	-20,5	12	32	6	7	28	49	19	19	8	1					181
80509	93	1	LIZY	26	265	-31,6	36	46	18	12	34	79	59	78	50	7	6		2	1	428
41096	93	2	GS	29	286	-29,3	28	13	6	5	1	2	2	1							58
80598	93	2	LIZY	29	277	-16,5	31	17	4	2	7	1	2	3	1						68
80599	93	2	LIZY	29	314	-7,02	85	53	15	7	3	6	4	9	6				1		189
80332	93	2	JH	30	326	-33	3	4	6	1	1	7	5	4	2		1				34
80334	93	2	JH	30	350	-20,7	10	5	5		1	3	1								25
80342	93	2	JH	30	345	-17,2	41	34	4			1		4		1	1				86
80342	93	2	JH	31	345	-17,2	41	34	4			1		4		1	1				86
80344	93	2	JH	31	375	-26,9	14	19	1	2	1			1	3	1					42
80611	93	2	LIZY	31	374	-19,9	22	30	2	1			1	3	1	2					62
80344	93	2	JH	32	375	-26,9	14	19	1	2	1			1	3	1					42

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80346	93	2	JH	32	285	-9,89	45	45	37	9	4	3	3	4	1				1		152
80610	93	2	LIZY	32	293	-29,2	41	40	13	8	10	5	2	5	4				1		129
80611	93	2	LIZY	32	374	-19,9	22	30	2	1			1	3	1	2					62
80615	93	2	LIZY	32	339	-16,7	53	37	10	1	1		2	2	2	2					110
80635	93	2	LIZY	36	280	-28,5	9	5	14	10	14	13	6	5	4		1				81
80039	94	1	JH	38	268	-36,4	74	70	6	6	12	49	51	17	5	6					296
80245	95	2	JH	59	308	-7,1	41	67	1		1	1	16	16	7	3					153
80273	95	2	JH	69	293	-26,1	49	63	9	1	1	1	6	13	6	4	1				154
80274	95	2	JH	69	354	-30,3	8	7	4		1	2	17	23	6	1					69
80304	95	2	JH	69	251	-15,4	17	47	1	3	2	2	6	4	4		1				87
80305	95	2	JH	69	257	-20,6	7	17	1	1	2		3	6	3	1	1				42
80514	95	2	JM	69	301	-23,5	1	91	11	11	8	13	22	22	2	2	1				184
80516	95	2	JM	69	248	-15,4	8	98	1	3	2	1	4	4	5	3					129
80517	95	2	JM	69	253	-20,6	10	41	4		1	3	4	7	4	3					77
80113	95	2	GS	71	293	-14,8	27	59	7	4	3	2	14	23	8	1					148
80114	95	2	GS	71	292	-20,3	12	25	1		3		20	37	25	4	1				128
80115	95	2	GS	71	294	-26	33	59	1		2	3	17	35	27	8	2				187
80116	95	2	GS	71	289	-28,6	3	6	1		1	5	28	46	18	6					114
80126	95	2	GS	71	292	-15,9	15	25		3	2	1	12	13	9	3					83
80127	95	2	GS	71	298	-21,6	29	70	12	4	6	3	8	28	13	7					180
80129	95	2	GS	71	296	-27,1	55	167	21	7	9	12	46	109	56	9	2	2			495
80130	95	2	GS	71	296	-19,4	63	151	16	5	2	10	32	57	25	5					366
80131	95	2	GS	71	295	-12,3	103	186	26	6	2	8	23	20	8	3					385
80138	95	2	GS	71	296	-15,2	6	21	1		2	7	8	9	6	3					63
80310	95	2	JH	71	299	-25,8	8	23	2			4	9	36	23	4					109
80311	95	2	JH	71	296	-20,9	19	22	7	4	1		5	15	6	1					80
80313	95	2	JH	71	298	-10,7	112	185	11	6	3	2	12	16	14	5					366
80318	95	2	JH	71	297	-14,6	20	67	6	3	2	3	9	31	14	2	1				158
80319	95	2	JH	71	295	-20,3	18	37	5	1	1	4	18	44	18	8	1				155
80320	95	2	JH	71	295	-26	36	75	8	2	2	6	25	43	25	5	1				228
80321	95	2	JH	71	292	-28,5	16	12	7			4	26	53	25	8					151
80332	95	2	JH	71	293	-15,8	19	54	5	1	3	1	8	12	9	3			1		116
80333	95	2	JH	71	298	-21,4	39	110	15	5	2	4	9	16	6						206
80335	95	2	JH	71	295	-27,1	232	323	52	9	8	19	55	128	63	11	3				903
80336	95	2	JH	71	295	-19,5	89	131	21	9	6	9	37	60	20	1		1			384
80337	95	2	JH	71	294	-12,4	107	371	18	11	12	9	28	59	20	8	1				644
80344	95	2	JH	71	296	-15	12	30	1	1		4	15	24	10	2	2				101
80522	95	2	JM	71	292	-25,8	5	86	5	4		2	18	46	45	14	1				226
80523	95	2	JM	71	291	-20,9	8	59	2	6	1	1	8	22	19	9	2				137
80524	95	2	JM	71	294	-15	10	120	7	2		3	6	8	3	3		1			163
80525	95	2	JM	71	300	-10,7	71	404	35	1	3	6	19	36	24	14	1				614
80292	96	2	JH	87	330	-14,9	3	16	26	14		3	7								69
80300	96	2	JH	87	365	-18,6		9	15	1	1	2	1	1	2	2					34
80311	96	2	JH	88	375	-6,56	1	2	4	1	1		1	6	6	3				1	26
80268	96	2	JH	89	333	-22,6	66	348	50	19	6	49	60	28	9	1					636
80326	96	2	JH	89	346	-10,8	2	2	3	3		15	60	140	111	58	10	3			407
80289	97	2	JH	100	384	-8,66	1	74	3	1	2	3	2	1	2		1				90
80291	97	2	JH	100	310	-24	3	18		1	1	1	1	2	1	6					34
81859	97	4	JH	103	275	-11,2	25	42	3	7	3	4	15	38	14	7	2				160
						Total	2046	4394	621	285	299	479	911	1508	814	268	47	7	6	2	**11687**
						%	17,5	37,6	5,3	2,4	2,6	4,1	7,8	12,9	7,0	2,3	0,4	0,1	0,1		

Redfish

Table I.16. Selected pelagic stations from “day shallow”. Number of redfish in every length group. Vessels codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
80221	93	1	JH	1	295	-2,74	5	39	1											59
80484	96	2	JM	2	290	5,22	20													34
						Total	25	39	1											**93**
						%	26,9	41,9	1,1											

Table I.17. Selected bottom stations from “day shallow”. Number of redfish in every length group. Vessels codes see in table I.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
80220	93	1	JH	1	325	-3,11		73	3											90
80485	96	2	JM	2	282	1,41	42		1											57
						Total	42	73	4											147
						%	28,6	49,7	2,7											

Table I.18. Selected pelagic stations from “night shallow”. Number of redfish in every length group. Vessels codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
41025	93	1	GS	3	292	-6,05	5	279	210	5										513
41057	93	1	GS	4	230	-29,3		27	3											44
41067	93	1	GS	5	289	-30,2	4	15	4		1									38
41070	93	2	GS	6	291	-5,48	2	50	51	11			1							129
41074	93	2	GS	7	273	-7,76	3	25	2											44
80310	93	2	JH	8	268	-33,5		11	10	1										36
80338	94	2	GS	9	290	-31,1		17	19	3	1									56
80350	94	2	GS	10	295	-29,8	1	3	20	7	2									49
80058	95	2	GS	11	261	-10,4	7		6	12	2	1	1	2						46
80062	95	2	GS	12	257	-19,1	88	1	12	34	4					1				155
80066	95	2	GS	13	284	-16,9	51	1	13	6										86
80235	95	2	JH	14	285	-22,8	38													53
80243	95	2	JH	15	273	-32,6	444													459
86218	95	4	GS	16	210	-11,8	65													80
86219	95	4	GS	17	267	-7,33	34													49
86237	95	4	GS	18	261	-11,5	94													109
86264	95	4	GS	19	267	-10,6	27		1											43
80253	96	2	JH	20	213	-19,9	56	4	1											75
80289	96	2	JH	21	281	-12,2	60	13	1		1			1						90
80617	96	3	GS	22	278	-11,6	77					2	4	2	2					101
80646	96	3	GS	23	287	-20,5	89	1		1						1				106
80656	96	3	GS	24	287	-16,4	42	1												57
						Total	1187	448	353	80	11	3	6	5	2	2				**2418**
						%	49,1	18,5	14,6	3,3	0,5	0,1	0,2	0,2	0,1	0,1				

Table I.19. Selected bottom stations from "night shallow". Number of redfish in every length group. Vessels codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
41024	93	1	GS	3	206	-13,3	42	1367	63	21										1507
41056	93	1	GS	4	240	-22,0	1	9	5	4	1	1		1						36
80561	93	2	LIZY	4	197	-30,9	6	9	19	24	9	6	1							88
80317	93	2	JH	5	250	-22,4		5	9	8	2						1			39
80311	93	2	JH	6	276	-31,5		36	114	57										221
80550	93	2	LIZY	6	269	-10,5	24	1184	1137	379		1								2739
80551	93	2	LIZY	6	227	-21,4	1	17	16	12										60
80559	93	2	LIZY	7	295	-11,3		126	105	82	3	4								334
80560	93	2	LIZY	7	243	-22,9	3	42	24	7	2	2								94
80561	93	2	LIZY	7	197	-30,9	6	9	19	24	9	6	1							88
80562	93	2	LIZY	7	268	-31,7	4	31	21	3	1	1								75
80311	93	2	JH	8	276	-31,5		36	114	57										221
80313	93	2	JH	8	270	-14,9		7	30	13	1	1								66
80550	93	2	LIZY	8	269	-10,5	24	1184	1137	379		1								2739
80551	93	2	LIZY	8	227	-21,4	1	17	16	12										60
80567	94	2	LIZY	9	275	-5,4		17	69	78	3									183
80581	94	2	LIZY	10	281	-30,6		2	14	13	2									47
80242	95	2	JH	11	244	-22,2	5		10	10	8		4	1						53
80244	95	2	JH	11	271	-30,6			9	12	6	2								44
80061	95	2	GS	12	296	-8,1	7		4	13	4				1					44
80063	95	2	GS	12	261	-26,7			22	26	3	1	1							68
80256	95	2	JH	12	287	-31,4	3	1	10	9	6	1			1					46
80065	95	2	GS	13	270	-24,4	5	32	40	7		1				1				101
80067	95	2	GS	13	296	-9,9		4	56	22	2									99
80236	95	2	JH	14	231	-32,1	12	33	40	26	9	3								138
80476	95	2	JM	14	240	-6,1	25	25	70	15	5									155
80477	95	2	JM	14	220	-21,3		14	10	14	7	2								62
80241	95	2	JH	15	253	-6,0	3		9	5	6	4	2		1					45
80242	95	2	JH	15	244	-22,2	5		10	10	8		4	1						53
80244	95	2	JH	15	271	-30,6			9	12	6	2								29
80245	95	2	JH	15	308	-7,1	40			15	14	15	19	20	6	1				130
86109	95	3	GS	16	267	-15,8	18	4	5	1	2	5								35
86113	95	3	GS	16	266	-13,5	5		1	3	3	2	4	4	2					24
86129	95	3	GS	16	265	-9,6	34		5	3	1	1	3	2	3					52
86137	95	3	GS	16	265	-15,2	2		4		2	7	9	18	5					47
86147	95	4	GS	16	268	-9,7	33	1	2	1	2	2	2	1	1					45
86197	95	4	GS	16	272	-8,2	16	1	6	5	1	4	3	12	7	6				61
86214	95	4	GS	16	268	-10,1	11	3	8	6	2	2	12	10	7	1	1			63
86233	95	4	GS	16	268	-8,7	27	2	4	3	5		1	2						44
86238	95	4	GS	16	268	-5,3	49		7	5	1	1		3	1					67
86256	95	4	GS	16	268	-8,4	19	2	4	3	17	17	11	8						81
86283	95	4	GS	16	270	-9,8	10		2	3	3	1	3	3	7					32
86287	95	4	GS	16	275	-9,5	6	1	1	3	2	4	6	8	8					39
86291	95	4	GS	16	270	-5,5	44	1	2	1	1	2	6	9	6	2	1			75
86109	95	3	GS	17	267	-15,8	18	4	5	1	2	5								35
86113	95	3	GS	17	266	-13,5	5		1	3	3	2	4	4	2					24
86129	95	3	GS	17	265	-9,6	34		5	3	1	1	3	2	3					52
86137	95	3	GS	17	265	-15,2	2		4		2	7	9	18	5					47
86147	95	4	GS	17	268	-9,7	33	1	2	1	2	2	2	1	1					45
86197	95	4	GS	17	272	-8,2	16	1	6	5	1	4	3	12	7	6				61
86214	95	4	GS	17	268	-10,1	11	3	8	6	2	2	12	10	7	1	1			63
86233	95	4	GS	17	268	-8,7	27	2	4	3	5		1	2						44
86238	95	4	GS	17	268	-5,3	49		7	5	1	1		3	1					82
86256	95	4	GS	17	268	-8,4	19	2	4	3	17	17	11	8						96
86283	95	4	GS	17	270	-9,8	10		2	3	3	1	3	3	7					47
86287	95	4	GS	17	275	-9,5	6	1	1	3	2	4	6	8	8					54
86291	95	4	GS	17	270	-5,5	44	1	2	1	1	2	6	9	6	2	1			90
86109	95	3	GS	18	267	-15,8	18	4	5	1	2	5								50
86113	95	3	GS	18	266	-13,5	5		1	3	3	2	4	4	2					39
86129	95	3	GS	18	265	-9,6	34		5	3	1	1	3	2	3					67
86137	95	3	GS	18	265	-15,2	2		4		2	7	9	18	5					62
86147	95	4	GS	18	268	-9,7	33	1	2	1	2	2	2	1	1					60
86197	95	4	GS	18	272	-8,2	16	1	6	5	1	4	3	12	7	6				76
86214	95	4	GS	18	268	-10,1	11	3	8	6	2	2	12	10	7	1	1			78
86233	95	4	GS	18	268	-8,7	27	2	4	3	5		1	2						59
86238	95	4	GS	18	268	-5,3	49		7	5	1	1		3	1					82
86256	95	4	GS	18	268	-8,4	19	2	4	3	17	17	11	8						96
86283	95	4	GS	18	270	-9,8	10		2	3	3	1	3	3	7					47
86287	95	4	GS	18	275	-9,5	6	1	1	3	2	4	6	8	8					54
86291	95	4	GS	18	270	-5,5	44	1	2	1	1	2	6	9	6	2	1			90
86113	95	3	GS	19	266	-13,5	5		1	3	3	2	4	4	2					39
86129	95	3	GS	19	265	-9,6	34		5	3	1	1	3	2	3					67
86137	95	3	GS	19	265	-15,2	2		4		2	7	9	18	5					62
86147	95	4	GS	19	268	-9,7	33	1	2	1	2	2	2	1	1					60
86197	95	4	GS	19	272	-8,2	16	1	6	5	1	4	3	12	7	6				76
86214	95	4	GS	19	268	-10,1	11	3	8	6	2	2	12	10	7	1	1			78
86233	95	4	GS	19	268	-8,7	27	2	4	3	5		1	2						59
86238	95	4	GS	19	268	-5,3	49		7	5	1	1		3	1					82
86256	95	4	GS	19	268	-8,4	19	2	4	3	17	17	11	8						96
86283	95	4	GS	19	270	-9,8	10		2	3	3	1	3	3	7					47
86287	95	4	GS	19	275	-9,5	6	1	1	3	2	4	6	8	8					54
86291	95	4	GS	19	270	-5,5	44	1	2	1	1	2	6	9	6	2	1			90
80254	96	2	JH	20	214	-30,5	9	13		1	4	5	1							47
80454	96	2	JM	20	200	-19,7	29	21	2	8	1	2								77
80281	96	2	JH	21	295	-10,3	6	2	7	39	10	1								79
80290	96	2	JH	21	275	-23,3	6	4	1	9	7	1			1	1			1	45
80613	96	3	GS	22	275	-18,9					4	9	23	11	3					64
80626	96	3	GS	22	272	-20,3	9				4	10	15	9	1					62
80630	96	3	GS	22	273	-19,6	3			1	2	6	16	7	1					50

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
80642	96	3	GS	22	284	-14,9	20	3			4		2	1		1				45
80657	96	3	GS	22	283	-8,9	99	7												120
80666	96	3	GS	22	282	-14,6	21	3			1		1	1						41
80613	96	3	GS	23	275	-18,9					4	9	23	11	3					64
80626	96	3	GS	23	272	-20,3	9				4	10	15	9	1					62
80630	96	3	GS	23	273	-19,6	3			1	2	6	16	7	1					50
80642	96	3	GS	23	284	-14,9	20	3			4		2	1		1				45
80657	96	3	GS	23	283	-8,9	99	7												120
80666	96	3	GS	23	282	-14,6	21	3			1		1	1						41
80613	96	3	GS	24	275	-18,9					4	9	23	11	3					64
80626	96	3	GS	24	272	-20,3	9				4	10	15	9	1					62
80630	96	3	GS	24	273	-19,6	3			1	2	6	16	7	1					50
80642	96	3	GS	24	284	-14,9	20	3			4		2	1		1				45
80657	96	3	GS	24	283	-8,9	99	7												120
80666	96	3	GS	24	282	-14,6	21	3			1		1	1						41
						Total	1801	4342	3420	1576	350	325	444	430	213	42	9		1	**14133**
						%	12,7	30,7	24,2	11,2	2,5	2,3	3,1	3,0	1,5	0,3	0,1			

Table I.20. Selected pelagic stations from "day-deep". Number of redfish in every length group. Vessels codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
80022	994	1	JH	25	373	-4,2		192	53	7										268
80079	995	2	GS	26	360	3,0	20	12	67	8										122
						Total	20	204	120	15										**390**
						%	5,1	52,3	30,8	3,8										

Table I.21. Selected bottom stations from "day-deep". Number of redfish in every length group. Vessels codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
80023	994	1	JH	25	365	-2,8		77	118	114	5	3	1							334
80080	995	2	GS	26	358	2,0	150	25	225	40	5		1	20	5					486
						Total	150	102	343	154	10	3	2	20	5					**820**
						%	18,3	12,4	41,8	18,8	1,2	0,4	0,2	2,4	0,6					

Table I.22. Selected pelagic stations from "night-deep". Number of redfish in every length group. Vessels codes see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
41013	93	1	GS	27	370	-25,1	10	68	32	5										115
41029	93	1	GS	28	350	-6,6	5	493												498
41034	93	1	GS	29	336	-5,8		160												160
41037	93	1	GS	30	344	-23,4	13	970	78											1061
41043	93	1	GS	31	390	-15,5	2	48	18	4	1									73
41044	93	1	GS	32	418	-33,9	5	29	46	12		1	1	1						95
41049	93	1	GS	33	370	-20,9	1	39	16	1	1									58
41075	93	2	GS	34	305	-25,6	1	34	17	2										54
41088	93	2	GS	35	362	-18,3	9	359	5											373
80361	93	2	JH	36	415	-10,9	2	36	94	20	6	4								162
80038	94	1	JH	37	327	-29,3		15	29	7										51
80057	95	2	GS	38	403	-31,4	97			3		2	1	1	1	1				106
80082	95	2	GS	39	386	-28,0	9	5	43	11	2									70
80089	95	2	GS	40	401	-17,3	11		26	8		2								47
80096	95	2	GS	41	476	-14,2	2	2	105	54	5	7	1							176

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
80275	95	2	JH	42	368	-24,4	88			6	2									96
80287	95	2	JH	43	441	-25,3	13	4	97	47	10	9	7							187
80350	95	2	JH	44	400	-15,2	20													20
80070	96	2	GS	45	350	-21,7	49	1												50
80112	96	3	GS	46	428	-23,7	46													46
80299	96	2	JH	47	364	-25,3	63													63
80306	96	2	JH	48	435	-25,8	178													178
80313	96	2	JH	49	410	-25,0	168													168
80327	96	2	JH	50	319	-23,4	88							1						89
80334	96	3	JH	51	359	-26,0	68	1						1						70
						Total	948	2264	606	180	27	25	10	4	1	1				**4066**
						%	23,3	55,7	14,9	4,4	0,7	0,6	0,2	0,1						

Table I.23. Selected bottom stations from "night-deep". Number of redfish in every length group. Vessels code see in table I.1.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	Total
41014	93	1	GS	27	448	-32,8		52	76	26	11	7	1							173
41028	93	1	GS	28	375	-34,0		6	26	7	1									40
41035	93	1	GS	29	350	-7,9		1296	293	42										1631
41038	93	1	GS	30	354	-27,8		39	137	56										232
41042	93	1	GS	31	390	-10,1		14	54	14	12	8								102
41045	93	1	GS	32	418	-35,7		28	32	12	8	12	8							100
41050	93	1	GS	33	380	-30,8	1	14	19	11	2	2								49
80559	93	2	LIZY	34	295	-11,3		126	105	82	3	4								320
80564	93	2	LIZY	34	345	-7,6		29	129	47	12	8								225
80526	93	1	LIZY	35	350	-13,1	1	143	21	3										168
80527	93	1	LIZY	35	365	-25,2	4	47	4											55
80528	93	1	LIZY	35	293	-36,2	4	172	16											192
80360	93	2	JH	36	380	-22,9		5	41	25	17	25	1			1				115
80568	93	2	LIZY	36	411	-26,1		10	14	8	13	10	1		1					57
80584	93	2	LIZY	36	412	-5,8		60	75	24	20	50	13	1						243
80039	94	1	JH	37	268	-36,4		3	10	18	2	11	4	2		1	1			52
80245	95	2	JH	38	308	-7,1	40			15	14	15	19	20	6	1				130
80083	95	2	GS	39	374	-24,2		13	66	45		1	2		1	1	1			130
80090	95	2	GS	40	391	-22,3			47	49	9	4	1		1					111
80286	95	2	JH	40	396	-8,7	6	11	46	63	12	15	1	1						155
80097	95	2	GS	41	478	-24,6		13	309	542	63	132	95	13						1167
80273	95	2	JH	42	293	-26,1	42		5	84	66	3	1	3						204
80516	95	2	JM	42	248	-15,4	15	1				4	4	2						26
80517	95	2	JM	42	253	-20,6	14				1	5		2						22
80288	95	2	JH	43	456	-28,4		9	170	150	35	32	6							402
80105	95	2	GS	44	288	-21,5			3	2	2	5	7	3						22
80349	95	2	JH	44	450	-6,9		1	69	67	28	55	11							231
80351	95	2	JH	44	358	-22,5		1	26	22	11	7								67
80071	96	2	GS	45	360	-25,8	4	7	50	100	13	2								176
80072	96	2	GS	45	340	-22,0	3	27	234	201										465
80113	96	3	GS	46	440	-24,5	3		11	44	47	29	8	2		2		2		148
80292	96	2	JH	47	330	-14,9	9	17	10	52	33	5	5	1	1					133
80298	96	2	JH	47	342	-25,9	16	37	25	119	70	4								271
80300	96	2	JH	47	365	-18,6	2	19	21	37	25	2		1	1			1		109
80304	96	2	JH	48	417	-6,7	11	18					1		1	2				33
80305	96	2	JH	48	431	-21,8	3	2	20	42	13	2								82
80307	96	2	JH	48	431	-20,4		7	19	132	28	7	2							195
80311	96	2	JH	48	375	-6,6	10	12	2	23	16	2		2	1					68
80312	96	2	JH	48	403	-19,2	1	8	12	34	19			1						75
80075	96	2	GS	49	432	-21,6	7	14	99	318	134	7								579
80305	96	2	JH	49	431	-21,8	3	2	20	42	13	2								82
80312	96	2	JH	49	403	-19,2	1	8	12	34	19			1						75
80314	96	2	JH	49	420	-23,1	1	1	32	48	12	1			1					96
80316	96	2	JH	49	408	-18,7	6	13	11	33	22	2					1			88
80268	96	2	JH	50	333	-22,6	13	5	6	73	89	19	10	6	1					222
80333	96	3	JH	51	330	-20,1	41	9		29	40	3	2							124
80335	96	3	JH	51	368	-25,1	20	8		20	97	23	9	4	3	1				185
80336	96	3	JH	51	288	-17,4	5	5					5		10					25
						Total	286	2312	2377	2795	1032	525	217	65	28	9	3	3		**9652**
						%	3,0	24,0	24,6	29,0	10,7	5,4	2,2	0,7	0,3	0,1				

Appendix II The selected independent database (1999-2000).

Cod

Table II.1. Selected pelagic stations from “day shallow” in the independent database. Number of cod from every length group. Vessels codes is: GS = G.O. Sars, JH = Johan Hjort, JM = Jan Mayen, MS = Michael Sars, LIZY = Anny Kræmer, JXWX = Varegg, LADD = Hopen.

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	Total
80866	99	8	MS	1	232	31,7			2	15	4	4	42	97	59	37	11	4	2		2						279
81126	99	8	JH	2	228	9,69						2	20	44	42	26	13	3	4								154
81159	99	8	JH	3	166	-3,18				3	5	8	13	9	8	2	1	2									51
81160	99	8	JH	4	225	-1,29						3	9	15	7	2			1		1						38
81171	99	8	JH	5	184	16,26					1	9	28	34	18	11	1	1	1			1					105
81172	99	8	JH	6	166	3,14						8	10	4	2		1										25
81174	99	8	JH	7	172	-3,2	1				2	12	17	14	4												50
81175	99	8	JH	8	123	1,6				1	14	34	25	11	6	1											92
81176	99	8	JH	9	141	6,69				5	25	118	147	128	79	29	10										541
81177	99	8	JH	10	189	15,71					3	10	23	28	25	10	4	1	1		1						106
81179	99	8	JH	11	191	31,36		1			3	33	28	20	10	5	1										101
80084	´00	2	GS	12	290	3,57		1		5	12	9	4	2	1												34
80093	´00	2	GS	13	277	3,93				16	20	56	56	16	20	12	4										200
80101	´00	2	GS	14	276	4,17						3	9	7	14	8	2										43
80119	´00	2	GS	15	235	-2,39						1	1	2	7	13	4	3	1	1							33
80144	´00	2	GS	16	297	7						2	3	6	2	4	4		1								22
80249	´00	2	JH	17	265	0,77		2	19	12	3	2															38
80257	´00	2	JH	18	250	4,8			10	140	212	238	137	42	10	3	3										795
						Total	1	4	31	197	304	552	572	479	314	163	59	14	11	1	4	1					**2707**
						%		0,1	1,1	7,3	11,2	20,4	21,1	17,7	11,6	6,0	2,2	0,5	0,4		0,1						

Table II. 2. Selected Bottom stations from “day shallow” ” in the independent database. Number of cod from every length group. Vessels codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	Total
80883	99	8	MS	1	257	15,5		64	60	8	1	4	1	1	1	4	1	3	1	3	4						156
81125	99	8	JH	2	235	19,49	12	20	9	6	13	6	2	7	7	4	5	1	1								93
81127	99	8	JH	2	220	2,05	4	8	16	28	20	20	10	10	4	9	6	3	6	2	3	1	1			1	152
81128	99	8	JH	2	178	0,52	20	28	36	29	18	8	20	15	9	8	10		2								203
81165	99	8	JH	3	120	5,11	3				2	43	69	71	30	6	3										227
81167	99	8	JH	3	145	35,11	80	7	1		21	42	145	101	138	42	23	16	3								619
81178	99	8	JH	3	183	25,48	73	40	21	27	40	45	33	46	41	16	9	6	2								399
81178	99	8	JH	4	183	25,48	73	40	21	27	40	45	33	46	41	16	9	6	2								399
81167	99	8	JH	5	145	35,11	80	7	1		21	42	145	101	138	42	23	16	3								619
81178	99	8	JH	5	183	25,48	73	40	21	27	40	45	33	46	41	16	9	6	2								399
81165	99	8	JH	6	120	5,11	3				2	43	69	71	30	6	3										227
81167	99	8	JH	6	145	35,11	80	7	1		21	42	145	101	138	42	23	16	3								619
81178	99	8	JH	6	183	25,48	73	40	21	27	40	45	33	46	41	16	9	6	2								399
81165	99	8	JH	7	120	5,11	3				2	43	69	71	30	6	3										227
81167	99	8	JH	7	145	35,11	80	7	1		21	42	145	101	138	42	23	16	3								619
81178	99	8	JH	7	183	25,48	73	40	21	27	40	45	33	46	41	16	9	6	2								399
81165	99	8	JH	8	120	5,11	3				2	43	69	71	30	6	3										227
81167	99	8	JH	8	145	35,11	80	7	1		21	42	145	101	138	42	23	16	3								619
81165	99	8	JH	9	120	5,11	3				2	43	69	71	30	6	3										227
81167	99	8	JH	9	145	35,11	80	7	1		21	42	145	101	138	42	23	16	3								619
81178	99	8	JH	9	183	25,48	73	40	21	27	40	45	33	46	41	16	9	6	2								399
81167	99	8	JH	10	145	35,11	80	7	1		21	42	145	101	138	42	23	16	3								619
81178	99	8	JH	10	183	25,48	73	40	21	27	40	45	33	46	41	16	9	6	2								399
81167	99	8	JH	11	145	35,11	80	7	1		21	42	145	101	138	42	23	16	3								619
81178	99	8	JH	11	183	25,48	73	40	21	27	40	45	33	46	41	16	9	6	2								399
80083	´00	2	GS	12	274	-0,3	7	1			1	4	6	6	8	5	6	1	1								46
80085	´00	2	GS	12	282	0,99	14	1	4	1			3	5	9	5	3	2	2								49
80091	´00	2	GS	13	246	-2,11	72	21	25	28	23	29	35	37	31	27	10	2	1	1	1						343
80092	´00	2	GS	13	269	4,17	29	6	16	34	19	4	3	4	7	8	1	2			1						134
80100	´00	2	GS	14	362	1,36	32	6	6	9	4	8	6	12	18	24	9	8	3	1	1	1	1				149
80102	´00	2	GS	14	287	-2,32	11	3	6	4	8	10	14	9	13	5	3	1					1				88
80108	´00	2	GS	14	360	-1,76	1	1		1	5	2	4	3	4	7	1		1		1						31
80118	´00	2	GS	15	270	4,45	15	8	6	11	3	7	4	9	8	15	9	1	1	1							98
80143	´00	2	GS	16	288	6,08	20	12	4	1	2	3	2	4	8	7	1	1	1	2							68
80145	´00	2	GS	16	309	1,58			2		2	1	4	8	10	22	14	6	2	2	1						74
80248	´00	2	JH	17	258	3,28	50	41	138	277	69	14		5													594
80256	´00	2	JH	18	249	2,57	67	27	69	104	57	27	32	22	12	7	7	2		2							435
80258	´00	2	JH	18	257	3,72	26	26	85	89	41	26	35	10	2	2		2									344
						Total	1619	649	658	846	784	1084	1950	1698	1733	653	357	211	62	14	12	2	3			1	**12336**
						%	13,1	5,3	5,3	6,9	6,4	8,8	15,8	13,8	14,0	5,3	2,9	1,7	0,5	0,1	0,1						

Table II.3. Selected pelagic stations from "night shallow" in the independent database. Number of cod from every length group. Vessels codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	Total
80260	´00	2	JH	19	210	-19,1	3	1	8	21	23	12	6														74
80262	´00	2	JH	20	187	-33,3			5	5	11	4	2														27
						Total	3	1	13	26	34	16	8														**101**
						%	3,0	1,0	12,9	25,7	33,7	15,8	7,9														

Table II. 4. Selected Bottom stations from "night shallow" " in the independent database. Number of cod from every length group. Vessels codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109	Total
80259	´00	2	JH	19	226	-8,98	17	6	7	1	11	9	1	3	4												59
80261	´00	2	JH	19	198	-26,7	35	12	14	15	21	28	24	8	5	1											163
80055	´00	2	GS	20	190	-18	11	7	9	28	41	14	4	2	1	1											118
80056	´00	2	GS	20	186	-25,2	19	19	13	7	10	2	5		1	3	2										81
80261	´00	2	JH	20	198	-26,7	35	12	14	15	21	28	24	8	5	1											163
80263	´00	2	JH	20	182	-30,6	12	34	52	56	118	44	17		2	1		1									337
						Total	129	90	109	122	222	125	75	21	18	7	2	1									**921**
						%	14,0	9,8	11,8	13,2	24,1	13,6	8,1	2,3	2,0	0,8	0,2	0,1									

Haddock

Table II.5. Selected pelagic stations from "day shallow" in the independent database. Number of haddock in every length group. Vessels codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
81159	99	8	JH	1	218	-3,18					5	93	329	108	5						540
81160	99	8	JH	2	218	-1,29					33	299	665	133	22						1152
81163	99	8	JH	3	219	21,99					3	9	13								25
81164	99	8	JH	4	219	8,87					2	17	58	36	10	5	1				129
81169	99	8	JH	5	220	28,57					3	6	8	3							20
81171	99	8	JH	6	220	16,26						4	11	13	7		1				36
81172	99	8	JH	7	220	3,14					1	12	39	25	2		1				80
81173	99	8	JH	8	220	-0,67					1	4	27	12	6						50
81174	99	8	JH	9	220	-3,2					3	31	59	10	2						105
81175	99	8	JH	10	221	1,6					3	87	140	59	6						295
81176	99	8	JH	11	221	6,69				11	33	141	587	359	43						1174
81177	99	8	JH	12	221	15,71					1	5	31	22	11	3					73
81179	99	8	JH	13	221	31,36					4	30	66	49	6						155
80093	00	2	GS	14	44	3,93			8	36	8	12	32	12	8						116
80101	00	2	GS	15	45	4,17	1			1	2	9	29	35	8	2			1		88
80119	00	2	GS	16	47	-2,39	1	3			2		7	2	4	1					20
						Total	2	3	8	48	104	759	2101	878	140	11	3		1		**4058**
						%		0,1	0,2	1,2	2,6	18,7	51,8	21,6	3,4	0,3	0,1				

Table II.6. Selected bottom stations from "day shallow" in the independent database. Number of haddock in every length group. Vessels codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
81165	99	8	JH	1	219	5,11					4	45	75	38	18	4	1				185
81167	99	8	JH	1	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	1	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81178	99	8	JH	2	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81165	99	8	JH	3	219	5,11					4	45	75	38	18	4	1				185
81167	99	8	JH	3	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	3	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81165	99	8	JH	4	219	5,11					4	45	75	38	18	4	1				185
81167	99	8	JH	4	220	35,11		56	19	7	37	168	157	52	7	7					510
81165	99	8	JH	5	219	5,11					4	45	75	38	18	4	1				185
81167	99	8	JH	5	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	5	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
81167	99	8	JH	6	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	6	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81165	99	8	JH	7	219	5,11					4	45	75	38	18	4	1				185
81167	99	8	JH	7	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	7	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81167	99	8	JH	8	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	8	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81165	99	8	JH	9	219	5,11					4	45	75	38	18	4	1				185
81167	99	8	JH	9	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	9	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81165	99	8	JH	10	219	5,11					4	45	75	38	18	4	1				185
81167	99	8	JH	10	220	35,11		56	19	7	37	168	157	52	7	7					510
81165	99	8	JH	11	219	5,11					4	45	75	38	18	4	1				185
81167	99	8	JH	11	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	11	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81167	99	8	JH	12	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	12	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
81167	99	8	JH	13	220	35,11		56	19	7	37	168	157	52	7	7					510
81178	99	8	JH	13	221	25,48	5	225	56	10	3	9	5	4	2	5	1				325
80091	00	2	GS	14	44	-2,11	35	154	51	12	2	2	21	19							296
80092	00	2	GS	14	44	4,17	136	531	39	14	2	4	6	5		1					738
80100	00	2	GS	16	45	1,36	72	257	57	16	6	3	3	9		3					426
80102	00	2	GS	16	45	-2,32	101	445	43	9	2	3	7	14	6	1	1				632
80108	00	2	GS	16	46	-1,76	78	198	24	3		1			1						305
80118	00	2	GS	19	47	4,45	63	389	54	11	1		2	1	1	1	1				524
						Total	540	5121	1112	259	522	2488	2578	1020	258	177	21				**14096**
						%	3,8	36,3	7,9	1,8	3,7	17,7	18,3	7,2	1,8	1,3	0,1				

Table II.7. Selected pelagic stations from "night shallow" in the independent database. Number of haddock in every length group. Vessels codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80104	00	2	GS	17	287	-25,3	39	157	24	16	4	6	10	8	4						268
80116	00	2	GS	18	254	-11,6		23	7	8	2	1	3	4	3						51
80140	00	2	GS	22	258	-29,1	3	18	8	3	8	13	17	17	4						91
80206	00	2	JH	23	224	-9,99	36	147	33	82	2	6	6	2							314
80260	00	2	JH	24	210	-19,1	50	119	307	105	18										599
80262	00	2	JH	25	187	-33,3	148	453	253	17											871
80297	00	2	JH	26	231	-30,7	15	315	67	58	3										458
						Total	291	1232	699	289	37	26	36	31	11						**2652**
						%	11,0	46,5	26,4	10,9	1,4	1,0	1,4	1,2	0,4						

Table II.8. Selected bottom stations from "night shallow" in the independent database. Number of haddock in every length group. Vessels codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80103	00	2	GS	17	276	-16,1	20	119	21	6	2	2	2	4							176
80105	00	2	GS	17	290	-30,1	24	135	28	9	1	4	6	7	5	3		1			223
80106	00	2	GS	17	304	-27,6	4	9	7	1			8	6	4	2					41
80107	00	2	GS	18	285	-13,1	41	74	9	1	2	2	1	3	2						135
80115	00	2	GS	18	271	-17	27	135	14	1	1	1	1	1	1						182
80120	00	2	GS	18	235	-9,4	35	168	26	5	5	2	4	2					2		249
80139	00	2	GS	22	251	-26,4	25	112	8	3	1		1	1	1						152
80141	00	2	GS	22	274	-22,3	49	200	21	2	1	2	2	1	1	1	1			1	282
80207	00	2	JH	23	200	-23,5	24	76	95	201	3		5		3						407
80208	00	2	JH	23	198	-35,3	74	160	176	188		8	4	4							614
80354	00	2	P3	23	165	-20,2	70	388	79	89	7	10	51	19	2						715
80355	00	2	P3	23	180	-33,4	12	84	17	8	8	7	15	6	4						161
80259	00	2	JH	24	226	-8,98	4	28	3	2											37
80261	00	2	JH	24	198	-26,7	11	36	24	8		1									80
80055	00	2	GS	25	190	-18	9	11	1												21
80261	00	2	JH	25	198	-26,7	11	36	24	8		1									80
80263	00	2	JH	25	182	-30,6	110	439	439	80											1068
80075	00	2	GS	26	229	-9,57	70	334	60	20	8	5	30	13			3				543
80293	00	2	JH	26	216	-6,32	10	106	59	26			5	3	1						210
80294	00	2	JH	26	225	-15,9	60	214	90	42	10	32	48	20	2						518
80295	00	2	JH	26	224	-25,6	30	131	211	127	33	24	28	11	2						597
80296	00	2	JH	26	229	-30,3	35	320	232	176	42	27	34	14	1						881
						Total	755	3315	1644	1003	124	128	245	115	29	6	4	1	2	1	**7372**
						%	10,2	45,0	22,3	13,6	1,7	1,7	3,3	1,6	0,4	0,1	0,1				

Table II.9. Selected pelagic station from "day-deep" in the independent database. Number of haddock in every length group. Vessel code see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80136	00	2	GS	21	317	3,38					1	6	12	9	7	5	1				**41**
						%					2,4	14,6	29,3	22,0	17,1	12,2	2,4				

Table II.10. Selected bottom station from "day-deep" in the independent database. Number of haddock in every length group. Vessel code see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80137	00	2	GS	21	308	-2,9	87	471	29	15	13	17	12	17	22	6	3				**692**
						%	12,6	68,1	4,2	2,2	1,9	2,5	1,7	2,5	3,2	0,9	0,4				

Table II.11. Selected pelagic stations from "night deep" in the independent database. Number of haddock in every length group. Vessel codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80097	00	2	GS	15	360	-29,6	13	21	2			2	1	2							41
80123	00	2	GS	20	363	-28,8	34	175	28	3						1					241
						Total	47	196	30	3		2	1	2		1					**282**
						%	16,7	69,5	10,6	1,1		0,7	0,4	0,7		0,4					

Table II.12. Selected bottom stations from "night deep" in the independent database. Number of haddock in every length group. Vessel codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	Total
80089	00	2	GS	15	330	-27	2	21	7		1		5	3	1						40
80113	00	2	GS	20	310	-29	7	73	40	4	4		1	2	2	1	1				135
						Total	9	94	47	4	5		6	5	3	1	1				**175**
						%	5,1	53,7	26,9	2,3	2,9		3,4	2,9	1,7	0,6	0,6				

Redfish

Table II.13. Selected pelagic station from "night deep" in the independent database. Number of redfish in every length group. Vessel codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	Total
80125	00	2	GS	1	430	-12,9		1	1	4	6	28	12	2							**54**
						%		1,9	1,9	7,4	11,1	51,9	22,2	3,7							

Table II.14. Selected bottom stations from"night deep" in the independent database. Number of redfish in every length group. Vessel codes see table II.1

Serie no	Year	Month	Vessel	Pair	Bottom depth	Sun angle	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	Total
80112	0	2	GS		420	-19,7				5	15	19	12	2			1				54
80124	0	2	GS		390	-21,8		1		10	5	20	10	1			2				49
						Total		1		15	20	39	22	3			3				**103**
						%		1,0		14,6	19,4	37,9	21,4	2,9			2,9				

Appendix III. Quartile lengths

Cod

Table III.1. Quartile lengths (cm) of cod in day and from pelagic and bottom trawl. Shallow pairs are from 1-35 and deeper than 300 meters are 89-105. (Figure 4.1.).

Pelagic trawl				Bottom trawl		
L 25	L 50	L 75	Pair	L 25	L 50	L 75
44,6	51,7	57,1	1	19,5	33,8	49,7
13,5	17,0	18,5	2	14,2	17,7	22,5
30,1	37,3	39,2	3	27,2	32,3	38,6
31,6	35,7	38,8	4	27,5	36,1	46,9
40,9	46,3	52,3	5	37,2	46,9	53,6
43,4	50,1	56,1	6	35,8	48,2	53,5
47,3	51,5	55,0	7	35,8	48,2	53,5
48,3	52,3	55,7	8	50,5	55,7	59,3
40,8	44,9	49,1	9	23,7	42,2	49,2
43,1	46,8	50,0	10	12,1	14,2	19,5
45,6	48,9	54,0	11	12,9	30,4	51,1
43,0	47,2	51,6	12	25,7	34,5	45,5
35,2	40,4	49,8	13	13,8	38,9	53,1
49,8	53,4	60,6	14	30,0	52,0	62,3
11,3	12,5	13,8	15	13,4	36,3	45,1
42,5	46,8	51,4	16	32,0	38,1	47,8
11,3	12,5	13,8	17	11,5	13,1	14,6
55,6	59,4	64,1	18	35,0	50,0	60,1
40,5	43,8	48,5	19	39,2	45,5	52,0
42,0	46,1	51,5	20	39,2	45,5	52,0
46,5	55,9	64,5	21	13,3	16,2	18,8
30,3	32,8	35,7	22	32,6	36,4	40,4
63,5	68,6	73,9	23	13,6	17,1	23,9
56,8	61,7	70,5	24	15,8	27,4	39,3
53,4	57,9	63,2	25	13,2	20,8	33,1
57,7	62,9	67,2	26	18,1	27,3	40,0
33,0	37,0	42,5	27	32,0	39,1	45,9
45,0	49,0	53,0	28	13,2	19,7	45,1
30,2	32,6	35,0	29	15,1	23,5	32,9
12,8	15,6	18,2	30	15,1	20,6	39,9
46,6	53,1	59,7	31	41,2	45,9	51,0
54,7	68,4	76,4	32	43,5	48,2	55,8
49,9	63,3	72,3	33	43,5	48,2	55,8
48,6	57,5	72,3	34	40,3	46,5	53,6

Pelagic trawl				Bottom trawl		
L 25	L 50	L 75	Pair	L 25	L 50	L 75
48,5	54,4	63,1	35	47,7	54,8	62,3
38,3	43,9	51,9	89	43,0	53,0	59,1
42,7	47,1	51,3	90	28,9	46,5	54,4
50,5	54,3	62,7	91	14,7	56,7	65,8
45,9	48,8	53,6	92	13,3	32,2	53,0
40,9	46,9	52,3	93	13,9	46,3	57,5
11,6	13,2	14,8	94	21,1	27,9	36,0
45,3	50,0	54,7	95	21,5	40,3	52,3
14,1	40,7	49,4	96	13,8	43,2	56,9
50,6	57,5	63,8	97	53,0	58,9	65,4
47,5	56,4	61,0	98	11,5	13,0	14,5
11,3	12,6	13,8	99	11,6	13,2	14,9
11,3	12,5	13,8	100	19,5	45,6	65,3
11,3	12,5	13,8	101	15,4	19,0	24,8
11,3	12,5	13,8	102	14,3	17,8	32,8
56,2	64,1	70,2	103	13,3	17,0	23,2
11,8	13,6	18,2	104	13,6	19,3	25,1
53,8	61,0	64,5	105	17,6	22,8	31,4

Table III.2. Quartile lengths (cm) of cod in night and from pelagic and bottom trawl. Shallow pairs are from 36-88 and deeper than 300 meters is 106-129. (Figure 4.1.).

Pelagic trawl				Bottom trawl		
L 25	L 50	L 75	Pair	L 25	L 50	L 75
37,0	48,3	53,2	36,0	48,8	54,5	60,0
28,1	33,0	39,8	37,0	18,6	31,0	44,8
31,0	34,0	46,7	38,0	26,9	34,8	47,2
31,2	33,8	37,5	39,0	32,0	37,3	44,6
15,5	18,8	23,8	40,0	17,4	26,2	30,8
24,8	27,4	29,8	41,0	28,5	32,5	36,9
18,4	21,4	23,9	42,0	21,5	28,1	34,3
22,2	27,5	32,8	43,0	25,7	31,4	36,6
23,1	26,7	30,4	44,0	28,6	32,4	36,3
30,8	34,4	38,5	45,0	37,0	46,2	52,9
36,6	44,2	50,8	46,0	37,8	47,2	52,8
36,9	44,2	52,8	47,0	38,0	48,0	52,2
21,4	23,9	27,2	48,0	17,3	21,8	36,7
27,6	30,8	34,1	49,0	17,3	21,8	36,7
47,5	52,9	57,9	50,0	39,2	50,6	56,8
42,5	52,0	58,1	51,0	39,2	50,6	56,8
42,4	50,4	55,7	52,0	39,2	50,6	56,8
44,3	52,8	58,3	53,0	39,2	50,6	56,8
34,6	37,3	39,9	54,0	33,8	37,6	43,2
12,9	17,0	28,3	55,0	21,5	26,6	32,6
13,1	16,3	19,4	56,0	25,2	27,6	30,1
11,7	13,5	17,0	57,0	20,2	27,1	35,1
11,6	13,2	14,8	58,0	25,0	30,8	43,7
11,9	13,8	17,6	59,0	26,1	34,5	41,5
11,3	12,5	13,8	60,0	12,4	14,9	49,4
18,3	24,2	30,0	61,0	26,6	39,0	47,7
11,6	13,2	14,8	62,0	14,4	28,5	45,6
16,9	40,4	47,9	63,0	13,5	20,9	41,8
13,7	26,5	37,6	64,0	24,4	45,0	52,7
11,7	13,4	27,5	65,0	40,1	48,5	57,5
14,8	48,1	53,3	66,0	14,8	53,1	63,7
14,5	45,0	51,3	67,0	41,8	51,2	62,7
11,7	13,3	15,0	68,0	35,0	49,6	58,0
11,4	12,7	14,1	69,0	13,3	41,0	52,3
11,3	12,7	14,0	70,0	21,7	34,4	41,9
11,3	12,5	13,8	71,0	20,0	27,3	32,5
11,3	12,5	13,8	72,0	14,6	49,5	57,8
36,5	40,3	46,0	73,0	37,9	45,8	52,8
11,3	12,6	13,9	74,0	13,1	34,2	44,6
11,4	12,8	14,2	75,0	18,5	21,8	24,0
11,3	12,5	13,8	76,0	11,9	13,8	22,5
11,3	12,5	13,8	77,0	11,5	12,9	14,4
11,4	12,8	14,2	78,0	14,2	47,3	58,8
11,3	12,5	13,8	79,0	11,4	12,7	14,1
11,4	12,7	14,1	80,0	13,3	23,3	36,9
11,3	12,5	13,8	81,0	11,8	13,5	21,0
11,3	12,6	13,9	82,0	11,8	13,5	21,0

Pelagic trawl				Bottom trawl		
L 25	L 50	L 75	Pair	L 25	L 50	L 75
11,3	12,6	13,9	83,0	11,8	13,5	21,0
11,3	12,5	13,8	84,0	11,6	13,2	14,9
11,3	12,6	13,9	85,0	12,9	17,2	29,3
11,3	12,6	13,8	86,0	13,1	25,2	47,0
11,3	12,6	13,8	87,0	56,3	68,2	76,6
16,7	18,3	85,0	88,0	43,8	62,5	90,6
13,9	16,3	18,2	106,0	20,5	25,8	30,0
47,0	53,1	58,0	107,0	41,1	48,9	54,0
51,3	54,4	59,0	108,0	50,2	55,3	60,3
40,1	43,1	41,0	109,0	13,2	45,0	52,1
11,3	12,5	13,8	110,0	28,0	43,3	49,4
15,8	26,1	30,8	111,0	24,6	29,5	44,0
13,1	32,5	49,4	112,0	13,8	46,2	54,5
11,5	13,0	14,5	113,0	40,9	52,8	61,2
11,3	12,5	13,8	114,0	11,3	12,7	14,0
13,0	38,3	52,0	115,0	45,3	53,0	60,7
11,4	12,8	14,1	116,0	35,1	45,5	55,2
11,3	12,5	13,8	117,0	11,8	13,6	16,0
11,3	12,6	13,9	118,0	14,2	20,6	23,9
11,3	12,7	14,0	119,0	44,8	52,6	59,3
11,3	12,6	13,9	120,0	11,7	13,3	15,0
11,3	12,6	13,9	121,0	12,8	19,6	55,5
11,3	12,6	13,8	122,0	12,4	14,7	35,8
11,3	12,5	13,8	123,0	12,6	31,0	64,4
11,3	12,5	13,8	124,0	11,4	12,8	14,2
11,3	12,5	13,8	125,0	11,4	12,8	14,1
11,3	12,5	13,8	126,0	11,3	12,7	14,0
11,3	12,5	13,8	127,0	11,6	13,3	14,9
11,3	12,7	14,0	128,0	56,3	68,2	76,6
12,0	14,0	19,1	129,0	35,3	40,1	47,4

Haddock

Table III.3. Quartile lengths (cm) of haddock in day and from pelagic and bottom trawl. Shallow pairs are from 1-23 and deeper than 300 meters is 78-88. (Figure 4.5.).

Pelagic trawl				Bottom trawl		
L 25	L 50	L 75	Pair	L 25	L 50	L 75
12,9	18,3	28,3	1	14,4	21,7	32,5
11,5	12,9	14,4	2	12,1	14,3	17,2
34,5	38,1	44,6	3	16,9	27,3	34,9
39,1	43,9	48,8	4	16,9	21,3	30,7
42,9	46,9	50,5	5	13,1	16,4	20,0
43,2	47,2	51,3	6	16,8	19,5	24,9
36,4	38,6	41,8	7	35,2	38,3	42,1
36,0	39,2	43,2	8	14,5	19,0	25,4
35,6	39,2	43,7	9	13,8	17,8	24,2
36,8	40,2	43,8	10	22,2	29,9	36,3
30,8	35,8	39,5	11	14,4	18,9	28,0
40,6	46,3	49,7	12	12,6	15,3	18,2
41,6	45,0	48,4	13	15,3	18,3	40,5
42,9	46,4	49,3	14	12,9	15,7	18,4
40,7	43,7	47,1	15	16,8	19,0	38,2
42,4	46,1	49,2	16	16,3	19,3	36,8
41,9	45,4	48,5	17	16,2	19,2	35,0
42,3	46,2	49,1	18	15,9	18,1	30,3
42,0	45,7	49,3	19	16,2	19,0	31,3
41,5	45,3	48,9	20	19,6	26,1	40,4
15,3	16,9	28,8	21	16,0	18,7	30,3
42,3	46,2	49,7	22	15,5	17,2	18,9
31,8	36,4	45,7	23	39,1	46,7	51,5
42,9	46,5	49,1	78	15,7	19,7	25,6
37,0	39,9	43,8	79	13,5	18,9	34,0
39,6	42,9	46,4	80	14,0	16,9	19,4
40,1	43,0	46,4	81	15,2	16,8	18,5
42,8	46,3	48,8	82	14,0	16,8	19,3
43,9	47,1	49,9	83	14,1	16,9	19,4
40,0	44,1	48,3	84	19,5	38,6	45,7
15,8	17,4	19,1	85	16,3	18,8	43,1
47,1	50,8	54,2	86	14,3	16,7	18,8
47,6	51,0	53,8	87	16,4	18,2	20,0
46,9	51,1	56,0	88	16,6	18,7	30,8

Table III.4. Quartile lengths (cm) of haddock in night and from pelagic and bottom trawl. Shallow pairs are from 24-77 and deeper than 300 meters is 89-105. (Figure 4.5.).

Pelagic trawl				Bottom trawl		
L 25	**L 50**	**L 75**	**Pair**	**L 25**	**L 50**	**L 75**
12,0	13,9	17,0	24	14,1	17,0	19,6
12,6	15,4	20,6	25	31,4	34,7	44,0
13,8	19,9	28,1	26	20,8	31,4	38,3
14,4	19,5	32,7	27	35,9	41,5	46,3
12,6	15,2	21,3	28	13,3	19,8	38,9
29,5	31,9	34,0	29	20,5	28,3	40,0
35,4	37,7	40,2	30	14,4	24,1	34,4
27,5	34,8	39,2	31	14,7	20,8	34,9
11,6	13,2	14,8	32	22,5	27,0	32,1
11,6	13,1	14,7	33	26,1	32,0	36,1
11,6	13,2	14,7	34	25,5	31,5	35,0
23,3	27,6	32,3	35	23,2	29,2	33,8
26,2	31,3	34,5	36	28,7	34,1	38,0
18,8	30,4	34,2	37	24,5	32,3	37,5
17,6	26,8	33,6	38	17,7	23,1	32,8
31,3	35,1	38,7	39	14,5	21,4	32,0
12,3	14,6	23,6	40	14,0	23,2	39,4
27,5	35,0	45,8	41	14,3	24,9	40,7
14,1	18,9	38,2	42	20,4	36,9	45,4
31,8	38,0	44,6	43	14,8	18,4	32,0
30,5	37,2	42,9	44	17,9	23,6	32,3
35,0	38,3	46,7	45	16,4	21,1	28,3
30,2	33,1	36,5	46	26,3	30,5	33,9
38,1	41,3	43,7	47	33,5	37,8	41,9
30,5	33,8	37,8	48	30,4	33,3	37,0
33,9	37,2	40,3	49	29,0	35,3	39,5
33,7	38,2	42,3	50	30,9	36,5	40,1
13,7	16,8	19,4	51	26,5	36,1	38,7
23,2	34,9	39,5	52	26,5	36,1	38,7
27,1	35,9	39,4	53	21,0	40,1	46,7
14,7	19,8	31,8	54	30,4	34,9	39,7
17,8	37,9	43,8	55	18,4	37,4	43,8
13,7	16,7	19,4	56	34,3	38,0	43,8
13,4	17,5	29,4	57	14,0	18,4	32,2
18,2	38,7	44,2	58	17,5	37,1	44,0
15,4	17,0	18,6	59	19,2	39,2	45,0
15,4	17,1	18,8	60	17,0	19,8	28,6
15,1	16,7	18,4	61	16,2	18,2	20,4
15,1	16,8	18,5	62	16,6	25,2	43,2
19,3	40,1	44,7	63	24,2	34,4	42,9
14,5	16,9	19,0	64	17,7	25,4	42,0
15,9	17,3	18,7	65	17,7	25,4	42,0
14,6	16,7	18,6	66	17,7	25,4	42,0
15,9	17,7	19,5	67	17,7	24,9	41,7
15,5	17,9	20,8	68	17,4	21,2	30,2
17,1	21,2	35,0	69	36,9	41,8	45,3
14,2	16,4	18,6	70	19,9	42,3	48,5
16,5	18,8	22,4	71	19,9	42,3	48,5
16,0	17,8	19,6	72	19,9	42,3	48,5
40,4	47,1	52,2	73	41,8	46,5	51,8
13,1	15,9	18,1	74	16,1	18,9	37,5
16,1	17,5	18,9	75	13,5	16,5	19,0
13,5	16,4	19,0	76	26,0	48,9	54,1
15,5	17,1	18,6	77	16,8	35,0	47,8
14,6	19,2	27,5	89	24,2	28,8	34,5
12,9	18,1	26,8	90	17,4	26,9	33,4
33,1	39,5	45,0	91	25,6	37,9	46,0
14,2	18,4	30,9	92	12,7	15,8	21,9
14,0	19,3	31,8	93	13,4	17,2	23,9
13,1	16,8	27,5	94	13,1	16,1	18,9
25,0	32,5	38,3	95	13,5	17,1	22,0
14,8	25,7	33,0	96	22,2	30,9	38,4
17,7	36,5	42,2	97	16,1	17,5	19,0
15,8	18,0	31,9	98	14,7	17,6	58,8

Pelagic trawl				Bottom trawl		
L 25	L 50	L 75	Pair	L 25	L 50	L 75
14,3	17,2	19,8	99	16,2	18,7	40,8
19,2	31,3	45,7	100	16,0	19,0	45,1
15,6	17,9	20,2	101	19,6	22,9	27,8
13,4	16,2	18,3	102	24,4	47,5	52,9
13,5	16,1	18,0	103	17,8	36,8	48,0
16,0	17,4	18,8	104	16,5	18,2	19,8
13,5	16,1	18,1	105	16,8	35,0	47,8

Redfish

Table III.4. Quartile lengths (cm) of redfish in night and from pelagic and bottom trawl. Shallow pairs are from 3-24 and deeper than 300 meters is 27-51. (Figure 4.9.).

Pelagic trawl				Bottom trawl		
L 25	L 50	L 75	Pair	L 25	L 50	L 75
7,1	9,4	12,1	3	6,2	7,6	8,9
6,4	7,8	9,2	4	9,7	16,4	19,1
5,7	7,7	9,7	5	10,7	14,2	18,0
7,7	10,5	13,4	6	7,9	10,9	13,8
5,9	7,4	8,9	7	7,9	11,4	15,5
7,5	10,0	12,8	8	7,9	10,9	13,9
7,9	10,8	13,4	9	11,8	14,8	17,5
11,1	13,1	15,5	10	12,1	14,8	17,8
10,6	16,0	19,3	11	13,1	17,2	21,5
2,0	4,0	15,6	12	12,4	16,0	16,1
1,7	3,5	10,5	13	10,1	12,3	14,5
1,3	2,5	3,8	14	7,8	11,9	15,3
1,3	2,5	3,8	15	11,6	19,5	29,3
1,3	2,5	3,8	16	3,0	14,3	32,6
1,3	2,5	3,8	17	3,0	14,3	32,6
1,3	2,5	3,8	18	3,0	14,3	32,6
1,3	2,6	3,9	19	3,1	15,3	33,4
1,4	2,7	4,1	20	3,2	6,5	10,0
1,6	3,2	4,8	21	13,8	17,3	19,8
1,4	2,8	4,2	22	2,5	4,9	31,5
1,3	2,6	3,9	23	2,5	4,9	31,5
1,3	2,6	3,8	24	2,5	4,9	31,5
6,4	8,5	11,3	27	9,2	12,3	15,3
6,2	7,5	8,7	28	10,8	12,7	14,6
6,3	7,5	8,8	29	6,6	8,1	9,7
6,3	7,7	9,0	30	10,7	12,8	14,9
6,7	8,6	11,3	31	11,1	13,4	18,0
8,2	11,5	14,0	32	9,5	13,4	21,9
6,7	8,6	11,1	33	9,0	12,5	16,3
6,8	8,8	11,6	34	9,4	12,5	15,8
6,2	7,5	8,8	35	6,3	7,7	9,2
10,1	12,3	14,4	36	11,1	15,2	24,9
9,3	11,8	14,0	37	15,0	18,6	27,7
1,4	2,7	4,1	38	4,1	23,6	33,6
10,4	12,4	14,5	39	11,5	13,9	17,1
10,1	12,4	14,7	40	12,7	16,0	19,0
11,9	14,0	17,1	41	14,5	17,4	20,9
1,4	2,7	4,1	42	4,4	17,9	22,1
11,5	13,9	17,8	43	12,7	15,7	19,1
1,3	2,5	3,8	44	14,0	18,3	25,6
1,3	2,6	3,8	45	12,1	14,9	17,6
1,3	2,5	3,8	46	17,6	21,7	26,0
1,3	2,5	3,8	47	12,5	17,4	20,8
1,3	2,5	3,8	48	13,9	17,2	19,6
1,3	2,5	3,8	49	15,0	17,4	19,8
1,3	2,5	3,8	50	17,2	20,8	23,9
1,3	2,6	3,9	51	9,0	21,1	24,1

Appendix IV. Mean of cumulative length frequency and standard deviation.

Cod

Table IV.1. Cumulative length frequency in every length group (cm) for cod catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.3.).

Day shallow	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109
Mean cumulative length frequency bottom catch	0,18	0,26	0,31	0,36	0,44	0,53	0,62	0,74	0,84	0,90	0,94	0,96	0,98	0,99	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,20	0,27	0,29	0,30	0,29	0,28	0,24	0,18	0,13	0,09	0,05	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00
K	0,56	0,48	0,45	0,42	0,48	0,58	0,67	0,76	0,85	0,90	0,94	0,97	0,98	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,10	0,12	0,14	0,15	0,21	0,31	0,42	0,56	0,71	0,80	0,88	0,93	0,96	0,98	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,25	0,31	0,32	0,32	0,35	0,38	0,36	0,34	0,29	0,25	0,18	0,13	0,07	0,03	0,01	0,01	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,08	0,11	0,12	0,14	0,21	0,30	0,41	0,56	0,71	0,80	0,88	0,93	0,96	0,98	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,11	0,13	0,13	0,12	0,14	0,16	0,16	0,14	0,11	0,08	0,05	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	0,02	0,01	0,02	0,01	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Table IV.2. Cumulative length frequency in every length group (cm) for cod catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.3.).

Night shallow	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109
Mean cumulative length frequency bottom catch	0,23	0,29	0,35	0,43	0,53	0,62	0,69	0,76	0,85	0,91	0,94	0,96	0,98	0,99	0,99	0,99	1,00	1,00	1,00	1,00
Standard deviation	0,25	0,26	0,27	0,29	0,29	0,27	0,25	0,22	0,17	0,14	0,11	0,08	0,07	0,05	0,04	0,04	0,03	0,01	0,01	0,00
K	1,63	1,51	1,44	1,37	1,29	1,21	1,17	1,13	1,08	1,06	1,04	1,02	1,01	1,01	1,00	1,00	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,37	0,43	0,50	0,59	0,68	0,75	0,80	0,86	0,92	0,96	0,98	0,99	0,99	0,99	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,41	0,39	0,39	0,39	0,37	0,33	0,30	0,25	0,18	0,14	0,11	0,08	0,07	0,05	0,04	0,04	0,03	0,01	0,01	0,00
Mean cumulative length frequency pelagic trawl catch	0,47	0,54	0,59	0,67	0,75	0,81	0,86	0,90	0,95	0,97	0,99	0,99	0,99	0,99	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,43	0,42	0,41	0,38	0,34	0,29	0,23	0,18	0,11	0,06	0,04	0,03	0,03	0,03	0,03	0,03	0,02	0,01	0,01	0,01
Difference between estimated and observed pelagic frequency	-0,10	-0,11	-0,09	-0,07	-0,06	-0,06	-0,05	-0,04	-0,03	-0,02	-0,01	-0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Table IV.3. Cumulative length frequency in every length group (cm) for cod catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.3.).

Day deep	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109
Mean cumulative length frequency bottom catch	0,30	0,40	0,47	0,52	0,56	0,61	0,65	0,71	0,78	0,84	0,90	0,95	0,98	0,99	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,22	0,25	0,28	0,30	0,31	0,29	0,28	0,25	0,19	0,14	0,09	0,04	0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00
K	0,84	0,79	0,74	0,71	0,69	0,68	0,73	0,84	0,93	0,98	1,01	1,02	1,01	1,01	1,00	1,00	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,25	0,32	0,34	0,37	0,39	0,41	0,48	0,59	0,73	0,82	0,91	0,96	0,99	0,99	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,19	0,20	0,21	0,21	0,21	0,20	0,20	0,21	0,18	0,14	0,09	0,04	0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,34	0,35	0,36	0,36	0,38	0,43	0,51	0,64	0,76	0,84	0,92	0,97	0,99	0,99	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,45	0,45	0,46	0,46	0,46	0,44	0,39	0,33	0,28	0,21	0,12	0,06	0,03	0,01	0,01	0,01	0,01	0,01	0,00	0,00
Difference between estimated and observed pelagic frequency	-0,09	-0,03	-0,01	0,01	0,00	-0,01	-0,04	-0,05	-0,04	-0,02	-0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Table IV.4. Cumulative length frequency in every length group (cm) for cod catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.3.).

Night deep	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109
Mean cumulative length frequency bottom catch	0,39	0,43	0,48	0,52	0,55	0,60	0,65	0,72	0,81	0,87	0,92	0,95	0,97	0,99	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,34	0,36	0,36	0,36	0,35	0,33	0,30	0,26	0,20	0,16	0,13	0,09	0,06	0,03	0,01	0,00	0,00	0,00	0,00	0,00
K	1,34	1,29	1,25	1,22	1,22	1,22	1,21	1,16	1,12	1,08	1,06	1,04	1,02	1,01	1,00	1,00	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,52	0,56	0,60	0,64	0,68	0,72	0,78	0,84	0,90	0,94	0,97	0,98	0,99	0,99	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,45	0,46	0,45	0,44	0,43	0,40	0,36	0,30	0,23	0,17	0,14	0,09	0,06	0,03	0,01	0,00	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,73	0,78	0,79	0,81	0,83	0,84	0,87	0,90	0,94	0,97	0,99	0,99	0,99	0,99	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,37	0,36	0,35	0,34	0,33	0,30	0,26	0,22	0,13	0,06	0,03	0,02	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	-0,21	-0,23	-0,19	-0,17	-0,15	-0,12	-0,10	-0,07	-0,04	-0,03	-0,02	-0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Table IV.5. Cumulative length frequency in every length group (cm) for cod catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from independent database (Figure 4.4.).

Day shallow Independent database	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109
Mean cumulative length frequency bottom catch	0,13	0,21	0,29	0,37	0,43	0,50	0,63	0,74	0,86	0,93	0,97	0,98	0,99	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,05	0,07	0,15	0,22	0,23	0,22	0,17	0,13	0,10	0,05	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
K	0,56	0,48	0,45	0,42	0,48	0,58	0,67	0,76	0,85	0,90	0,94	0,97	0,98	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,08	0,10	0,13	0,15	0,21	0,29	0,42	0,56	0,73	0,83	0,91	0,95	0,97	0,99	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,03	0,03	0,07	0,09	0,11	0,13	0,11	0,10	0,08	0,05	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,00	0,01	0,04	0,08	0,15	0,32	0,53	0,72	0,86	0,94	0,98	0,99	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,00	0,01	0,13	0,20	0,25	0,29	0,29	0,24	0,17	0,08	0,04	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	0,07	0,09	0,09	0,07	0,06	-0,02	-0,10	-0,16	-0,13	-0,11	-0,07	-0,04	-0,02	-0,01	0,00	0,00	0,00	0,00	0,00	0,00

Table IV.5. Cumulative length frequency in every length group (cm) for cod catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from independent database (Figure 4.4.).

Night shallow Independent database	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 94	95 - 99	100 - 104	105 - 109
Mean cumulative length frequency bottom catch	0,17	0,26	0,37	0,49	0,69	0,84	0,93	0,96	0,99	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,09	0,07	0,05	0,01	0,10	0,07	0,04	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
K	1,63	1,51	1,44	1,37	1,29	1,21	1,17	1,13	1,08	1,06	1,04	1,02	1,01	1,01	1,00	1,00	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,28	0,40	0,54	0,67	0,89	1,02	1,09	1,09	1,07	1,05	1,04	1,02	1,01	1,01	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,14	0,11	0,07	0,01	0,12	0,08	0,05	0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,02	0,03	0,17	0,41	0,77	0,92	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,03	0,04	0,02	0,05	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	0,26	0,37	0,37	0,26	0,13	0,10	0,09	0,09	0,07	0,05	0,04	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00

Haddock

Table IV.6. Cumulative length frequency in every length group (cm) for haddock catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.7.).

Day shallow	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Mean cumulative length frequency bottom catch	0,21	0,55	0,65	0,71	0,78	0,85	0,91	0,97	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,15	0,26	0,25	0,24	0,21	0,16	0,12	0,06	0,02	0,00	0,00	0,00	0,00	0,00
K	0,43	0,22	0,20	0,20	0,28	0,45	0,69	0,91	0,98	0,99	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,09	0,12	0,13	0,14	0,22	0,39	0,63	0,88	0,98	0,99	1,00	1,00	1,00	1,00
Standard deviation	0,07	0,06	0,05	0,05	0,06	0,07	0,08	0,06	0,02	0,00	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,07	0,11	0,13	0,15	0,23	0,39	0,64	0,88	0,98	0,99	1,00	1,00	1,00	1,00
Standard deviation	0,20	0,29	0,31	0,32	0,33	0,33	0,24	0,10	0,03	0,01	0,01	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	0,02	0,01	0,00	0,00	-0,01	-0,01	-0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Table IV.7. Cumulative length frequency in every length group (cm) for haddock catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.7.).

Night shallow	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Mean cumulative length frequency bottom catch	0,11	0,29	0,38	0,47	0,59	0,73	0,85	0,95	0,99	1,01	1,00	1,00	1,00	1,00
Standard deviation	0,10	0,21	0,22	0,22	0,21	0,19	0,15	0,10	0,08	0,08	0,00	0,00	0,00	0,00
K	1,10	1,34	1,23	1,17	1,13	1,10	1,08	1,03	1,00	0,98	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,12	0,39	0,47	0,55	0,67	0,81	0,91	0,98	0,99	0,99	1,00	1,00	1,00	1,00
Standard deviation	0,11	0,28	0,27	0,25	0,23	0,21	0,16	0,10	0,08	0,08	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,21	0,52	0,58	0,65	0,75	0,87	0,94	0,99	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,21	0,37	0,38	0,35	0,28	0,19	0,11	0,05	0,02	0,01	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	-0,10	-0,13	-0,11	-0,10	-0,08	-0,06	-0,03	-0,01	-0,01	-0,01	0,00	0,00	0,00	0,00

Table IV.8. Cumulative length frequency in every length group (cm) for haddock catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.7.).

Day deep	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Mean cumulative length frequency bottom catch	0,21	0,70	0,75	0,79	0,82	0,85	0,90	0,95	0,98	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,11	0,20	0,17	0,16	0,15	0,13	0,09	0,05	0,01	0,00	0,00	0,00	0,00	0,00
K	0,02	0,10	0,09	0,09	0,11	0,25	0,50	0,81	0,93	0,99	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,01	0,07	0,07	0,07	0,09	0,21	0,45	0,77	0,92	0,98	1,00	1,00	1,00	1,00
Standard deviation	0,00	0,02	0,02	0,01	0,02	0,03	0,04	0,04	0,01	0,00	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,01	0,08	0,08	0,09	0,11	0,23	0,46	0,77	0,92	0,98	1,00	1,00	1,00	1,00
Standard deviation	0,04	0,27	0,27	0,28	0,27	0,28	0,30	0,22	0,10	0,02	0,01	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	-0,01	-0,02	-0,02	-0,02	-0,02	-0,02	-0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Table IV.8. Cumulative length frequency in every length group (cm) for haddock catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.7.).

Night deep	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Mean cumulative length frequency bottom catch	0,19	0,48	0,57	0,63	0,69	0,75	0,82	0,91	0,96	0,99	1,00	1,00	1,00	1,00
Standard deviation	0,14	0,24	0,21	0,19	0,18	0,17	0,15	0,09	0,04	0,02	0,01	0,01	0,01	0,00
K	0,91	1,03	1,06	1,08	1,11	1,11	1,10	1,07	1,04	1,01	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,17	0,50	0,61	0,68	0,77	0,83	0,90	0,97	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,13	0,25	0,23	0,21	0,20	0,19	0,17	0,10	0,04	0,02	0,01	0,01	0,01	0,00
Mean cumulative length frequency pelagic trawl catch	0,25	0,61	0,68	0,73	0,81	0,87	0,93	0,98	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,12	0,29	0,27	0,25	0,22	0,16	0,09	0,03	0,01	0,00	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	-0,07	-0,11	-0,08	-0,05	-0,04	-0,04	-0,03	-0,01	0,00	0,00	0,00	0,00	0,00	0,00

Table IV.9. Cumulative length frequency in every length group (cm) for haddock catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from independent database (Figure 4.8.).

Day shallow Independent database	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Mean cumulative length frequency bottom catch	0,03	0,40	0,49	0,50	0,54	0,72	0,90	0,97	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,06	0,26	0,28	0,28	0,26	0,16	0,06	0,02	0,01	0,00	0,00	0,00	0,00	0,00
K	0,43	0,22	0,20	0,20	0,28	0,45	0,69	0,91	0,98	0,99	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,01	0,09	0,10	0,10	0,15	0,32	0,62	0,88	0,97	0,99	1,00	1,00	1,00	1,00
Standard deviation	0,03	0,06	0,06	0,06	0,07	0,07	0,04	0,02	0,01	0,00	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,00	0,01	0,02	0,04	0,08	0,25	0,70	0,92	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,01	0,05	0,05	0,10	0,13	0,14	0,16	0,08	0,02	0,01	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	0,01	0,08	0,08	0,06	0,07	0,07	-0,08	-0,04	-0,02	0,00	0,00	0,00	0,00	0,00

Table IV.10. Cumulative length frequency in every length group (cm) for haddock catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from independent database (Figure 4.8.).

Night shallow Independent database	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Mean cumulative length frequency bottom catch	0,12	0,66	0,85	0,94	0,95	0,96	0,98	0,99	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,04	0,17	0,12	0,06	0,05	0,04	0,02	0,01	0,01	0,00	0,00	0,00	0,00	0,00
K	1,10	1,34	1,23	1,17	1,13	1,10	1,08	1,03	1,00	0,98	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,14	0,88	1,04	1,10	1,06	1,06	1,05	1,02	1,00	0,98	1,00	1,00	1,00	1,00
Standard deviation	0,04	0,23	0,14	0,07	0,05	0,05	0,03	0,01	0,01	0,00	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,08	0,53	0,72	0,84	0,87	0,90	0,94	0,98	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,06	0,21	0,22	0,23	0,20	0,16	0,09	0,02	0,00	0,00	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	0,05	0,35	0,32	0,26	0,20	0,16	0,11	0,04	0,00	-0,02	0,00	0,00	0,00	0,00

Table IV.11. Cumulative length frequency in every length group (cm) for haddock catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from independent database (Figure 4.8.).

Day deep Independent database	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Mean cumulative length frequency bottom catch	0,13	0,81	0,85	0,87	0,89	0,91	0,93	0,96	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K	0,02	0,10	0,09	0,09	0,11	0,25	0,50	0,81	0,93	0,99	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,00	0,08	0,08	0,08	0,10	0,22	0,47	0,77	0,92	0,98	1,00	1,00	1,00	1,00
Standard deviation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mean cumulative length frequency pelagic trawl catch	0,00	0,00	0,00	0,00	0,02	0,17	0,46	0,68	0,85	0,98	1,00	1,00	1,00	1,00
Standard deviation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Difference between estimated and observed pelagic frequency	0,00	0,08	0,08	0,08	0,07	0,05	0,00	0,09	0,07	0,01	0,00	0,00	0,00	0,00

Table IV.12. Cumulative length frequency in every length group (cm) for haddock catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from independent database (Figure 4.8.).

Night deep Independent database	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Mean cumulative length frequency bottom catch	0,05	0,58	0,82	0,83	0,86	0,86	0,93	0,97	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,00	0,01	0,10	0,12	0,12	0,12	0,04	0,00	0,01	0,01	0,00	0,00	0,00	0,00
K	0,91	1,03	1,06	1,08	1,11	1,11	1,10	1,07	1,04	1,01	1,00	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,05	0,60	0,87	0,90	0,96	0,95	1,02	1,04	1,03	1,01	1,00	1,00	1,00	1,00
Standard deviation	0,00	0,01	0,10	0,13	0,14	0,14	0,04	0,00	0,01	0,01	0,00	0,00	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,23	0,85	0,93	0,94	0,94	0,96	0,97	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,12	0,03	0,07	0,08	0,08	0,05	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	-0,18	-0,24	-0,06	-0,04	0,02	-0,01	0,05	0,05	0,03	0,01	0,00	0,00	0,00	0,00

Redfish

Table IV.13. Cumulative length frequency in every length group (cm) for redfish catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.11.).

Night shallow	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64
Mean cumulative length frequency bottom catch	0,20	0,37	0,59	0,77	0,84	0,88	0,93	0,98	0,99	1,00	1,00
Standard deviation	0,20	0,22	0,18	0,19	0,17	0,14	0,08	0,03	0,01	0,01	0,00
K	2,32	1,68	1,46	1,20	1,13	1,10	1,06	1,02	1,01	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,46	0,62	0,86	0,93	0,95	0,97	0,99	1,00	1,00	1,00	1,00
Standard deviation	0,46	0,37	0,27	0,22	0,19	0,15	0,09	0,03	0,01	0,01	0,00
Mean cumulative length frequency pelagic trawl catch	0,56	0,78	0,92	0,98	0,99	0,99	0,99	1,00	1,00	1,00	1,00
Standard deviation	0,44	0,28	0,14	0,05	0,04	0,03	0,02	0,01	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	-0,10	-0,15	-0,07	-0,05	-0,04	-0,02	-0,01	0,00	0,00	0,00	0,00

Table IV.14. Cumulative length frequency in every length group (cm) for redfish catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from dependent database (Figure 4.11.).

Night Deep	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64
Mean cumulative length frequency bottom catch	0,04	0,21	0,49	0,76	0,88	0,95	0,98	0,99	1,00	1,00	1,00
Standard deviation	0,09	0,22	0,26	0,20	0,13	0,08	0,04	0,02	0,01	0,00	0,00
K	4,25	1,92	1,51	1,21	1,10	1,04	1,02	1,01	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,18	0,40	0,73	0,92	0,97	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,37	0,42	0,39	0,24	0,14	0,08	0,04	0,02	0,01	0,00	0,00
Mean cumulative length frequency pelagic trawl catch	0,42	0,71	0,92	0,98	0,99	0,99	1,00	1,00	1,00	1,00	1,00
Standard deviation	0,47	0,35	0,11	0,03	0,02	0,01	0,01	0,00	0,00	0,00	0,00
Difference between estimated and observed pelagic frequency	-0,24	-0,32	-0,19	-0,06	-0,02	-0,01	0,00	0,00	0,00	0,00	0,00

Table IV.15. Cumulative length frequency in every length group (cm) for redfish catch from observed bottom, pelagic and estimated pelagic of K (equation 3.2.). Data from independent database (Figure 4.12.).

Night Deep Independent database	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64
Mean cumulative length frequency bottom catch	0,00	0,01	0,01	0,16	0,35	0,73	0,94	0,97	0,97	0,97	1,00
Standard deviation	-	-	-	-	-	-	-	-	-	-	-
K	4,25	1,92	1,51	1,21	1,10	1,04	1,02	1,01	1,00	1,00	1,00
Mean cumulative length frequency estimated pelagic catch	0,00	0,02	0,01	0,19	0,39	0,76	0,96	0,98	0,97	0,97	1,00
Standard deviation	-	-	-	-	-	-	-	-	-	-	-
Mean cumulative length frequency pelagic trawl catch	0,00	0,02	0,04	0,11	0,22	0,74	0,96	1,00	1,00	1,00	1,00
Standard deviation	-	-	-	-	-	-	-	-	-	-	-
Difference between estimated and observed pelagic frequency	0,00	0,00	-0,02	0,08	0,16	0,02	-0,01	-0,02	-0,03	-0,03	0,00

Appendix V Wilcoxon rank test for cod in seasons.

Table V.1. Wilcoxon rank test on the quartile lengths from every pair tested in the categories and seasons. Winter is January - February, spring is Mars - April and summer is surveys from June – September. The ranking reforms to the difference between pelagic fish length and bottom fish length.

					Wilcoxon rank test for L.25			Wilcoxon rank test for L.50			Wilcoxon rank test for L.75		
		number of			Rank value			Rank value			Rank value		
Season	Group	pair	pelagic trawl	bottom trawl	+	-	P-Value	+	-	P-Value	+	-	P-Value
Winter	Day and < 300 meter	17	17	27	143	10	<0.0005	117	36	<0.05	75	78	>0.05
Winter	Night and < 300 meter	47	47	105	261	867	<0.0025	118	1010	<<0.0005	42	1086	<<0.0005
Winter	Day and >300 meter	10	10	21	46	9	<0.05	29	26	>0.05	15	40	>0.05
Winter	Night and >300 meter	21	21	69	41	190	<0.005	11	220	<0.0005	8	223	<<0.0005
Summer	Day and < 300 meter	13	13	33	84	7	=0.0025	77	14	<0.025	69	22	>0.05
Summer	Night and < 300 meter	1	1	1	0	1	-	0	1	-	0	1	-
Summer	Day and >300 meter	6	6	15	11	10	>0.05	11	10	>0.05	9	12	>0.05
Spring	Day and < 300 meter	5	5	8	15	0	=0.05	14	1	>0.05	15	0	=0.05
Spring	Night and < 300 meter	5	5	40	0	15	=0.05	0	15	=0.05	0	15	=0.05
Spring	Day and >300 meter	1	1	1	0	1	-	0	1	-	0	1	-
Spring	Night and >300 meter	3	3	5	0	6	-	0	6	-	0	6	-