# 5 Faroe haddock

**Executive summary**

Being an update assessment, the only changes compared to last year are additions of new data from 2008 and some minor revisions of the landings data for 2006 and 2007 with corresponding revisions of the catch@age data. The main assessment tool is XSA tuned with 2 research vessel bottom trawl surveys. The results are in line with those from 2008, showing a declining SSB mainly due to poor recruitment. SSB is now estimated just below $B_{pa}$ and is predicted to be close to $B_{lim}$ in 2010 and 2011 with status quo fishing mortality. Fishing mortality in 2008 is estimated at 0.22 ($F_{pa}$ = 0.25) and landings in 2008 were only 7 500t. In recent years there has been a tendency to overestimate SSB and underestimate F.

## 5.1 Stock description and management units

Haddock in Faroese Waters, i.e. ICES Subdivisions Vb1 and Vb2 and in the southern part of ICES Division IIa, close to the border of Subdivision Vb1, are generally believed to belong to the same stock and are treated as one management unit named Faroe haddock. Haddock is distributed all over the Faroe Plateau and the Faroe Bank from shallow water down to more than 450 m. Spawning takes place from late March to the beginning of May with a peak in the middle of April and occurs in several areas on the Faroe Plateau and on the Faroe Bank. Haddock does not form as dense spawning aggregations as cod and saithe, nor does it perform ordinary spawning migrations. After spawning, eggs and fry are pelagic for about 4 months over the Plateau and Bank and settling starts in August. This is a prolonged process and pelagic juveniles can be found at least until September. Also during the first years of life they can be pelagic and this vertical distribution seems to be connected to year class strength, with some individuals from large year classes staying pelagic for a longer time period. No special nursery areas can be found, because young haddock are distributed all over the Plateau and Bank. After settling the haddock is considered very stationary as seen in tagging experiments. Figures 5.8-5.9 show the age-aggregated distribution by year as seen in the two regular groundfish surveys in the area.

## 5.2 Scientific data

### 5.2.1 Trends in landings and fisheries

Nominal landings of Faroe haddock have in recent years increased very rapidly from only 4 000 t in 1993 to 27 000 t in 2003; they have declined since and amounted in 2008 to about 7 600 t. Most of the landings are taken from the Faroe Plateau; the landings from the Faroe Bank (Subdivision Vb2) in 2008 were about 360 t (Tables 5.1 and 5.2). As can be seen from Figure 5.1, landings in 2002-2004 reached historical highs. The cumulative landings by month (Figure 5.2) suggest that landings in 2009 may be smaller than those in 2008.

Faroese vessels have taken almost the entire catch since the late 1970s (Figure 5.1). Table 5.3 shows the proportion of the Faroese landings taken by each fleet category since 1985. The longliners have taken most of the catches in recent years followed by the trawlers; the proportions in 2008 were: longliners 81% and trawlers 19% (Figure 5.3).

### 5.2.2 Catch-at-age

For the Faroese landings, catch-at-age data were provided for fish taken from the Faroe Plateau and the Faroe Bank. The sampling intensity in 2008 is shown in Table 5.4 and was somewhat lower than in recent years. The main reasons for this are illness, small catches and difficulties to get access to some of the landings.

Due to the low sampling level in 2008, the practise in the past to disaggregate samples from each fleet category by season (Jan-Apr, May-Aug and Sep-Dec) and then raise them by the corresponding catch proportions to give the annual catch-at-age in numbers for each fleet, had to be replaced by using 2 seasons only (Jan-Jun, Jul-Dec. The results are given in Table 5.4. Catches of some minor fleets have been included under the "Others" heading. No catch-at-age data were available from other nations fishing in Faroese waters. Therefore, catches by trawlers from France, Russia and UKwere assumed to have the same age composition as Faroese otter board trawlers larger than 1 000 HP. The Norwegian longliners were assumed to have the same age distribution as the Faroese longliners greater than 100 GRT. The most recent data were revised according to the final catch figures. The resulting total catch-at-age in numbers is given in Tables 5.4 and 5.5, and in Figure 5.4 the LN(catch-at-age in numbers) is shown for the whole period of analytical assessments.

In general the catch-at-age matrix in recent years appears consistent although from time to time a few small year classes are disturbing this consistency, both in numbers and mean weights at age. Also there are some problems with what ages should be included in the plus group; there are some periods where only a few fishes are older than 9 years, and other period with a quite substantial plus group (10+). These problems have been addressed in former reports of this WG and will not be further dealt with here. No estimates of discards of haddock are available. However, since almost no quotas are used in the management of the fisheries on this stock, the incentive to discard in order to high grade the catches should be low. The landings statistics is therefore regarded as being adequate for assessment purposes. The ban on discarding as stated in the law on fisheries should also – in theory – keep the discarding at a low level.

### 5.2.3 Weight-at-age

Mean weight-at-age data are provided for the Faroese fishery (Table 5.4). Figure 5.5 shows the mean weights-at-age in the landings for age groups 2-7 since 1976. During the period, weights have shown cyclical changes, and have decreased during the most recent years to very low values in 2006; in 2007 and 2008, mean weights for ages up to 5 years included show a small increase, age 6 show a small increase in 2008 while older fish continue to decline. The mean weight at age in the stock are assumed equal to those in the landings.

### 5.2.4 Maturity-at-age

Maturity-at-age data is available from the Faroese Spring Groundfish Surveys 1982–2009. The survey is carried out in February-March, so the maturity-at-age is determined just prior to the spawning of haddock in Faroese waters and the determinations of the different maturity stages is relatively easy.

In order to reduce eventual year-to-year effects due to possible inadequate sampling and at the same time allow for trends in the series, the routine by the WG has been to use a 3-year running average in the assessment. For the years prior to 1982, average maturity-at-age from the surveys 1982–1995 was adopted (Table 5.7 and Figure 5.6).

## 5.3 Information from the fishing industry

There exists a considerable amount of data on fish size in the fishing industry. No such information was used in the 2009 assessment.

## 5.4 Methods

This assessment is an update of the 2008 assessment, with exactly the same settings of the XSA. The only changes are minor revisions of recent landings according to revised data and corresponding revisions of the c@age input file. All other input files (VPA and tuning fleets) are the same except for the addition of the 2008 and 2009 data.

### 5.4.1 Tuning and estimates of fishing mortality

Commercial cpue series. Several commercial catch per unit effort series are updated every year, but as discussed in previous reports of this WG they are not used directly for tuning of the VPA due to changes in catchability caused by e.g. productivity variations in the area (see Faroe Plateau cod), a different behaviour of the fleets after the introduction of the management system and in years when haddock prices are low as compared to cod the fleets apparently try to avoid grounds with high abundances of haddock, especially the younger age groups. The opposite may also happen if prices of haddock become high as compared to other species. The distribution of fishing activities by year for some major fleets (selected vessels) can be seen in chapter 2; the data are based on logbooks. These are mixed fisheries and not directly targeting haddock. It is not possible to show the fishing activities for the longliners below 100 GRT because part of this fleet is not obliged to keep logbooks. The age-aggregated cpue series for longliners and pair trawlers are presented in Figure 5.7. In general the two series show the same trends although in some periods the two series are conflicting; this has been explained by variations in catchability of the longlines due to the above mentioned changes in productivity of the ecosystem (see chapter 2).

Fisheries independent cpue series. Two annual groundfish surveys are available, one carried out in February-March since 1982 (100 stations per year down to 500 m depth), and the other in August-September since 1996 (200 stations per year down to 500 m depth). The distribution of haddock catches in the surveys are shown in Figure 5.9 (spring surveys 1994-2009) and Figure 5.10 (summer surveys 1996-2008). Biomass estimates (kg/hour) are available for both series since they were initiated (Figure 5.8), and in general, there is a good agreement between them. Age disaggregated data are available for the whole summer series, but due to problems with the database (see earlier reports), age disaggregated data for the spring survey are only available since 1994. The calculation of indices at age is based on age-length keys and a smoother is applied. This is a useful method but by analyzing the number of otoliths for the youngest ages and comparing it with the length distributions some artifacts may be introduced because the smoothing can assign wrong ages to some lengths, especially for the youngest and oldest specimen. As last year the length distributions have been used more directly for calculation of indices at age for ages 0-3. LN(numbers at age) for the surveys are presented in Figures 5.11-5.12 and show consistent patterns. Further analysis of the performances of the two series are shown in figures 5.13 – 5.15. In general there is a good relationship between the indices for one year class in two successive years (Figures 5.13-5.14). The same applies when comparing the corresponding indices at age from the two surveys (Figure 5.15).

A spaly (same procedure as last year) run, with the same settings of the XSA as in 2008 and tuned with the two surveys combined (Table 5.8), with 2008 data included

and some minor revisions of recent catch figures (Table 5.9), gave similar 2007 estimates as the 2008 assessment, although the recruitment and biomass were overestimated and the fishing mortality underestimated in the 2008 assessment (Section 5.10). The log q residuals for the two surveys are shown in Figure 5.16.

The retrospective pattern for fishing mortality, recruitment and spawning stock biomass of this XSA is shown in Figure 5.17. There has been a tendency to overestimate SSB and underestimate F in recent years. The retrospective pattern of the fishing mortality is hampered by strange values of some small poorly sampled year classes which in some years are included in the FBAR reference ages and consequently they will create problems for estimation of the stock (see the 2005 NWWG report); this is not a problem for the time being but the behaviour of the small year classes from 2005 and 2006 should be carefully inspected. In order to investigate the retrospective pattern, an exploratory XSA was run without shrinkage (Shr. 2.0). The resulting retrospective pattern was worse than with the spaly shrinkage of 0.5, and the Fbar from this run for 2008 was only 0.18.

Results. The fishing mortalities from the final XSA run are given in Table 5.10 and in Figure 5.18. According to this the fishing mortality showed an overall decline since the early 1960s and has been estimated to be below or at the natural mortality of 0.2 in several years from the late 1970s. It increased again in the years 1993-1998 to reach more than 0.5 in 1998. After that there was a drop to below 0.3 in 2000-2002 followed by an increase in 2003 to about 0.45. Since then the fishing mortality has decreased every year and is estimated in this years assessment to only 0.22 in 2008.

## 5.5 Reference points

The yield- and spawning stock biomass per recruit (age 2) based on the long-term data are shown in Table 5.17 and Figure 5.20. From Figure 5.19, showing the recruit/spawning stock relationship, and from Table 5.17, $\mathbf{F}_{med}$, and $\mathbf{F}_{high}$ were calculated at 0.28 and 1.45, respectively. $F_{max}$ is estimated at 0.61, and $F_{0.1}$ at 0.18; these values are slightly higher than last year.

The precautionary reference fishing mortalities were set in 1998 by ACFM with $F_{pa}$ as the $\mathbf{F}_{med}$ value of 0.25 and $F_{lim}$ two standard deviations above $\mathbf{F}_{pa}$ equal to 0.40. The precautionary reference spawning stock biomass levels were changed by ACFM in 2007. $B_{lim}$ was set at 22 000 t ($B_{loss}$) and $B_{pa}$ at 35 000 t based on the formula $B_{pa} = B_{lim}e^{1.645\sigma}$, assuming a $\sigma$ of about 0.3 to account for the uncertainties in the assessment.

## 5.6 State of the stock - historical and compared to what is now.

The stock size in numbers is given in Table 5.11 and a summary of the VPA with the biomass estimates is given in Table 5.12 and in Figure 5.18. According to this assessment, the spawning stock biomass has shown big changes in recent years. It decreased from 67 000 t in 1987 to 22 000 t in 1994, increased again to 83 000 t in 1997 and 1998, decreased to 54 000 t in 2000 and increased after that to 98 000 t in 2003. After 2003 the spawning stock biomass has declined steadily, and the 2008 point estimate is 32 000 t. The decline in the spawning stock began in the late 1970s due to very poor recruitment in the years before. The stabilization at relatively high SSB's in the mid–1980s was due to the relatively good 1982 and 1983 year classes, but the decline since was partly due to poor year classes since the mid–1980s, as well as the pronounced decline in the mean weights-at-age in the stock. The main reason for the very abrupt increase in the spawning stock biomass is the recruitment and growth of the very large 1993 year class and the well-above-average 1994 year class. The most

recent increase in the spawning stock is due to new strong year classes entering the fishery of which the 1999 year class is the highest on record (105 mio. at age 2). Also the YC's from 2000 and 2001 are estimated well above average and the 2002 YC slightly above average, but all more recent YC's are estimated or predicted to be small.

## 5.7 Short term forecast

### 5.7.1 Input data

The input data for the short-term predictions are estimated in the same way as last year and given in Tables 5.13-14. All year classes up to 2007 are taken directly from the 2009 final XSA, the 2008 year class at age 2 is estimated from the 2009 XSA age 1 applying a natural mortality of 0.2 in a forward calculation of the numbers using basic VPA equations. The YC 2009 at age 2 in 2011 is estimated as the geometric mean of the 2-year-olds since 1980. This period has been selected, because the recruitment in earlier years was more stable and not characteristic for the recent years.

The exploitation pattern used in the prediction was derived from averaging the 2006–2008 fishing mortality matrices from the final VPA and re-scaling to 2008. The same exploitation pattern was used for all three years.

The mean weight@age have been declining in recent years to low values but from inspection of Figure 5.5 and Table 5.6, most ages have increasing again in 2007 and 2008. The mean weight-at-age for ages 2-10 in 2009-2011 was set equal to the average of the weights for 2006-2008.

The maturity ogive for 2009 is based on samples from the Faroese Groundfish Spring Survey 2008 and 2009, and the ogives in 2010-2011 are estimated as the average of the smoothed 2007-2009 values.

### 5.7.2 Results

Although the allocated number of fishing days for the fishing year 2008-2009 was reduced by 10% as compared to the year before, it should not be unrealistic to assume fishing mortalities in 2010 as the average of some recent years, here the average of F(2006-2008); however, possible changes in the catchability of the fleets (which seem to be linked to productivity changes in the environment) could undermine this assumption; low prices on haddock will also have a similar effect. The landings in 2009 are then predicted to be about 6 000 t, and continuing with this fishing mortality will result in 2010 landings of about 5 000 t. The SSB will decrease to 27 000 t in 2009, 23 000 t in 2010, and to 22 000 t in 2011 which is equal to $B_{lim}$. The results of the short-term prediction are shown in Table 5.15 and in Figure 5.20. The contribution by year-classes to the age composition of the predicted 2010 and 2011 SSB's is shown in Figure 5.22.

## 5.8 Medium term forecasts and yield per recruit

No medium term projections are presented in this years report.

The input data for the long-term yield and spawning stock biomass (yield-per-recruit calculations) are listed in Table 5.16. Mean weights-at-age (stock and catch) are averages for the 1977–2008 period. The maturity ogives are averages for the years 1982-2008. The exploitation pattern is the same as in the short term prediction.

The results are given in Table 5.17, Figure 5.20 and under Biological reference points.

## 5.9 Uncertainties in assessment and forecast

Misreporting is not believed to be a problem under the current effort management system and since almost no quotas are used in the management of the fisheries on this stock, the incentive to discard in order to high grade the catches should be low. The landings statistics is therefore regarded as being adequate for assessment purposes. The ban on discarding as stated in the law on fisheries should also – in theory – keep the discarding at a low level.

The sampling of the catches for length measurements, otolith readings and length-weight relationships is considered to be adequate.

The quality of the tuning data is considered high. The same research vessel has been used in all years and the gear as well as sampling procedures of the catch have remained the same.

The ADAPT component of the assessment toolbox developed by the USA National Marine Fisheries Service (http://nft.nefsc.noaa.gov/) has been systematically applied to the main stocks in the Faroes (Faroe Plateau cod, haddock and saithe). One of the objectives of the exercise was to use the bootstrap feature of the toolbox to evaluate the uncertainties in the assessment.

This exercise was not repeated this year, but Figure 5.21 shows the F and SSB's from a 1000 bootstraps of the 2008 ADAPT. The figure also shows the F and SSB from the XSA assessment. F in both methods is the Fbar(3-7). The XSA results fall almost in the middle of the cloud of bootstrapped ADAPT results.

## 5.10 Comparison with previous assessment and forecast

As explained previously in the report, this assessment is an update of the 2008 assessment. The only changes are minor revisions of recent landings according to revised data and corresponding revisions of the c@age input file. All other input files (VPA and tuning fleets) are the same except for the addition of the 2008-2009 data.

Following differences in the 2007 estimates were observed as compared to last year:

**Text table Comparisons between 2008 and 2009 assessment of 2007data**
**The year of comparison is 2007**

| | R at age 2 (thousands) | Total B (tonnes) | SSB (tonnes) | Landings (tonnes) | F (3-7) |
|---|---|---|---|---|---|
| 2008 spaly | 3,750 | 54,400 | 49,100 | 12,633 | 0.28 |
| 2009 spaly | 3,275 | 49,450 | 44,350 | 12,656 | 0.31 |
| %-change | -13 | -9 | -10 | 0 | 11 |

It can be seen, that recruitment and biomass has been overestimated while fishing mortality has been underestimated, but the differences are relatively small, in the order of 10%.

## 5.11 Management plans and evaluations

A management system based on number of fishing days, closed areas and other technical measures was introduced in 1996. See overview in section 2 for details.

## 5.12 Management considerations

Management of fisheries on haddock also needs to take into account measures for cod and saithe.

### 5.13 Ecosystem considerations

Since about 80% of the catches are taken by longlines and the remaining by trawls, effects of the haddock fishery on the bottom is moderate.

### 5.14 Regulations and their effects

As explained in the overview (section 2), the fishery for haddock in Vb is regulated through a maximum number of fishing days, closed areas during spawning times and large areas closed to trawling. As a consequence, around 80% of the landings derive from long line fisheries. Since the minimum mesh size in the trawls (codend) is 145 mm, the trawl catches consist of fewer small fish than the long line fisheries. Other nations fishing in Faroese waters are regulated by TAC's obtained during bilateral negotiations; their total landings are minimal, however. Discarding of haddock is considered minimal and there is a ban to discarding.

### 5.15 Changes in fishing technology and fishing patterns

See section 2.

### 5.16 Changes in the environment

See section 2.

**Table 5.1** Faroe Plateau (Sub-division Vb1) HADDOCK. Nominal catches (tonnes) by countries 1982-2008, I.e. Working Group estimates in Vb1.

| Country | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Denmark | - | - | - | - | 1 | 8 | 4 | - | - | - | | | |
| Faroe Islands | 10,319 | 11,898 | 11,418 | 13,597 | 13,359 | 13,954 | 10,867 | 13,506 | 11,106 | 8,074 | 4,655 | 3,622 | 3,675 |
| France[1] | 2 | 2 | 20 | 23 | 8 | 22 | 14 | - | - | - | 164 | - | |
| Germany | 1 | + | + | + | 1 | 1 | - | + | + | + | | - | |
| Norway | 12 | 12 | 10 | 21 | 22 | 13 | 54 | 111 | 94 | 125 | 71 | 28 | 22 |
| UK (Engl. and Wales) | - | - | - | - | - | 2 | - | - | 7 | - | 54 | 81 | 31 |
| UK (Scotland)[3] | 1 | - | - | - | - | - | - | - | - | - | - | - | |
| United Kingdom | | | | | | | | | | | | | |
| Total | 10,335 | 11,912 | 11,448 | 13,641 | 13,391 | 14,000 | 10,939 | 13,617 | 11,207 | 8,199 | 4,944 | 3,731 | 5,722 |
| Working Group estimate[4,5] | 11,937 | 12,894 | 12,378 | 15,143 | 14,477 | 14,882 | 12,178 | 14,325 | 11,726 | 8,429 | 5,476 | 4,026 | 4,252 |

| Country | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 # | 2005 | 2006 | 2007 | 2008 [2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Faroe Islands | 4,549 | 9,152 | 16,585 | 19,135 | 16,643 | 13,620 [8] | 13,457 [8] | 20,776 [8] | 21,615 | 18,995 | 18,022 | 15,600 | 11,688 | 7,119 |
| France[1] | | | | 2 [2,7] | - [2] | 6 | 8 [7] | 2 | 4 | 1 [5] | + | 12 [7] | 4 [7] | 1 [7] |
| Germany | 5 | - | - | | 33 | 1 | 2 | 6 | 1 | 6 | | 1 | | |
| Greenland | | | | | 30 [6] | 22 [6] | 0 [6] | 4 [6] | | | | 1 | 13 [5] | |
| Iceland | | | | | | | | 4 | | | | | | |
| Norway | 28 | 45 | 45 | 71 | 411 | 355 | 257 [2] | 227 | 265 | 229 | 212 | 57 | 61 | 26 |
| Russia | | | | | | | | | | 16 | | | | 10 [7] |
| Spain | | | | | | | | | | 49 | | | | |
| UK (Engl. and Wales) | 23 | 5 | 22 | 30 [1] | 59 [7] | 19 [7] | 4 [7] | 11 [7] | 14 [7] | 8 [7] | 1 [7] | 1 [7] | | |
| UK (Scotland)[11] | - | … | … | … | | | | | 185 [7] | 186 [7] | 126 [7] | 106 [7] | 35 [7] | |
| United Kingdom | | | | | | | | | | | | | | 65 [7] |
| Total | 4,605 | 9,202 | 16,652 | 19,238 | 17,176 | 14,023 | 13,728 | 21,030 | 22,084 | 19,490 | 18,361 | 15,778 | 11,801 | 7,221 |
| Working Group estimate[4,5,8] | 4,948 | 9,642 | 17,924 | 22,210 | 18,482 | 15,821 | 15,890 | 24,933 | 27,128 | 23,287 | 20,305 | 17,082 | 12,656 | 7,582 |

1) Including catches from Sub-division Vb2. Quantity unknown 1989-1991, 1993 and 1995-2001.

2) Preliminary data

3)From 1983 to 1996 catches included in Sub-division Vb2.

4) Includes catches from Sub-division Vb2 and Division IIa in Faroese waters.

5)Includes French and Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service

6) Reported as Division Vb, to the Faroese coastal guard service.

7) Reported as Division Vb.

8) Includes Faroese landings reported to the NWWG by the Faroese Fisheries Laboratory

9) Included in Vb2

10) Includes 14 reported as Vb

**Table 5.2 Faroe Bank ( Sub-division Vb2) HADDOCK. Nominal catches (tonnes) by countries,**
1982-2008, I.e. Working Group estimates in Vb2.

| Country | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Faroe Islands | 1,533 | 967 | 925 | 1,474 | 1,050 | 832 | 1,160 | 659 | 325 | 217 | 338 | 185 | 353 |
| France1 | - | - | - | - | - | - | - | - | - | - | - | - - | |
| Norway | 1 | 2 | 5 | 3 | 10 | 5 | 43 | 16 | 97 | 4 | 23 | 8 | 1 |
| UK (Engl. and Wales) | - | - | - | - | - | - | - | - | - | - | + | + + | |
| UK (Scotland)3 | 48 | 13 | + | 25 | 26 | 45 | 15 | 30 | 725 | 287 | 869 | 102 | 170 |
| Total | 1,582 | 982 | 930 | 1,502 | 1,086 | 882 | 1,218 | 705 | 1,147 | 508 | 1,230 | 295 | 524 |

| Country | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 [2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Faroe Islands | 303 | 338 | 1,133 | 2,810 | 1,110 | 1,565 [5] | 1,948 | 3,698 | 4,804 | 3,594 | 1,899 | 1,412 | 832 | 361 |
| France1 | - | - | - | | | | | | | | + | | | |
| Norway | 1 | 40 | 4 | 60 | 3 | 48 | 66 | 28 | 54 | 17 | 45 | 1 | 8 | |
| UK (Engl. and Wales) | ... [1] | … [1] | … [1] | … [1] | [1] | [1] | [1] | [1] | [1] | [1] | [1] | [4] | [4] | |
| UK (Scotland)3 | 39 | 62 | 135 | 102 | 193 | 185 | 148 | 177 | [4] | [1] | [4] | [4] | 15 | |
| Total | 343 | 440 | 1,272 | 2,972 | 1,306 | 1,798 | 2,162 1 | 3,903 | 5,044 | 3,797 | 1,944 | 1,304 | 855 | 361 |

1) Catches included in Sub-division Vb1.

2) Provisional data

3)From 1983 to 1996 includes also catches taken in Sub-division Vb1 (see Table 2.4.1)

4) Reported as Division Vb.

5) Provided by the NWWG

**Table 5.3** Total Faroese landings of haddock from Division Vb 1985-2008 by each fleet category (%).

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Open boats | 7 | 7 | 11 | 2 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 4 | 4 | 4 | 6 | 6 | 6 |
| Longliners < 100GRT | 39 | 39 | 39 | 49 | 58 | 60 | 56 | 46 | 24 | 18 | 23 | 28 | 31 | 30 | 23 | 24 | 29 | 31 | 34 | 40 | 41 | 47 | 35 | 34 |
| Longliners > 100GRT | 13 | 12 | 13 | 19 | 18 | 18 | 18 | 22 | 25 | 25 | 38 | 36 | 38 | 40 | 40 | 36 | 38 | 34 | 42 | 42 | 43 | 36 | 39 | 41 |
| Otter board trawlers < 1000HP | 7 | 5 | 7 | 6 | 4 | 4 | 3 | 3 | 11 | 10 | 12 | 13 | 9 | 8 | 7 | 9 | 7 | 6 | 4 | 3 | 3 | 1 | 4 | 7 |
| Otterboard trawlers > 1000HP | 8 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 2 | 2 | 3 | 3 | 7 | 5 | 5 | 11 | 3 | 1 | 1 | 2 | 8 | 2 |
| Pairtrawlers < 1000HP | 19 | 20 | 17 | 11 | 7 | 5 | 7 | 11 | 13 | 10 | 8 | 7 | 6 | 5 | 6 | 7 | 6 | 4 | 4 | 2 | 2 | 2 | 3 | 3 |
| Pairtrawlers > 1000HP | 6 | 10 | 9 | 9 | 6 | 8 | 11 | 14 | 22 | 29 | 16 | 13 | 12 | 12 | 14 | 19 | 12 | 10 | 8 | 7 | 4 | 5 | 6 | 7 |
| Nets | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jigging | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 0 |
| Other gears | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 5.4**

**Catch at age 2009**

| Age | Vb1 Open Boats | Vb1 LLiners < 100GRT | Vb1 LLiners > 100GRT | Vb1 OB. trawl. < 1000HP | Vb1 OB. trawl. > 1000HP | Vb1 Pair trawl. < 1000HP | Vb1 Pair trawl. > 1000HP | Vb 1 Others | Vb1 All Faroese Fleets | Vb2 All Faroese LLiners | Vb2 All Faroese Pairtrawlers | Vb2 All Faroese Fleets | Vb Foreign Trawlers | Vb1 Foreign LLiners |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0.00 | 0 | 0 | 0 | 0 |
| **2** | 9 | 50 | 6 | 5 | 0 | 0 | 0 | 0 | 68 | 0.00 | 0 | 0 | 0 | 0 |
| **3** | 16 | 95 | 76 | 16 | 2 | 1 | 2 | 0 | 205 | 0.01 | 1 | 3 | 1 | 1 |
| **4** | 68 | 416 | 277 | 132 | 6 | 10 | 36 | 1 | 927 | 0.02 | 3 | 10 | 3 | 2 |
| **5** | 16 | 106 | 178 | 38 | 12 | 19 | 67 | 1 | 427 | 0.00 | 0 | 1 | 6 | 2 |
| **6** | 42 | 274 | 721 | 93 | 37 | 48 | 193 | 2 | 1382 | 0.17 | 32 | 105 | 17 | 7 |
| **7** | 58 | 385 | 693 | 146 | 49 | 68 | 274 | 2 | 1641 | 0.13 | 25 | 81 | 23 | 6 |
| **8** | 42 | 248 | 586 | 104 | 30 | 42 | 199 | 1 | 1226 | 0.06 | 13 | 42 | 14 | 5 |
| **9** | 14 | 76 | 142 | 35 | 7 | 6 | 33 | 0 | 308 | 0.03 | 5 | 16 | 3 | 1 |
| **10** | 0 | 0 | 24 | 0 | 1 | 1 | 8 | 0 | 33 | 0.00 | 0 | 0 | 1 | 0 |
| **11** | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 4 | 0.00 | 0 | 1 | 0 | 0 |
| **12** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.00 | 0 | 0 | 0 | 0 |
| **13** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 |
| **14** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 |
| **15** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 |
| **Total no.** | 267 | 1655 | 2703 | 569 | 145 | 195 | 817 | 8 | 6227 | 0.40 | 80 | 258 | 67 | 24 |
| **Catch, t.** | 271 | 1649 | 2884 | 588 | 142 | 185 | 823 | 8 | 6414 | 1 | 100 | 325 | 66 | 26 |

Notes: Numbers in 1000'
Catch, gutted weight in tonnes
Others includes netters, jiggers, other small categories and catches not otherwise accounted for
LLiners = Longliners OB.trawl. = Otterboard tra Pair Trawl. = Pair trawlers

| Sampling 2007 | Vb1 Open Boats | Vb1 LLiners < 100GRT | Vb1 LLiners > 100GRT | Vb1 OB. trawl. < 1000HP | Vb1 OB. trawl. > 1000HP | Vb1 Pair trawl. < 1000HP | Vb1 Pair trawl. > 1000HP | Vb 1 Others | Vb1 All Faroese Fleets | Vb2 All Faroese LLiners | Vb2 All Faroese trawlers | Vb2 All Faroese Fleets | Vb Foreign Trawlers | Vb1 Foreign LLiners |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. samples | 12 | 19 | 25 | 5 | 1 | 6 | 23 | 0 | 91 | 4 | 0 | 4 | 0 | 0 |
| No. lengths | 2051 | 3798 | 5147 | 1080 | 248 | 1192 | 4852 | 0 | 18368 | 846 | 0 | 846 | 0 | 0 |
| No. weights | 1811 | 3441 | 3950 | 1080 | 248 | 736 | 4290 | 0 | 15556 | 846 | 0 | 846 | 0 | 0 |
| No. ages | 300 | 359 | 660 | 120 | 60 | 120 | 538 | 0 | 2157 | 120 | 0 | 120 | 0 | 0 |

**Tabel 5.5 Faroe haddock. Catch number-at-age**

```
Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD_IND

   At 23/04/2009  17:34

    Table  1    Catch numbers at age                              Numbers*10**-3
    YEAR,       1957,    1958,

    AGE
      0,            0,       0,
      1,           45,     116,
      2,         4133,    6255,
      3,         7130,    8021,
      4,         8442,    5679,
      5,         1615,    3378,
      6,          894,    1299,
      7,          585,     817,
      8,          227,     294,
      9,           94,     125,
    +gp,           58,     105,
 TOTALNUM,     23223,   26089,
 TONSLAND,     20995,   23871,
 SOPCOF %,        89,      90,
```

| Table 1 Catch numbers at age | | | | | | | | | | Numbers*10**-3 |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1959, | 1960, | 1961, | 1962, | 1963, | 1964, | 1965, | 1966, | 1967, | 1968, |
| AGE | | | | | | | | | | |
| 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, |
| 1, | 525, | 854, | 941, | 784, | 356, | 46, | 39, | 90, | 70, | 49, |
| 2, | 3971, | 6061, | 7932, | 9631, | 13552, | 2284, | 1368, | 1081, | 1425, | 5881, |
| 3, | 7663, | 10659, | 7330, | 13977, | 8907, | 7457, | 4286, | 3304, | 2405, | 4097, |
| 4, | 4544, | 6655, | 5134, | 5233, | 7403, | 3899, | 5133, | 4804, | 2599, | 2812, |
| 5, | 2056, | 2482, | 1937, | 2361, | 2242, | 2360, | 1443, | 2710, | 1785, | 1524, |
| 6, | 1844, | 1559, | 1305, | 1407, | 1539, | 1120, | 1209, | 1112, | 1426, | 1526, |
| 7, | 721, | 1169, | 838, | 868, | 860, | 728, | 673, | 740, | 631, | 923, |
| 8, | 236, | 243, | 236, | 270, | 257, | 198, | 1345, | 180, | 197, | 230, |
| 9, | 98, | 85, | 59, | 72, | 75, | 49, | 43, | 54, | 52, | 68, |
| +gp, | 47, | 28, | 13, | 22, | 23, | 7, | 8, | 9, | 13, | 12, |
| TOTALNUM, | 21705, | 29795, | 25725, | 34625, | 35214, | 18148, | 15547, | 14084, | 10603, | 17122, |
| TONSLAND, | 20239, | 25727, | 20831, | 27151, | 27571, | 19490, | 18479, | 18766, | 13381, | 17852, |
| SOPCOF %, | 90, | 88, | 88, | 89, | 89, | 101, | 94, | 109, | 101, | 102, |

| Table 1 Catch numbers at age | | | | | | | | | | Numbers*10**-3 |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1969, | 1970, | 1971, | 1972, | 1973, | 1974, | 1975, | 1976, | 1977, | 1978, |
| AGE | | | | | | | | | | |
| 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, |
| 1, | 95, | 57, | 55, | 43, | 665, | 253, | 94, | 40, | 0, | 0, |
| 2, | 2384, | 1728, | 717, | 750, | 3311, | 5633, | 7337, | 4396, | 255, | 32, |
| 3, | 7539, | 4855, | 4393, | 3744, | 8416, | 2899, | 7952, | 7858, | 4039, | 1022, |
| 4, | 4567, | 6581, | 4727, | 4179, | 1240, | 3970, | 2097, | 6798, | 5168, | 4248, |
| 5, | 1565, | 1624, | 3267, | 2706, | 2795, | 451, | 1371, | 1251, | 4918, | 4054, |
| 6, | 1485, | 1383, | 1292, | 1171, | 919, | 976, | 247, | 1189, | 2128, | 1841, |
| 7, | 1224, | 1099, | 864, | 696, | 1054, | 466, | 352, | 298, | 946, | 717, |
| 8, | 378, | 326, | 222, | 180, | 150, | 535, | 237, | 720, | 443, | 635, |
| 9, | 114, | 68, | 147, | 113, | 68, | 68, | 419, | 258, | 731, | 243, |
| +gp, | 20, | 10, | 102, | 95, | 11, | 147, | 187, | 318, | 855, | 312, |
| TOTALNUM, | 19371, | 17731, | 15786, | 13677, | 18629, | 15398, | 20293, | 23126, | 19483, | 13104, |
| TONSLAND, | 23272, | 21361, | 19393, | 16485, | 18035, | 14773, | 20715, | 26211, | 25555, | 19200, |
| SOPCOF %, | 108, | 102, | 97, | 96, | 97, | 97, | 117, | 107, | 98, | 99, |

**Table 5.5 Faroe haddock. Catch number-at-age (cont.)**

| Table 1 | Catch numbers at age | | | | | | Numbers*10**-3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1979, | 1980, | 1981, | 1982, | 1983, | 1984, | 1985, | 1986, | 1987, | 1988, |
| AGE | | | | | | | | | | |
| 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, |
| 1, | 1, | 0, | 0, | 0, | 0, | 25, | 0, | 0, | 0, | 0, |
| 2, | 1, | 143, | 74, | 539, | 441, | 1195, | 985, | 230, | 283, | 655, |
| 3, | 1162, | 58, | 455, | 934, | 1969, | 1561, | 4553, | 2549, | 1718, | 444, |
| 4, | 1755, | 3724, | 202, | 784, | 383, | 2462, | 2196, | 4452, | 3565, | 2463, |
| 5, | 3343, | 2583, | 2586, | 298, | 422, | 147, | 1242, | 1522, | 2972, | 3036, |
| 6, | 1851, | 2496, | 1354, | 2182, | 93, | 234, | 169, | 738, | 1114, | 2140, |
| 7, | 772, | 1568, | 1559, | 973, | 1444, | 42, | 91, | 39, | 529, | 475, |
| 8, | 212, | 660, | 608, | 1166, | 740, | 861, | 61, | 130, | 83, | 151, |
| 9, | 155, | 99, | 177, | 1283, | 947, | 388, | 503, | 71, | 48, | 18, |
| +gp, | 74, | 86, | 36, | 214, | 795, | 968, | 973, | 712, | 334, | 128, |
| TOTALNUM, | 9326, | 11417, | 7051, | 8373, | 7234, | 7883, | 10773, | 10443, | 10646, | 9510, |
| TONSLAND, | 12424, | 15016, | 12233, | 11937, | 12894, | 12378, | 15143, | 14477, | 14882, | 12178, |
| SOPCOF %, | 104, | 100, | 109, | 92, | 106, | 106, | 106, | 101, | 102, | 97, |

| Table 1 | Catch numbers at age | | | | | | Numbers*10**-3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1989, | 1990, | 1991, | 1992, | 1993, | 1994, | 1995, | 1996, | 1997, | 1998, |
| AGE | | | | | | | | | | |
| 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, |
| 1, | 0, | 0, | 0, | 0, | 43, | 1, | 0, | 1, | 0, | 0, |
| 2, | 63, | 105, | 77, | 40, | 113, | 277, | 804, | 326, | 77, | 106, |
| 3, | 1518, | 1275, | 1044, | 154, | 298, | 191, | 452, | 5234, | 2913, | 1055, |
| 4, | 658, | 1921, | 1774, | 776, | 274, | 307, | 235, | 1019, | 10517, | 5269, |
| 5, | 2787, | 768, | 1248, | 1120, | 554, | 153, | 226, | 179, | 710, | 9856, |
| 6, | 2554, | 1737, | 651, | 959, | 538, | 423, | 132, | 163, | 116, | 446, |
| 7, | 1976, | 1909, | 1101, | 335, | 474, | 427, | 295, | 161, | 123, | 99, |
| 8, | 541, | 885, | 698, | 373, | 131, | 383, | 290, | 270, | 93, | 87, |
| 9, | 133, | 270, | 317, | 401, | 201, | 125, | 262, | 234, | 220, | 95, |
| +gp, | 81, | 108, | 32, | 162, | 185, | 301, | 295, | 394, | 516, | 502, |
| TOTALNUM, | 10311, | 8978, | 6942, | 4320, | 2811, | 2588, | 2991, | 7981, | 15285, | 17515, |
| TONSLAND, | 14325, | 11726, | 8429, | 5476, | 4026, | 4252, | 4948, | 9642, | 17924, | 22210, |
| SOPCOF %, | 100, | 102, | 106, | 106, | 103, | 100, | 103, | 100, | 103, | 101, |

| Table 1 | Catch numbers at age | | | | | | Numbers*10**-3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1999, | 2000, | 2001, | 2002, | 2003, | 2004, | 2005, | 2006, | 2007, | 2008, |
| AGE | | | | | | | | | | |
| 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, | 0, |
| 1, | 9, | 73, | 19, | 0, | 0, | 3, | 0, | 0, | 0, | 6, |
| 2, | 174, | 1461, | 4380, | 1515, | 133, | 245, | 84, | 246, | 76, | 68, |
| 3, | 1142, | 3061, | 3128, | 14039, | 3443, | 2023, | 1659, | 444, | 984, | 209, |
| 4, | 942, | 210, | 2423, | 2879, | 13579, | 4841, | 3824, | 2555, | 548, | 942, |
| 5, | 4677, | 682, | 173, | 1200, | 2229, | 10510, | 6703, | 3933, | 2737, | 435, |
| 6, | 6619, | 2685, | 451, | 133, | 951, | 1172, | 6082, | 5400, | 3316, | 1510, |
| 7, | 226, | 2846, | 1151, | 239, | 163, | 412, | 538, | 3265, | 2763, | 1751, |
| 8, | 26, | 79, | 1375, | 843, | 335, | 90, | 146, | 136, | 1119, | 1287, |
| 9, | 20, | 1, | 17, | 1095, | 860, | 167, | 28, | 63, | 89, | 328, |
| +gp, | 192, | 71, | 18, | 33, | 935, | 818, | 153, | 70, | 9, | 40, |
| TOTALNUM, | 14027, | 11169, | 13135, | 21976, | 22628, | 20281, | 19217, | 16112, | 11641, | 6576, |
| TONSLAND, | 18482, | 15821, | 15890, | 24933, | 27128, | 23287, | 20305, | 17082, | 12656, | 7582, |
| SOPCOF %, | 100, | 103, | 100, | 100, | 100, | 99, | 100, | 100, | 100, | 101, |

**Table 5.6 Faroe haddock. Catch weight-at-age.**

```
Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD_IND

    At 23/04/2009  17:34


       Table  2    Catch weights at age (kg)
       YEAR,       1957,    1958,

       AGE
         0,         .0000,   .0000,
         1,         .2500,   .2500,
         2,         .4700,   .4700,
         3,         .7300,   .7300,
         4,        1.1300,  1.1300,
         5,        1.5500,  1.5500,
         6,        1.9700,  1.9700,
         7,        2.4100,  2.4100,
         8,        2.7600,  2.7600,
         9,        3.0700,  3.0700,
       +gp,        3.5500,  3.5500,
     SOPCOFAC,      .8937,   .8983,


       Table  2    Catch weights at age (kg)
       YEAR,       1959,    1960,    1961,    1962,    1963,    1964,    1965,    1966,    1967,    1968,

       AGE
         0,         .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,         .2500,   .2500,   .2500,   .2500,   .2500,   .2500,   .2500,   .2500,   .2500,   .2500,
         2,         .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,
         3,         .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,
         4,        1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,
         5,        1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,
         6,        1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,
         7,        2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,
         8,        2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,
         9,        3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,
       +gp,        3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,
     SOPCOFAC,      .9034,   .8832,   .8832,   .8929,   .8915,  1.0111,   .9383,  1.0885,  1.0117,  1.0246,


       Table  2    Catch weights at age (kg)
       YEAR,       1969,    1970,    1971,    1972,    1973,    1974,    1975,    1976,    1977,    1978,

       AGE
         0,         .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,         .2500,   .2500,   .2500,   .2500,   .2500,   .2500,   .2500,   .2500,   .0000,   .0000,
         2,         .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .3110,   .3570,
         3,         .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .6330,   .7900,
         4,        1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.0440,  1.0350,
         5,        1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.4260,  1.3980,
         6,        1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.8250,  1.8700,
         7,        2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.2410,  2.3500,
         8,        2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.2050,  2.5970,
         9,        3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  2.5700,  3.0140,
       +gp,        3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  2.5910,  2.9200,
     SOPCOFAC,    1.0787,  1.0249,   .9688,   .9597,   .9690,   .9678,  1.1696,  1.0741,   .9784,   .9947,
```

**Table 5.6 Faroe haddock. Catch weight-at-age (cont.).**

```
      Table  2    Catch weights at age (kg)
       YEAR,       1979,    1980,    1981,    1982,    1983,    1984,    1985,    1986,    1987,    1988,

       AGE
         0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,        .3000,   .0000,   .0000,   .0000,   .0000,   .3590,   .0000,   .0000,   .0000,   .0000,
         2,        .3570,   .6430,   .4520,   .7000,   .4700,   .6810,   .5280,   .6080,   .6050,   .5010,
         3,        .6720,   .7130,   .7250,   .8960,   .7400,  1.0110,   .8590,   .8870,   .8310,   .7810,
         4,        .8940,   .9410,   .9570,  1.1500,  1.0100,  1.2550,  1.3910,  1.1750,  1.1260,   .9740,
         5,       1.1560,  1.1570,  1.2370,  1.4440,  1.3200,  1.8120,  1.7770,  1.6310,  1.4620,  1.3630,
         6,       1.5900,  1.4930,  1.6510,  1.4980,  1.6600,  2.0610,  2.3260,  1.9840,  1.9410,  1.6800,
         7,       2.0700,  1.7390,  2.0530,  1.8290,  2.0500,  2.0590,  2.4400,  2.5190,  2.1730,  1.9750,
         8,       2.5250,  2.0950,  2.4060,  1.8870,  2.2600,  2.1370,  2.4010,  2.5830,  2.3470,  2.3440,
         9,       2.6960,  2.4650,  2.7250,  1.9610,  2.5400,  2.3680,  2.5320,  2.5700,  3.1180,  2.2480,
        +gp,      3.5190,  3.3100,  3.2500,  2.8560,  3.0400,  2.6860,  2.6860,  2.9220,  2.9330,  3.2950,
      SOPCOFAC,   1.0380,  1.0017,  1.0870,   .9238,  1.0554,  1.0593,  1.0559,  1.0141,  1.0197,   .9695,



       Table  2    Catch weights at age (kg)
       YEAR,       1989,    1990,    1991,    1992,    1993,    1994,    1995,    1996,    1997,    1998,

       AGE
         0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,        .0000,   .0000,   .0000,   .0000,   .3600,   .0000,   .0000,   .3600,   .0000,   .0000,
         2,        .5800,   .4380,   .5470,   .5250,   .7550,   .7540,   .6660,   .5340,   .5190,   .6220,
         3,        .7790,   .6990,   .6930,   .7240,   .9820,  1.1030,  1.0540,   .8580,   .7710,   .8460,
         4,        .9230,   .9390,   .8840,   .8170,  1.0270,  1.2540,  1.4890,  1.4590,  1.0660,  1.0160,
         5,       1.2070,  1.2040,  1.0860,  1.0380,  1.1920,  1.4650,  1.7790,  1.9930,  1.7990,  1.2830,
         6,       1.5640,  1.3840,  1.2760,  1.2490,  1.3780,  1.5930,  1.9400,  2.3300,  2.2700,  2.0800,
         7,       1.7460,  1.5640,  1.4770,  1.4300,  1.6430,  1.8040,  2.1820,  2.3510,  2.3400,  2.5560,
         8,       2.0860,  1.8180,  1.5740,  1.5640,  1.7960,  2.0490,  2.3570,  2.4690,  2.4750,  2.5720,
         9,       2.4240,  2.1680,  1.9300,  1.6330,  1.9710,  2.2250,  2.4900,  2.7770,  2.5010,  2.4520,
        +gp,      2.5140,  2.3350,  2.1530,  2.1260,  2.2400,  2.4230,  2.6780,  2.5820,  2.6760,  2.7530,
0     SOPCOFAC,   1.0025,  1.0195,  1.0635,  1.0554,  1.0320,   .9969,  1.0331,  1.0043,  1.0250,  1.0106,



       Table  2    Catch weights at age (kg)
       YEAR,       1999,    2000,    2001,    2002,    2003,    2004,    2005,    2006,    2007,    2008,

       AGE
         0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,        .2780,   .2800,   .2800,   .0000,   .0000,   .3670,   .0000,   .0000,   .0000,   .4910,
         2,        .5040,   .6610,   .6080,   .5840,   .5710,   .5740,   .5380,   .4750,   .6280,   .6360,
         3,        .6240,   .9360,   .9400,   .8570,   .7150,   .7700,   .6490,   .6010,   .6690,   .7540,
         4,        .9740,  1.1660,  1.3740,  1.4050,  1.0080,   .8870,   .7970,   .7680,   .8590,   .8600,
         5,       1.2200,  1.4830,  1.7790,  1.7990,  1.5370,  1.1590,  1.0200,   .9110,   .9690,   .9910,
         6,       1.4900,  1.6160,  1.9710,  1.9740,  1.9110,  1.6380,  1.2450,  1.1260,  1.0600,  1.0820,
         7,       2.4560,  1.8930,  2.1190,  2.3010,  2.0910,  1.8700,  1.8430,  1.3740,  1.2450,  1.1510,
         8,       2.6580,  2.8210,  2.3730,  2.3700,  2.3010,  2.4380,  2.0610,  2.1580,  1.4750,  1.3790,
         9,       2.5980,  3.7490,  2.7500,  2.6260,  2.4060,  2.3570,  2.2630,  2.2110,  2.2660,  1.7270,
        +gp,      2.9530,  3.1960,  3.9660,  3.1300,  2.5350,  2.4170,  2.5790,  2.5690,  2.2560,  2.4350,
0     SOPCOFAC,    .9973,  1.0349,   .9960,  1.0010,  1.0040,   .9928,   .9988,   .9985,  1.0000,  1.0065,
```

**Table 5.7 Faroe haddock. Proportion mature-at-age.**

```
Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD_IND

At 23/04/2009  17:34

   Table  5    Proportion mature at age
   YEAR,       1957,    1958,

   AGE
     0,        .0000,   .0000,
     1,        .0000,   .0000,
     2,        .0600,   .0600,
     3,        .4800,   .4800,
     4,        .9100,   .9100,
     5,       1.0000,  1.0000,
     6,       1.0000,  1.0000,
     7,       1.0000,  1.0000,
     8,       1.0000,  1.0000,
     9,       1.0000,  1.0000,
   +gp,       1.0000,  1.0000,


   Table  5    Proportion mature at age
   YEAR,       1959,    1960,    1961,    1962,    1963,    1964,    1965,    1966,    1967,    1968,

   AGE
     0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     2,        .0600,   .0600,   .0600,   .0600,   .0600,   .0600,   .0600,   .0600,   .0600,   .0600,
     3,        .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,
     4,        .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,
     5,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
     6,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
     7,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
     8,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
     9,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
   +gp,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,


   Table  5    Proportion mature at age
   YEAR,       1969,    1970,    1971,    1972,    1973,    1974,    1975,    1976,    1977,    1978,

   AGE
     0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     2,        .0600,   .0600,   .0600,   .0600,   .0600,   .0600,   .0600,   .0600,   .0600,   .0600,
     3,        .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,
     4,        .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,
     5,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
     6,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
     7,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
     8,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
     9,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
   +gp,       1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,  1.0000,
```

**Table 5.7 Faroe haddock. Proportion mature-at-age (cont.).**

| Table 5 Proportion mature at age<br>YEAR, | 1979, | 1980, | 1981, | 1982, | 1983, | 1984, | 1985, | 1986, | 1987, | 1988, |
|---|---|---|---|---|---|---|---|---|---|---|
| AGE | | | | | | | | | | |
| 0, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 1, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 2, | .0600, | .0600, | .0600, | .0800, | .0800, | .0800, | .0300, | .0300, | .0500, | .0500, |
| 3, | .4800, | .4800, | .4800, | .6200, | .6200, | .7600, | .6200, | .4300, | .3200, | .2400, |
| 4, | .9100, | .9100, | .9100, | .8900, | .8900, | .9800, | .9600, | .9500, | .9100, | .8900, |
| 5, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | .9900, | .9800, | .9800, |
| 6, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| 7, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| 8, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| 9, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| +gp, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |

| Table 5 Proportion mature at age<br>YEAR, | 1989, | 1990, | 1991, | 1992, | 1993, | 1994, | 1995, | 1996, | 1997, | 1998, |
|---|---|---|---|---|---|---|---|---|---|---|
| AGE | | | | | | | | | | |
| 0, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 1, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 2, | .0200, | .0800, | .1600, | .1800, | .1100, | .0500, | .0300, | .0300, | .0100, | .0100, |
| 3, | .2200, | .3700, | .5800, | .6500, | .5000, | .4200, | .4700, | .4700, | .4700, | .3600, |
| 4, | .8700, | .9000, | .9300, | .9100, | .8500, | .8600, | .9100, | .9300, | .9100, | .8700, |
| 5, | .9900, | 1.0000, | 1.0000, | 1.0000, | .9700, | .9600, | .9600, | .9800, | 1.0000, | .9900, |
| 6, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | .9900, | .9900, | .9900, | 1.0000, | 1.0000, | 1.0000, |
| 7, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| 8, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| 9, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| +gp, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |

| Table 5 Proportion mature at age<br>YEAR, | 1999, | 2000, | 2001, | 2002, | 2003, | 2004, | 2005, | 2006, | 2007, | 2008, |
|---|---|---|---|---|---|---|---|---|---|---|
| AGE | | | | | | | | | | |
| 0, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 1, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 2, | .0100, | .0200, | .0900, | .0800, | .0700, | .0000, | .0100, | .0100, | .0200, | .0100, |
| 3, | .3500, | .3600, | .5400, | .4900, | .4500, | .3500, | .3400, | .4200, | .5200, | .6400, |
| 4, | .8600, | .8700, | .9300, | .9700, | .9700, | .9400, | .9100, | .9100, | .9100, | .9500, |
| 5, | .9900, | .9900, | 1.0000, | 1.0000, | .9900, | .9900, | .9900, | 1.0000, | 1.0000, | 1.0000, |
| 6, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| 7, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| 8, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| 9, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |
| +gp, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, | 1.0000, |

**Table 5.8 Faroe haddock. 2009 tuning file.**

```
FAROE Haddock (ICES SUBDIVISION VB)       COMB-SURVEY-SPALY-09-jr.txt
102
SUMMER SURVEY
1996 2008
1 1 0.6 0.7
1 8
200   42362.00 38050.46 60866.49   1138.05   210.25   286.72  238.48  416.44
200    6851.83 12379.93 24184.20  47016.45   852.22   177.11   81.49  163.30
200   18825.00  2793.18  2545.32  14600.59 18399.09   285.78   89.61   73.64
200   24115.03  9521.26  5553.74   1548.70  8698.75  9829.62  204.06    7.89
200  161583.90 18837.41  7340.20    371.40  1301.41  4638.88 5699.14   85.81
200   98708.03 96675.44 11962.07   4424.74   174.57   629.27 2615.71 3209.95
200   89340.23 52092.34 57922.78   5538.84  1909.63   162.47  395.07 1256.27
200   47450.28 36196.89 22847.00  35941.83  3962.64   621.93  101.63  428.87
200    9049.95 33653.00 15117.67  16561.09 16561.09   885.34  185.66   24.20
200   14574.15  7694.99 12936.61  16513.01 11635.42 11963.56  517.84   36.46
200    3484.57  9591.77  2004.49   8969.12  8908.60  6973.94 3364.52  125.74
200    3295.49  3250.16  1707.14   6581.63  5809.35  3985.64 1821.87   56.85
200    3241.71  3492.73   568.99   3408.02  3734.64  3331.06 1623.97   53.26
SPRING SURVEY SHIFTED
1993 2008
1 1 0.95 1.0
0 6
100  16009.60   1958.70    216.70    338.10    172.80   305.30    399.60
100  35395.20  19462.60    702.20    216.60    150.70    48.80    141.10
100   6611.80  33206.50  19338.50    663.10     98.20    73.90     56.00
100    371.70   8095.00  15618.00  25478.90    628.10   146.10     37.00
100   3481.60   1545.80   3353.40  10120.10  12687.60   336.20      9.90
100   4459.50   6739.70    112.20   1517.30   4412.30  3139.20     48.70
100  25964.40   8354.40   4858.70    198.10    443.90  1669.60   1940.70
100  25283.30  36311.20   3384.70   1056.60     26.70   106.60    427.70
100  21111.90  17809.30  25760.60   1934.70    684.90    40.60    101.70
100   9391.10  22335.10  13272.70  12734.40    776.10   230.10     19.30
100   1823.10  16068.30  10327.10   7487.70  11212.50   487.50     79.10
100   5798.80   6022.70   7742.00   6165.00   4565.90  4912.80    238.60
100    705.50   6284.80   1574.60   4457.00   3250.40  3267.50   1577.20
100   1173.20   1891.90   4313.40   1010.00   3511.30  3712.50   2874.90
100    637.40   1688.00   1924.00    591.00   1745.90  1626.20   1027.20
100   3251.80   2316.40   1352.70    321.90   1057.40  1099.60    917.20
```

**Table 5.9 Faroe haddock 2009 xsa.**

```
Lowestoft VPA Version 3.1

  23/04/2009  17:32

Extended Survivors Analysis

FAROE HADDOCK (ICES DIVISION Vb)                 HAD_IND

CPUE data from file D:\vpa\vpa2009\vpa\input-files\comb-survey-spaly-09-jr.txt

Catch data for  52 years. 1957 to 2008. Ages  0 to  10.

     Fleet,            First, Last, First, Last, Alpha,  Beta
                    ,    year, year,  age ,  age
SUMMER SURVEY       ,   1996, 2008,   1,     8,   .600,   .700
SPRING SURVEY SHIFTE,   1993, 2008,   0,     6,   .950,  1.000

Time series weights :

     Tapered time weighting not applied


Catchability analysis :

     Catchability independent of stock size for all ages

     Catchability independent of age for ages >=    6


Terminal population estimation :

     Survivor estimates shrunk towards the mean F
     of the final   5 years or the   5 oldest ages.

     S.E. of the mean to which the estimates  are shrunk =    .500

     Minimum standard error for population
     estimates derived from each fleet =    .300

     Prior weighting not applied

Tuning converged after   42 iterations


Regression weights
      , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000



Fishing mortalities
   Age,  1999,  2000,  2001,  2002,  2003,  2004,  2005,  2006,  2007,  2008

     0,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000
     1,  .000,  .001,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .001
     2,  .012,  .079,  .048,  .028,  .004,  .009,  .010,  .027,  .026,  .019
     3,  .553,  .313,  .240,  .215,  .084,  .072,  .080,  .066,  .143,  .093
     4,  .230,  .181,  .439,  .364,  .333,  .162,  .188,  .171,  .108,  .198
     5,  .339,  .260,  .223,  .406,  .537,  .467,  .353,  .300,  .281,  .117
     6,  .381,  .332,  .274,  .268,  .663,  .610,  .547,  .539,  .447,  .246
     7,  .758,  .279,  .231,  .228,  .615,  .688,  .638,  .648,  .592,  .452
     8, 1.944,  .661,  .211,  .265,  .578,  .850,  .560,  .322,  .481,  .615
     9,  .747,  .330,  .283,  .259,  .474,  .647,  .711,  .504,  .362,  .250
```

**Table 5.9 Faroe haddock 2009 xsa (cont.)**

XSA population numbers (Thousands)

| YEAR | AGE 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1999 | 1.54E+05 | 2.61E+04 | 1.56E+04 | 2.97E+03 | 5.06E+03 | 1.80E+04 | 2.31E+04 | 4.70E+02 | 3.35E+01 | 4.20E+01, |
| 2000 | 8.90E+04 | 1.26E+05 | 2.14E+04 | 1.26E+04 | 1.40E+03 | 3.29E+03 | 1.05E+04 | 1.29E+04 | 1.80E+02 | 3.93E+00, |
| 2001 | 5.92E+04 | 7.29E+04 | 1.03E+05 | 1.62E+04 | 7.53E+03 | 9.56E+02 | 2.08E+03 | 6.16E+03 | 7.99E+03 | 7.63E+01, |
| 2002 | 4.36E+04 | 4.85E+04 | 5.97E+04 | 8.03E+04 | 1.04E+04 | 3.97E+03 | 6.26E+02 | 1.29E+03 | 4.01E+03 | 5.30E+03, |
| 2003 | 1.42E+04 | 3.57E+04 | 3.97E+04 | 4.75E+04 | 5.30E+04 | 5.93E+03 | 2.17E+03 | 3.92E+02 | 8.44E+02 | 2.52E+03, |
| 2004 | 1.53E+04 | 1.16E+04 | 2.93E+04 | 3.24E+04 | 3.58E+04 | 3.11E+04 | 2.84E+03 | 9.15E+02 | 1.74E+02 | 3.88E+02, |
| 2005 | 4.89E+03 | 1.25E+04 | 9.53E+03 | 2.37E+04 | 2.47E+04 | 2.49E+04 | 1.60E+04 | 1.26E+03 | 3.76E+02 | 6.08E+01, |
| 2006 | 5.95E+03 | 4.00E+03 | 1.02E+04 | 7.73E+03 | 1.79E+04 | 1.68E+04 | 1.43E+04 | 7.56E+03 | 5.45E+02 | 1.76E+02, |
| 2007 | 1.33E+04 | 4.87E+03 | 3.27E+03 | 8.16E+03 | 5.93E+03 | 1.24E+04 | 1.02E+04 | 6.84E+03 | 3.24E+03 | 3.24E+02, |
| 2008 | 1.76E+04 | 1.09E+04 | 3.99E+03 | 2.61E+03 | 5.79E+03 | 4.36E+03 | 7.65E+03 | 5.32E+03 | 3.10E+03 | 1.64E+03, |

Estimated population abundance at 1st Jan 2009

, 0.00E+00, 1.44E+04, 8.91E+03, 3.21E+03, 1.95E+03, 3.89E+03, 3.17E+03, 4.89E+03, 2.77E+03, 1.37E+03,

Taper weighted geometric mean of the VPA populations:

, 2.74E+04, 2.30E+04, 1.93E+04, 1.54E+04, 1.06E+04, 6.34E+03, 3.73E+03, 1.99E+03, 9.34E+02, 4.22E+02,

Standard error of the weighted Log(VPA populations) :

, 1.0269, 1.0302, 1.0268, .9801, .9524, .9448, .9432, .9713, 1.1248, 1.3968,

Log catchability residuals.

Fleet : SUMMER SURVEY

| Age | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| 0 | No data for this fleet at this age | | | | | |
| 1 | 99.99 | 99.99 | 99.99 | 1.24 | .31 | -.11 |
| 2 | 99.99 | 99.99 | 99.99 | -.09 | .41 | -.18 |
| 3 | 99.99 | 99.99 | 99.99 | .37 | .20 | -.38 |
| 4 | 99.99 | 99.99 | 99.99 | -.45 | .40 | .00 |
| 5 | 99.99 | 99.99 | 99.99 | -.19 | -.04 | .01 |
| 6 | 99.99 | 99.99 | 99.99 | .20 | .41 | -.29 |
| 7 | 99.99 | 99.99 | 99.99 | -.04 | -.36 | .96 |
| 8 | 99.99 | 99.99 | 99.99 | -.12 | .14 | .62 |

| Age | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | No data for this fleet at this age | | | | | | | | | |
| 1 | -.18 | .15 | .21 | .51 | .19 | -.35 | .06 | -.24 | -.49 | -1.31 |
| 2 | -.39 | .01 | .06 | -.03 | .00 | .23 | -.12 | .04 | .10 | -.03 |
| 3 | 1.55 | .23 | .42 | .38 | -.11 | -.15 | .01 | -.74 | -.90 | -.90 |
| 4 | -.55 | -.72 | .24 | .09 | .31 | -.18 | .21 | -.09 | .66 | .09 |
| 5 | .04 | -.21 | -1.00 | .08 | .50 | .22 | .02 | .11 | -.02 | .47 |
| 6 | .02 | .03 | -.39 | -.55 | -.19 | -.14 | .70 | .26 | -.02 | -.04 |
| 7 | .29 | -.01 | -.08 | -.41 | -.32 | -.52 | .15 | .24 | -.31 | -.26 |
| 8 | .44 | .31 | -.15 | -.36 | .33 | -.79 | -1.34 | -.63 | -3.10 | -3.03 |

Mean log catchability and standard error of ages with catchability
independent of year class strength and constant w.r.t. time

| Age | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Mean Log q | -5.0709 | -5.2570 | -5.7371 | -5.6551 | -5.7192 | -5.7969 | -5.7969 | -5.7969 |
| S.E(Log q) | .5902 | .1935 | .6649 | .3951 | .3691 | .3349 | .4001 | 1.3730 |

**Table 5.9 Faroe haddock 2009 xsa (cont.)**

Regression statistics :

Ages with q independent of year class strength and constant w.r.t. time.

| Age | Slope | t-value | Intercept | RSquare | No Pts | Reg s.e | Mean Q |
|---|---|---|---|---|---|---|---|
| 1 | .88 | .856 | 5.63 | .82 | 13 | .53 | -5.07 |
| 2 | .99 | .127 | 5.29 | .97 | 13 | .20 | -5.26 |
| 3 | .91 | .576 | 6.10 | .78 | 13 | .62 | -5.74 |
| 4 | .84 | 2.146 | 6.25 | .94 | 13 | .29 | -5.66 |
| 5 | .88 | 1.802 | 6.08 | .96 | 13 | .30 | -5.72 |
| 6 | .94 | 1.023 | 5.95 | .96 | 13 | .31 | -5.80 |
| 7 | 1.07 | -.872 | 5.74 | .93 | 13 | .43 | -5.85 |
| 8 | 1.63 | -1.912 | 6.34 | .45 | 13 | 1.81 | -6.39 |

Fleet : SPRING SURVEY SHIFTE

| Age | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| 0 | -.51 | 1.03 | .98 | -1.02 | -.21 | -.28 |
| 1 | -.37 | -.79 | .49 | .70 | -.07 | -.02 |
| 2 | -.56 | -.67 | -.10 | .43 | .51 | -1.98 |
| 3 | .08 | .07 | -.15 | .72 | .55 | .36 |
| 4 | -.30 | -.18 | -.12 | .45 | .53 | .25 |
| 5 | -.30 | -1.08 | -.24 | 1.04 | .64 | -.20 |
| 6 | .40 | -.35 | -.25 | -.04 | -.62 | -.17 |
| 7 | No data for this fleet at this age | | | | | |
| 8 | No data for this fleet at this age | | | | | |

| Age | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | -.09 | .43 | .66 | .16 | -.36 | .72 | -.24 | .07 | -1.35 | .00 |
| 1 | -.13 | -.23 | -.40 | .24 | .21 | .35 | .32 | .26 | -.05 | -.53 |
| 2 | .34 | -.27 | .16 | .02 | .15 | .18 | -.29 | .66 | .99 | .43 |
| 3 | -.40 | -.41 | -.12 | .13 | .00 | .18 | .17 | -.21 | -.72 | -.24 |
| 4 | -.35 | -1.92 | -.11 | -.38 | .63 | -.04 | .02 | .40 | .75 | .36 |
| 5 | -.04 | -1.17 | -.94 | -.45 | .03 | .61 | .32 | .79 | .25 | .74 |
| 6 | .21 | -.56 | -.44 | -.91 | -.35 | .43 | .53 | 1.23 | .46 | .43 |
| 7 | No data for this fleet at this age | | | | | | | | | |
| 8 | No data for this fleet at this age | | | | | | | | | |

Mean log catchability and standard error of ages with catchability independent of year class strength and constant w.r.t. time

| Age | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Mean Log q | -6.1014 | -5.4232 | -5.9068 | -6.1754 | -6.2728 | -6.4141 | -6.7224 |
| S.E(Log q) | .6643 | .4010 | .6881 | .3670 | .6269 | .6828 | .5564 |

**Table 5.9 Faroe haddock 2009 xsa (cont.)**

```
Regression statistics :


 Ages with q independent of year class strength and constant w.r.t. time.

 Age, Slope , t-value , Intercept, RSquare, No Pts, Reg s.e,  Mean Q

  0,     .86,    1.083,      6.68,     .80,     16,     .57,   -6.10,
  1,    1.11,   -1.060,      4.95,     .88,     16,     .44,   -5.42,
  2,     .89,     .847,      6.31,     .81,     16,     .62,   -5.91,
  3,     .88,    2.064,      6.56,     .95,     16,     .29,   -6.18,
  4,     .80,    2.292,      6.80,     .91,     16,     .44,   -6.27,
  5,     .88,    1.012,      6.66,     .84,     16,     .60,   -6.41,
  6,     .79,    3.203,      7.00,     .94,     16,     .34,   -6.72,

 Terminal year survivor and F summaries :

 Age  0   Catchability constant w.r.t. time and dependent on age

 Year class = 2008

 Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
      ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,        1.,   .000,       .000,    .00,   0,  .000,     .000
 SPRING SURVEY SHIFTE,    14446.,   .685,       .000,    .00,   1, 1.000,     .000

   F shrinkage mean  ,         0.,    .50,,,,                         .000,     .000

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
     14446.,       .68,      .00,    1,    .000,   .000


 Age  1   Catchability constant w.r.t. time and dependent on age

 Year class = 2007

 Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
      ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,     2407.,   .613,       .000,    .00,   1,  .182,     .002
 SPRING SURVEY SHIFTE,     4204.,   .354,       .360,   1.02,   2,  .545,     .001

   F shrinkage mean  ,    95179.,    .50,,,,                         .273,     .000

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
      8906.,       .26,     1.00,    4,   3.837,   .001
```

**Table 5.9 Faroe haddock 2009 xsa (cont.)**

```
Age  2   Catchability constant w.r.t. time and dependent on age

Year class = 2006

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      2842.,   .269,       .180,    .67,   2,  .495,     .021
SPRING SURVEY SHIFTE,      3448.,   .317,       .131,    .41,   3,  .358,     .018

  F shrinkage mean  ,      4026.,    .50,,,,                        .147,     .015

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     3205.,       .19,      .10,    6,    .509,   .019



Age  3   Catchability constant w.r.t. time and dependent on age

Year class = 2005

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      1778.,   .251,       .241,    .96,   3,  .424,     .101
SPRING SURVEY SHIFTE,      2102.,   .243,       .233,    .96,   4,  .456,     .086

  F shrinkage mean  ,      2030.,    .50,,,,                        .120,     .089

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     1950.,       .16,      .14,    8,    .826,   .093



Age  4   Catchability constant w.r.t. time and dependent on age

Year class = 2004

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      3765.,   .215,       .162,    .76,   4,  .471,     .204
SPRING SURVEY SHIFTE,      4005.,   .228,       .289,   1.27,   5,  .410,     .193

  F shrinkage mean  ,      3999.,    .50,,,,                        .119,     .193

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     3889.,       .15,      .14,   10,    .930,   .198
```

**Table 5.9 Faroe haddock 2009 xsa (cont.)**

```
Age  5   Catchability constant w.r.t. time and dependent on age

Year class = 2003

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      3653.,   .187,       .216,   1.15,   5,  .526,     .102
SPRING SURVEY SHIFTE,      3633.,   .217,       .187,    .86,   6,  .380,     .103

  F shrinkage mean  ,       824.,    .50,,,,                        .093,     .390

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     3173.,       .14,      .18,   12,   1.342,   .117



Age  6   Catchability constant w.r.t. time and dependent on age

Year class = 2002

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      5083.,   .169,       .057,    .34,   6,  .556,     .238
SPRING SURVEY SHIFTE,      6335.,   .207,       .043,    .21,   7,  .336,     .195

  F shrinkage mean  ,      1795.,    .50,,,,                        .108,     .566

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     4894.,       .13,      .11,   14,    .859,   .246



Age  7   Catchability constant w.r.t. time and age (fixed at the value for age)  6

Year class = 2001

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      2722.,   .165,       .078,    .47,   7,  .579,     .459
SPRING SURVEY SHIFTE,      3825.,   .207,       .092,    .44,   7,  .259,     .347

  F shrinkage mean  ,      1760.,    .50,,,,                        .162,     .642

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     2769.,       .14,      .09,   15,    .627,   .452
```

**Table 5.9 Faroe haddock 2009 xsa (cont.)**

```
Age  8   Catchability constant w.r.t. time and age (fixed at the value for age)  6

Year class = 2000

Fleet,                 Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                 Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      1160.,   .173,       .240,   1.39,   8,  .491,     .695
SPRING SURVEY SHIFTE,      1720.,   .208,       .228,   1.09,   7,  .202,     .517

  F shrinkage mean  ,      1541.,    .50,,,,                        .307,     .563

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     1371.,       .18,      .14,   16,    .772,   .615



Age  9   Catchability constant w.r.t. time and age (fixed at the value for age)  6

Year class = 1999

Fleet,                 Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                 Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      1241.,   .187,       .296,   1.58,   8,  .455,     .214
SPRING SURVEY SHIFTE,      1361.,   .223,       .130,    .58,   7,  .159,     .197

  F shrinkage mean  ,       765.,    .50,,,,                        .386,     .328

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     1045.,       .21,      .16,   16,    .760,   .250
```

**Table 5.10 Faroe haddock. Fishing mortality (F) at age.**

```
     Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD_IND

   At 23/04/2009  17:34

                 Terminal Fs derived using XSA (With F shrinkage)

      Table  8    Fishing mortality (F) at age
      YEAR,       1957,    1958,

      AGE
        0,        .0000,   .0000,
        1,        .0010,   .0024,
        2,        .1394,   .1939,
        3,        .3707,   .4378,
        4,        .6163,   .5737,
        5,        .3909,   .5386,
        6,        .4380,   .6346,
        7,        .6340,   .9504,
        8,        .5599,   .7839,
        9,        .5321,   .7028,
      +gp,        .5321,   .7028,
   FBAR  3- 7,    .4900,   .6270,
```

| Table 8 Fishing mortality (F) at age<br>YEAR, | 1959, | 1960, | 1961, | 1962, | 1963, | 1964, | 1965, | 1966, | 1967, | 1968, |
|---|---|---|---|---|---|---|---|---|---|---|
| AGE | | | | | | | | | | |
| 0, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 1, | .0132, | .0150, | .0219, | .0149, | .0106, | .0018, | .0017, | .0032, | .0012, | .0014, |
| 2, | .1066, | .2074, | .1875, | .3232, | .3801, | .0876, | .0691, | .0610, | .0641, | .1261, |
| 3, | .3860, | .4599, | .4162, | .5866, | .5639, | .3723, | .2354, | .2370, | .1873, | .2647, |
| 4, | .4782, | .6926, | .4209, | .5980, | .7261, | .5193, | .4767, | .4515, | .2971, | .3483, |
| 5, | .4195, | .5260, | .4387, | .3480, | .5591, | .5369, | .3678, | .5006, | .2997, | .2847, |
| 6, | .6458, | .6591, | .5879, | .6706, | .4026, | .6107, | .5882, | .5421, | .5406, | .4540, |
| 7, | .9184, | 1.2130, | .9483, | 1.0499, | 1.2493, | .3375, | .9618, | .9128, | .6906, | .8367, |
| 8, | .8206, | .9667, | .8742, | .9736, | 1.1139, | 1.2027, | 2.3618, | .7509, | .6634, | .5851, |
| 9, | .6625, | .8198, | .6600, | .7351, | .8185, | .6472, | .9619, | .6373, | .5022, | .5057, |
| +gp, | .6625, | .8198, | .6600, | .7351, | .8185, | .6472, | .9619, | .6373, | .5022, | .5057, |
| FBAR 3- 7, | .5696, | .7101, | .5624, | .6506, | .7002, | .4753, | .5260, | .5288, | .4031, | .4377, |

| Table 8 Fishing mortality (F) at age<br>YEAR, | 1969, | 1970, | 1971, | 1972, | 1973, | 1974, | 1975, | 1976, | 1977, | 1978, |
|---|---|---|---|---|---|---|---|---|---|---|
| AGE | | | | | | | | | | |
| 0, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 1, | .0024, | .0033, | .0015, | .0016, | .0114, | .0033, | .0015, | .0014, | .0000, | .0000, |
| 2, | .0860, | .0551, | .0526, | .0253, | .1677, | .1266, | .1230, | .0908, | .0108, | .0010, |
| 3, | .2363, | .2528, | .1936, | .4225, | .4320, | .2172, | .2650, | .1878, | .1128, | .0547, |
| 4, | .5320, | .3344, | .4186, | .2853, | .2392, | .3730, | .2412, | .3810, | .1815, | .1665, |
| 5, | .3330, | .3639, | .2754, | .4517, | .3143, | .1279, | .2116, | .2216, | .5273, | .2115, |
| 6, | .4975, | .5561, | .5560, | .1495, | .2703, | .1714, | .0957, | .2871, | .7246, | .3819, |
| 7, | .8277, | .8740, | .8385, | .6720, | .1951, | .2134, | .0859, | .1601, | .3904, | .5759, |
| 8, | 1.0631, | .5430, | .4224, | .4066, | .2907, | .1433, | .1599, | .2538, | .3788, | .4968, |
| 9, | .6566, | .5386, | .5061, | .3957, | .2633, | .2067, | .1595, | .2621, | .4437, | .3689, |
| +gp, | .6566, | .5386, | .5061, | .3957, | .2633, | .2067, | .1595, | .2621, | .4437, | .3689, |
| FBAR 3- 7, | .4853, | .4762, | .4564, | .3962, | .2902, | .2206, | .1799, | .2475, | .3873, | .2781, |

**Table 5.10 Faroe haddock. Fishing mortality (F) at age (cont.).**

| Table 8 Fishing mortality (F) at age<br>YEAR, | 1979, | 1980, | 1981, | 1982, | 1983, | 1984, | 1985, | 1986, | 1987, | 1988, |
|---|---|---|---|---|---|---|---|---|---|---|
| AGE | | | | | | | | | | |
| 0, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 1, | .0002, | .0000, | .0000, | .0000, | .0000, | .0006, | .0000, | .0000, | .0000, | .0000, |
| 2, | .0004, | .0325, | .0237, | .0383, | .0251, | .0329, | .0279, | .0096, | .0336, | .0393, |
| 3, | .0458, | .0285, | .1373, | .4616, | .1916, | .1166, | .1692, | .0938, | .0924, | .0678, |
| 4, | .1255, | .2024, | .1313, | .3707, | .3479, | .3893, | .2389, | .2487, | .1840, | .1857, |
| 5, | .1913, | .2749, | .2111, | .2916, | .3496, | .2169, | .3471, | .2593, | .2617, | .2359, |
| 6, | .1408, | .2135, | .2264, | .2774, | .1381, | .3333, | .4158, | .3583, | .3074, | .3053, |
| 7, | .2721, | .1701, | .2004, | .2523, | .2989, | .0852, | .2081, | .1570, | .4737, | .2076, |
| 8, | .3302, | .3953, | .0919, | .2265, | .3100, | .2927, | .1718, | .5171, | .5835, | .2373, |
| 9, | .2130, | .2525, | .1729, | .2853, | .2905, | .2649, | .2779, | .3099, | .3644, | .2355, |
| +gp, | .2130, | .2525, | .1729, | .2853, | .2905, | .2649, | .2779, | .3099, | .3644, | .2355, |
| FBAR 3- 7, | .1551, | .1779, | .1813, | .3307, | .2652, | .2283, | .2758, | .2235, | .2638, | .2005, |

| Table 8 Fishing mortality (F) at age<br>YEAR, | 1989, | 1990, | 1991, | 1992, | 1993, | 1994, | 1995, | 1996, | 1997, | 1998, |
|---|---|---|---|---|---|---|---|---|---|---|
| AGE | | | | | | | | | | |
| 0, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 1, | .0000, | .0000, | .0000, | .0000, | .0061, | .0000, | .0000, | .0001, | .0000, | .0000, |
| 2, | .0049, | .0124, | .0290, | .0167, | .0709, | .0490, | .0092, | .0079, | .0094, | .0318, |
| 3, | .1203, | .1291, | .1639, | .0745, | .1664, | .1645, | .1055, | .0768, | .0906, | .1727, |
| 4, | .1357, | .2201, | .2668, | .1763, | .1841, | .2586, | .3129, | .3657, | .2179, | .2351, |
| 5, | .3314, | .2322, | .2173, | .2689, | .1841, | .1484, | .3084, | .4183, | .4713, | .3267, |
| 6, | .3194, | .3554, | .3155, | .2585, | .1997, | .2089, | .1846, | .3830, | .5295, | .6197, |
| 7, | .5152, | .4208, | .4011, | .2654, | .1962, | .2412, | .2205, | .3595, | .5623, | 1.3006, |
| 8, | .3870, | .4599, | .2661, | .2284, | .1569, | .2407, | .2565, | .3226, | .3641, | 1.0557, |
| 9, | .3398, | .3398, | .2950, | .2407, | .1850, | .2206, | .2579, | .3399, | .4762, | .7942, |
| +gp, | .3398, | .3398, | .2950, | .2407, | .1850, | .2206, | .2579, | .3399, | .4762, | .7942, |
| FBAR 3- 7, | .2844, | .2715, | .2729, | .2088, | .1861, | .2043, | .2264, | .3207, | .3743, | .5310, |

| Table 8 Fishing mortality (F) at age<br>YEAR, | 1999, | 2000, | 2001, | 2002, | 2003, | 2004, | 2005, | 2006, | 2007, | 2008, |
|---|---|---|---|---|---|---|---|---|---|---|
| AGE | | | | | | | | | | |
| 0, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, | .0000, |
| 1, | .0004, | .0006, | .0003, | .0000, | .0000, | .0003, | .0000, | .0000, | .0000, | .0006, |
| 2, | .0124, | .0785, | .0482, | .0285, | .0037, | .0093, | .0098, | .0269, | .0260, | .0190, |
| 3, | .5528, | .3131, | .2403, | .2148, | .0835, | .0715, | .0804, | .0656, | .1430, | .0926, |
| 4, | .2302, | .1813, | .4393, | .3643, | .3329, | .1621, | .1877, | .1714, | .1078, | .1982, |
| 5, | .3387, | .2599, | .2231, | .4059, | .5373, | .4674, | .3532, | .3003, | .2806, | .1169, |
| 6, | .3812, | .3323, | .2740, | .2675, | .6629, | .6104, | .5467, | .5393, | .4474, | .2462, |
| 7, | .7576, | .2793, | .2311, | .2282, | .6146, | .6885, | .6379, | .6483, | .5919, | .4525, |
| 8, | 1.9442, | .6613, | .2109, | .2648, | .5779, | .8498, | .5600, | .3223, | .4810, | .6149, |
| 9, | .7469, | .3303, | .2829, | .2593, | .4743, | .6468, | .7111, | .5036, | .3624, | .2500, |
| +gp, | .7469, | .3303, | .2829, | .2593, | .4743, | .6468, | .7111, | .5036, | .3624, | .2500, |
| FBAR 3- 7, | .4521, | .2732, | .2816, | .2962, | .4462, | .4000, | .3612, | .3450, | .3141, | .2213, |

**Table 5.11 Faroe haddock. Stock number (N) at age.**

Run title : FAROE HADDOCK (ICES DIVISION Vb) HAD_IND

At 23/04/2009 17:34

Terminal Fs derived using XSA (With F shrinkage)

| Table 10 | Stock number at age (start of year) | | Numbers*10**-3 |
|---|---|---|---|
| YEAR, | 1957, | 1958, | |
| AGE | | | |
| 0, | 64927, | 54061, | |
| 1, | 47944, | 53158, | |
| 2, | 35106, | 39212, | |
| 3, | 25440, | 25003, | |
| 4, | 20280, | 14377, | |
| 5, | 5517, | 8965, | |
| 6, | 2786, | 3055, | |
| 7, | 1377, | 1472, | |
| 8, | 585, | 598, | |
| 9, | 252, | 274, | |
| +gp, | 154, | 227, | |
| TOTAL, | 204367, | 200401, | |

| Table 10 | Stock number at age (start of year) | | | | | Numbers*10**-3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1959, | 1960, | 1961, | 1962, | 1963, | 1964, | 1965, | 1966, | 1967, | 1968, |
| AGE | | | | | | | | | | |
| 0, | 77651, | 58761, | 71715, | 45400, | 33843, | 30192, | 37948, | 81924, | 47768, | 53238, |
| 1, | 44261, | 63576, | 48109, | 58715, | 37170, | 27709, | 24719, | 31069, | 67074, | 39109, |
| 2, | 43417, | 35763, | 51279, | 38537, | 47362, | 30110, | 22644, | 20203, | 25356, | 54852, |
| 3, | 26445, | 31954, | 23796, | 34806, | 22837, | 26515, | 22585, | 17302, | 15563, | 19470, |
| 4, | 13213, | 14717, | 16517, | 12850, | 15850, | 10638, | 14961, | 14613, | 11176, | 10566, |
| 5, | 6632, | 6706, | 6028, | 8877, | 5786, | 6278, | 5182, | 7604, | 7617, | 6798, |
| 6, | 4284, | 3570, | 3245, | 3182, | 5132, | 2708, | 3005, | 2937, | 3774, | 4622, |
| 7, | 1326, | 1839, | 1512, | 1476, | 1332, | 2809, | 1204, | 1366, | 1398, | 1800, |
| 8, | 466, | 433, | 448, | 480, | 423, | 313, | 1641, | 377, | 449, | 574, |
| 9, | 224, | 168, | 135, | 153, | 148, | 114, | 77, | 127, | 146, | 189, |
| +gp, | 106, | 54, | 29, | 46, | 45, | 16, | 14, | 21, | 36, | 33, |
| TOTAL, | 218024, | 217540, | 222811, | 204522, | 169929, | 137402, | 133981, | 177543, | 180357, | 191251, |

| Table 10 | Stock number at age (start of year) | | | | | Numbers*10**-3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1969, | 1970, | 1971, | 1972, | 1973, | 1974, | 1975, | 1976, | 1977, | 1978, |
| AGE | | | | | | | | | | |
| 0, | 23136, | 49623, | 35419, | 78973, | 104864, | 83640, | 39135, | 52374, | 4155, | 7378, |
| 1, | 43588, | 18943, | 40628, | 28998, | 64657, | 85855, | 68478, | 32041, | 42880, | 3402, |
| 2, | 31976, | 35601, | 15457, | 33213, | 23703, | 52335, | 70063, | 55980, | 26197, | 35107, |
| 3, | 39588, | 24022, | 27584, | 12007, | 26514, | 16410, | 37752, | 50724, | 41855, | 21218, |
| 4, | 12234, | 25590, | 15275, | 18609, | 6442, | 14093, | 10813, | 23713, | 34419, | 30613, |
| 5, | 6106, | 5884, | 14997, | 8229, | 11454, | 4153, | 7946, | 6955, | 13264, | 23504, |
| 6, | 4187, | 3583, | 3348, | 9322, | 4289, | 6849, | 2992, | 5265, | 4562, | 6409, |
| 7, | 2403, | 2084, | 1682, | 1572, | 6573, | 2680, | 4724, | 2226, | 3235, | 1810, |
| 8, | 638, | 860, | 712, | 595, | 657, | 4428, | 1772, | 3549, | 1553, | 1793, |
| 9, | 262, | 180, | 409, | 382, | 325, | 402, | 3141, | 1237, | 2255, | 871, |
| +gp, | 45, | 26, | 281, | 319, | 52, | 865, | 1396, | 1515, | 2613, | 1109, |
| TOTAL, | 164163, | 166396, | 155791, | 192219, | 249530, | 271710, | 248212, | 235580, | 176989, | 133214, |

**Table 5.11 Faroe haddock. Stock number (N) at age (cont.).**

| Table 10 | Stock number at age (start of year) | | | | | | | | | Numbers*10**-3 |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1979, | 1980, | 1981, | 1982, | 1983, | 1984, | 1985, | 1986, | 1987, | 1988, |
| AGE | | | | | | | | | | |
| 0, | 5209, | 23632, | 29289, | 60865, | 58959, | 39576, | 14116, | 28056, | 21304, | 14083, |
| 1, | 6041, | 4265, | 19348, | 23979, | 49832, | 48272, | 32402, | 11557, | 22970, | 17442, |
| 2, | 2785, | 4945, | 3492, | 15841, | 19633, | 40799, | 39499, | 26529, | 9462, | 18807, |
| 3, | 28715, | 2280, | 3919, | 2792, | 12482, | 15675, | 32322, | 31448, | 21512, | 7491, |
| 4, | 16447, | 22458, | 1814, | 2797, | 1441, | 8438, | 11421, | 22344, | 23441, | 16058, |
| 5, | 21220, | 11877, | 15018, | 1302, | 1581, | 833, | 4681, | 7364, | 14265, | 15966, |
| 6, | 15575, | 14349, | 7387, | 9955, | 797, | 912, | 549, | 2708, | 4652, | 8990, |
| 7, | 3582, | 11077, | 9489, | 4823, | 6176, | 568, | 535, | 297, | 1550, | 2801, |
| 8, | 833, | 2234, | 7650, | 6359, | 3068, | 3750, | 427, | 356, | 208, | 790, |
| 9, | 893, | 490, | 1232, | 5713, | 4151, | 1843, | 2291, | 294, | 174, | 95, |
| +gp, | 424, | 423, | 249, | 947, | 3462, | 4569, | 4405, | 2933, | 1199, | 670, |
| TOTAL, | 101724, | 98031, | 98888, | 135375, | 161582, | 165235, | 142648, | 133884, | 120735, | 103192, |

| Table 10 | Stock number at age (start of year) | | | | | | | | | Numbers*10**-3 |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1989, | 1990, | 1991, | 1992, | 1993, | 1994, | 1995, | 1996, | 1997, | 1998, |
| AGE | | | | | | | | | | |
| 0, | 4445, | 3980, | 2722, | 9607, | 143970, | 68262, | 13523, | 5590, | 23215, | 31911, |
| 1, | 11530, | 3639, | 3258, | 2229, | 7866, | 117873, | 55888, | 11071, | 4577, | 19007, |
| 2, | 14280, | 9440, | 2979, | 2668, | 1825, | 6401, | 96505, | 45757, | 9064, | 3747, |
| 3, | 14805, | 11635, | 7634, | 2370, | 2148, | 1392, | 4990, | 78284, | 37168, | 7351, |
| 4, | 5731, | 10748, | 8372, | 5306, | 1801, | 1489, | 967, | 3677, | 59358, | 27795, |
| 5, | 10918, | 4097, | 7061, | 5249, | 3642, | 1226, | 941, | 579, | 2088, | 39082, |
| 6, | 10325, | 6418, | 2659, | 4652, | 3284, | 2480, | 866, | 566, | 312, | 1067, |
| 7, | 5424, | 6142, | 3683, | 1588, | 2941, | 2202, | 1648, | 589, | 316, | 150, |
| 8, | 1863, | 2653, | 3301, | 2019, | 997, | 1979, | 1417, | 1082, | 337, | 147, |
| 9, | 510, | 1036, | 1371, | 2071, | 1315, | 698, | 1274, | 897, | 642, | 192, |
| +gp, | 308, | 411, | 138, | 832, | 1205, | 1672, | 1426, | 1500, | 1491, | 997, |
| TOTAL, | 80140, | 60198, | 43179, | 38590, | 170993, | 205673, | 179443, | 149593, | 138567, | 131446, |

| Table 10 | Stock number at age (start of year) | | | | | | | | | Numbers*10**-3 |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR, | 1999, | 2000, | 2001, | 2002, | 2003, | 2004, | 2005, | 2006, | 2007, | 2008, | 2009, |
| AGE | | | | | | | | | | | |
| 0, | 153554, | 89036, | 59244, | 43637, | 14225, | 15276, | 4885, | 5952, | 13294, | 17645, | 0, |
| 1, | 26126, | 125719, | 72896, | 48505, | 35727, | 11647, | 12507, | 4000, | 4873, | 10884, | 14446, |
| 2, | 15562, | 21382, | 102864, | 59665, | 39712, | 29251, | 9533, | 10240, | 3275, | 3990, | 8906, |
| 3, | 2972, | 12583, | 16184, | 80255, | 47479, | 32393, | 23727, | 7729, | 8161, | 2612, | 3205, |
| 4, | 5064, | 1400, | 7533, | 10420, | 53004, | 35757, | 24691, | 17925, | 5926, | 5792, | 1950, |
| 5, | 17989, | 3294, | 956, | 3975, | 5926, | 31109, | 24895, | 16755, | 12364, | 4356, | 3889, |
| 6, | 23079, | 10496, | 2079, | 626, | 2169, | 2835, | 15960, | 14317, | 10159, | 7646, | 3173, |
| 7, | 470, | 12907, | 6164, | 1294, | 392, | 915, | 1261, | 7564, | 6836, | 5317, | 4894, |
| 8, | 34, | 180, | 7992, | 4005, | 844, | 174, | 376, | 545, | 3239, | 3097, | 2769, |
| 9, | 42, | 4, | 76, | 5299, | 2516, | 388, | 61, | 176, | 324, | 1639, | 1371, |
| +gp, | 398, | 277, | 80, | 159, | 2710, | 1875, | 328, | 194, | 32, | 199, | 1172, |
| TOTAL, | 245289, | 277278, | 276069, | 257841, | 204705, | 161620, | 118224, | 85397, | 68482, | 63176, | 45775, |

**Table 5.12. Faroe haddock. Stock summary of the 2009 VPA.**

| Run | title | FAROE | HADDOCK | (ICES | DIVISION | Vb) | HAD_IND |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| At | 23/04/2009 | 17:34 | | | | | |
| | | | | | | | |
| Table | 16 | | Summary | (without | SOP | correction) | |
| | | | | | | | |
| Terminal | Fs | derived | using | XSA | (With | F | shrinkage) |
| | | | | | | | |
| | Recruits | Recruits | Total | Total | Landings | Yield/SSB | FBAR(3-7) |
| | Age 0 | Age 2 | Biomass | SSB | | | |
| 1957 | 64927 | 35106 | 90264 | 51049 | 20995 | 0.4113 | 0.49 |
| 1958 | 54061 | 39212 | 92975 | 51409 | 23871 | 0.4643 | 0.627 |
| 1959 | 77651 | 43417 | 89969 | 48340 | 20239 | 0.4187 | 0.5696 |
| 1960 | 58761 | 35763 | 96422 | 51101 | 25727 | 0.5035 | 0.7101 |
| 1961 | 71715 | 51279 | 93296 | 47901 | 20831 | 0.4349 | 0.5624 |
| 1962 | 45400 | 38537 | 98262 | 52039 | 27151 | 0.5217 | 0.6506 |
| 1963 | 33843 | 47362 | 90204 | 49706 | 27571 | 0.5547 | 0.7002 |
| 1964 | 30192 | 30110 | 75561 | 44185 | 19490 | 0.4411 | 0.4753 |
| 1965 | 37948 | 22644 | 71884 | 45605 | 18479 | 0.4052 | 0.526 |
| 1966 | 81924 | 20203 | 68774 | 44027 | 18766 | 0.4262 | 0.5288 |
| 1967 | 47768 | 25356 | 77101 | 42086 | 13381 | 0.3179 | 0.4031 |
| 1968 | 53238 | 54852 | 87972 | 45495 | 17852 | 0.3924 | 0.4377 |
| 1969 | 23136 | 31976 | 94879 | 53583 | 23272 | 0.4343 | 0.4853 |
| 1970 | 49623 | 35601 | 92144 | 59958 | 21361 | 0.3563 | 0.4762 |
| 1971 | 35419 | 15457 | 92931 | 63921 | 19393 | 0.3034 | 0.4564 |
| 1972 | 78973 | 33213 | 91508 | 63135 | 16485 | 0.2611 | 0.3962 |
| 1973 | 104864 | 23703 | 98979 | 61623 | 18035 | 0.2927 | 0.2902 |
| 1974 | 83640 | 52335 | 116881 | 64632 | 14773 | 0.2286 | 0.2206 |
| 1975 | 39135 | 70063 | 138911 | 75408 | 20715 | 0.2747 | 0.1799 |
| 1976 | 52374 | 55980 | 143634 | 89225 | 26211 | 0.2938 | 0.2475 |
| 1977 | 4155 | 26197 | 121054 | 96385 | 25555 | 0.2651 | 0.3873 |
| 1978 | 7378 | 35107 | 120594 | 97245 | 19200 | 0.1974 | 0.2781 |
| 1979 | 5209 | 2785 | 99519 | 85415 | 12424 | 0.1455 | 0.1551 |
| 1980 | 23632 | 4945 | 87656 | 81920 | 15016 | 0.1833 | 0.1779 |
| 1981 | 29289 | 3492 | 78984 | 75867 | 12233 | 0.1612 | 0.1813 |
| 1982 | 60865 | 15841 | 68329 | 56823 | 11937 | 0.2101 | 0.3307 |
| 1983 | 58959 | 19633 | 63993 | 51833 | 12894 | 0.2488 | 0.2652 |
| 1984 | 39576 | 40799 | 100760 | 53854 | 12378 | 0.2298 | 0.2283 |
| 1985 | 14116 | 39499 | 94065 | 62649 | 15143 | 0.2417 | 0.2758 |
| 1986 | 28056 | 26529 | 98653 | 65675 | 14477 | 0.2204 | 0.2235 |
| 1987 | 21304 | 9462 | 87793 | 67407 | 14882 | 0.2208 | 0.2638 |
| 1988 | 14083 | 18807 | 77582 | 62030 | 12178 | 0.1963 | 0.2005 |
| 1989 | 4445 | 14280 | 69801 | 51869 | 14325 | 0.2762 | 0.2844 |
| 1990 | 3980 | 9440 | 53809 | 43873 | 11726 | 0.2673 | 0.2715 |
| 1991 | 2722 | 2979 | 38961 | 34852 | 8429 | 0.2419 | 0.2729 |
| 1992 | 9607 | 2668 | 29290 | 27151 | 5476 | 0.2017 | 0.2088 |
| 1993 | 143970 | 1825 | 28949 | 23384 | 4026 | 0.1722 | 0.1861 |
| 1994 | 68262 | 6401 | 27607 | 21759 | 4252 | 0.1954 | 0.2043 |
| 1995 | 13523 | 96505 | 88249 | 22904 | 4948 | 0.216 | 0.2264 |
| 1996 | 5590 | 45757 | 113847 | 50162 | 9642 | 0.1922 | 0.3207 |
| 1997 | 23215 | 9064 | 108268 | 82728 | 17924 | 0.2167 | 0.3743 |
| 1998 | 31911 | 3747 | 93130 | 82670 | 22210 | 0.2687 | 0.531 |
| 1999 | 153554 | 15562 | 80755 | 63612 | 18482 | 0.2905 | 0.4521 |
| 2000 | 89036 | 21382 | 110433 | 53581 | 15821 | 0.2953 | 0.2732 |
| 2001 | 59244 | 102864 | 146869 | 61823 | 15890 | 0.257 | 0.2816 |
| 2002 | 43637 | 59665 | 153533 | 85960 | 24933 | 0.2901 | 0.2962 |
| 2003 | 14225 | 39712 | 138990 | 97536 | 27128 | 0.2781 | 0.4462 |
| 2004 | 15276 | 29251 | 126003 | 86462 | 23287 | 0.2693 | 0.4 |
| 2005 | 4885 | 9533 | 89552 | 72287 | 20305 | 0.2809 | 0.3612 |
| 2006 | 5952 | 10240 | 67117 | 58369 | 17082 | 0.2927 | 0.345 |
| 2007 | 13294 | 3275 | 49450 | 44356 | 12656 | 0.2853 | 0.3141 |
| 2008 | 17645 | 3990 | 41127 | 32312 | 7582 | 0.2346 | 0.2213 |
| | | | | | | | |
| Arith. | | | | | | | |
| Mean | 41446 | 28719 | 89563 | 58830 | 16905 | 0.2938 | 0.3591 |
| Units | (Thousands) | (Thousands) | (Tonnes) | (Tonnes) | (Tonnes) | | |

**Table 5.13. Management options table - INPUT DATA descriptions.**

Stock size

The stock in numbers 2009 is taken directly from the 2009 XSA. The year class 2008 at age 2 (in 2010) is estimated from the 2009 XSA age 1 applying a natural mortality of 0.2 in foreward calculation of the number using the standard VPA equation. The year class 2009 at age 2 (in 2011) is estimated as the geomean of the year classes since 1980.

| Age | 2009 | 2010 | 2011 |
|---|---|---|---|
| 2 | 8906 | 11827 | 12898 |
| 3 | 3205 | | |
| 4 | 1950 | | |
| 5 | 3889 | | |
| 6 | 3173 | | |
| 7 | 4894 | | |
| 8 | 2769 | | |
| 9 | 1371 | | |
| 10+ | 1172 | | |

Numbers in thousands (rounded).

Proportion mature at age

The proportion mature at age in 2009 is estimated as the average of the observed data in 2008 and 2009. For 2010 and 2011, the average for 2007 to 2009 is used.

| Age | 2009 | 2010 | 2011 |
|---|---|---|---|
| 2 | 0.01 | 0.01 | 0.01 |
| 3 | 0.63 | 0.60 | 0.60 |
| 4 | 0.93 | 0.93 | 0.93 |
| 5 | 1.00 | 1.00 | 1.00 |
| 6 | 1.00 | 1.00 | 1.00 |
| 7 | 1.00 | 1.00 | 1.00 |
| 8 | 1.00 | 1.00 | 1.00 |
| 9 | 1.00 | 1.00 | 1.00 |
| 10+ | 1.00 | 1.00 | 1.00 |

Catch&Stock weights at age

Catch and stock weights at age 2009-2011 were estimated as the average weights at age in the catch 2007-2009 and kept constant for all years.

| Age | 2009 | 2010 | 2011 |
|---|---|---|---|
| 2 | 0.580 | 0.580 | 0.580 |
| 3 | 0.675 | 0.675 | 0.675 |
| 4 | 0.829 | 0.829 | 0.829 |
| 5 | 0.957 | 0.957 | 0.957 |
| 6 | 1.089 | 1.089 | 1.089 |
| 7 | 1.257 | 1.257 | 1.257 |
| 8 | 1.671 | 1.671 | 1.671 |
| 9 | 2.068 | 2.068 | 2.068 |
| 10+ | 2.420 | 2.420 | 2.420 |

**Exploitation pattern**

The exploitation pattern is estimated as the average fishing mortality matrix in 2006-2008 from the final VPA in 2009, re-scaled to 2008, and kept constant for all 3 years. Justification for changing procedures from last year, when the 3-years average was used un-scaled is, that there has been a declining trend in fishing mortality for many years, and there has been a retrospective pattern in recent years of overestimations of fishing mortality.

| Age | 2009 | 2010 | 2011 |
|---|---|---|---|
| 2 | 0.0181 | 0.0181 | 0.0181 |
| 3 | 0.0757 | 0.0757 | 0.0757 |
| 4 | 0.1200 | 0.1200 | 0.1200 |
| 5 | 0.1754 | 0.1754 | 0.1754 |
| 6 | 0.3099 | 0.3099 | 0.3099 |
| 7 | 0.4255 | 0.4255 | 0.4255 |
| 8 | 0.3565 | 0.3565 | 0.3565 |
| 9 | 0.2805 | 0.2805 | 0.2805 |
| 10+ | 0.2805 | 0.2805 | 0.2805 |

**Table 5.14 Faroe haddock. Management option table - Input data**

MFDP version 1
Run: jr1
Time and date: 21:37 4/24/2009
Fbar age range: 3-7

**2009**

| Age | N | M | Mat | PF | PM | SWt | Sel | CWt |
|---|---|---|---|---|---|---|---|---|
| 2 | 8906 | 0.2 | 0.01 | 0 | 0 | 0.580 | 0.0181 | 0.580 |
| 3 | 3205 | 0.2 | 0.63 | 0 | 0 | 0.675 | 0.0757 | 0.675 |
| 4 | 1950 | 0.2 | 0.93 | 0 | 0 | 0.829 | 0.1200 | 0.829 |
| 5 | 3889 | 0.2 | 1 | 0 | 0 | 0.957 | 0.1754 | 0.957 |
| 6 | 3173 | 0.2 | 1 | 0 | 0 | 1.089 | 0.3099 | 1.089 |
| 7 | 4894 | 0.2 | 1 | 0 | 0 | 1.257 | 0.4254 | 1.257 |
| 8 | 2769 | 0.2 | 1 | 0 | 0 | 1.671 | 0.3565 | 1.671 |
| 9 | 1371 | 0.2 | 1 | 0 | 0 | 2.068 | 0.2805 | 2.068 |
| 10 | 1172 | 0.2 | 1 | 0 | 0 | 2.420 | 0.2805 | 2.420 |

**2010**

| Age | N | M | Mat | PF | PM | SWt | Sel | CWt |
|---|---|---|---|---|---|---|---|---|
| 2 | 11827 | 0.2 | 0.01 | 0 | 0 | 0.580 | 0.0181 | 0.580 |
| 3 . | | 0.2 | 0.6 | 0 | 0 | 0.675 | 0.0757 | 0.675 |
| 4 . | | 0.2 | 0.93 | 0 | 0 | 0.829 | 0.1200 | 0.829 |
| 5 . | | 0.2 | 1 | 0 | 0 | 0.957 | 0.1754 | 0.957 |
| 6 . | | 0.2 | 1 | 0 | 0 | 1.089 | 0.3099 | 1.089 |
| 7 . | | 0.2 | 1 | 0 | 0 | 1.257 | 0.4254 | 1.257 |
| 8 . | | 0.2 | 1 | 0 | 0 | 1.671 | 0.3565 | 1.671 |
| 9 . | | 0.2 | 1 | 0 | 0 | 2.068 | 0.2805 | 2.068 |
| 10 . | | 0.2 | 1 | 0 | 0 | 2.420 | 0.2805 | 2.420 |

**2011**

| Age | N | M | Mat | PF | PM | SWt | Sel | CWt |
|---|---|---|---|---|---|---|---|---|
| 2 | 12898 | 0.2 | 0.01 | 0 | 0 | 0.580 | 0.0181 | 0.580 |
| 3 . | | 0.2 | 0.6 | 0 | 0 | 0.675 | 0.0757 | 0.675 |
| 4 . | | 0.2 | 0.93 | 0 | 0 | 0.829 | 0.1200 | 0.829 |
| 5 . | | 0.2 | 1 | 0 | 0 | 0.957 | 0.1754 | 0.957 |
| 6 . | | 0.2 | 1 | 0 | 0 | 1.089 | 0.3099 | 1.089 |
| 7 . | | 0.2 | 1 | 0 | 0 | 1.257 | 0.4254 | 1.257 |
| 8 . | | 0.2 | 1 | 0 | 0 | 1.671 | 0.3565 | 1.671 |
| 9 . | | 0.2 | 1 | 0 | 0 | 2.068 | 0.2805 | 2.068 |
| 10 . | | 0.2 | 1 | 0 | 0 | 2.420 | 0.2805 | 2.420 |

Input units are thousands and kg - output in tonnes

**Table 5.15 Faroe haddock. Management option table - Results**

MFDP version 1
Run: jr1
Index file 24/04/2009
Time and date: 21:37 4/24/2009
Fbar age range: 3-7

| 2009 Biomass | SSB | FMult | FBar | Landings |
|---|---|---|---|---|
| 32567 | 26543 | 1 | 0.2213 | 6249 |

| 2010 Biomass | SSB | FMult | FBar | Landings | 2011 Biomass | SSB |
|---|---|---|---|---|---|---|
| 31827 | 22966 | 0 | 0 | 0 | 38089 | 27734 |
| . | 22966 | 0.1 | 0.0221 | 575 | 37475 | 27127 |
| . | 22966 | 0.2 | 0.0443 | 1134 | 36879 | 26538 |
| . | 22966 | 0.3 | 0.0664 | 1677 | 36301 | 25967 |
| . | 22966 | 0.4 | 0.0885 | 2204 | 35740 | 25414 |
| . | 22966 | 0.5 | 0.1106 | 2717 | 35195 | 24876 |
| . | 22966 | 0.6 | 0.1328 | 3216 | 34667 | 24355 |
| . | 22966 | 0.7 | 0.1549 | 3700 | 34154 | 23849 |
| . | 22966 | 0.8 | 0.177 | 4171 | 33656 | 23358 |
| . | 22966 | 0.9 | 0.1992 | 4629 | 33172 | 22881 |
| . | 22966 | 1 | 0.2213 | 5075 | 32702 | 22419 |
| . | 22966 | 1.1 | 0.2434 | 5508 | 32246 | 21970 |
| . | 22966 | 1.2 | 0.2655 | 5929 | 31803 | 21533 |
| . | 22966 | 1.3 | 0.2877 | 6339 | 31373 | 21110 |
| . | 22966 | 1.4 | 0.3098 | 6738 | 30954 | 20699 |
| . | 22966 | 1.5 | 0.3319 | 7126 | 30548 | 20299 |
| . | 22966 | 1.6 | 0.354 | 7504 | 30153 | 19912 |
| . | 22966 | 1.7 | 0.3762 | 7871 | 29770 | 19535 |
| . | 22966 | 1.8 | 0.3983 | 8229 | 29397 | 19169 |
| . | 22966 | 1.9 | 0.4204 | 8577 | 29034 | 18813 |
| . | 22966 | 2 | 0.4426 | 8916 | 28682 | 18467 |

Input units are thousands and kg - output in tonnes

**Table 5.16 Faroe haddock. Long-term Prediction - Input data**

MFYPR version 1
Run: jr2
Index file 24/04/2009
Time and date: 21:53 4/24/2009
Fbar age range: 3-7

| Age | M | Mat | PF | PM | SWt | Sel | CWt |
|---|---|---|---|---|---|---|---|
| 2 | 0.2 | 0.05 | 0 | 0 | 0.560 | 0.0181 | 0.560 |
| 3 | 0.2 | 0.47 | 0 | 0 | 0.799 | 0.0757 | 0.799 |
| 4 | 0.2 | 0.91 | 0 | 0 | 1.060 | 0.1200 | 1.060 |
| 5 | 0.2 | 0.99 | 0 | 0 | 1.378 | 0.1754 | 1.378 |
| 6 | 0.2 | 1.00 | 0 | 0 | 1.680 | 0.3099 | 1.680 |
| 7 | 0.2 | 1.00 | 0 | 0 | 1.967 | 0.4254 | 1.967 |
| 8 | 0.2 | 1.00 | 0 | 0 | 2.206 | 0.3565 | 2.206 |
| 9 | 0.2 | 1.00 | 0 | 0 | 2.448 | 0.2805 | 2.448 |
| 10 | 0.2 | 1.00 | 0 | 0 | 2.766 | 0.2805 | 2.766 |

Weights in kilograms

**Table 5.17 Faroe haddock. Long-term Prediction - Results**

MFYPR version 1
Run: jr2
Time and date: 21:53 4/24/2009
Yield per results

| FMult | Fbar | CatchNos | Yield | StockNos | Biomass | SpwnNosJan | SSBJan | SpwnNosSpwn | SSBSpwn |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 5.5167 | 8.5087 | 4.0671 | 7.5582 | 4.0671 | 7.5582 |
| 0.1 | 0.0221 | 0.0825 | 0.1597 | 5.1058 | 7.469 | 3.6576 | 6.5198 | 3.6576 | 6.5198 |
| 0.2 | 0.0443 | 0.1465 | 0.2744 | 4.7872 | 6.679 | 3.3406 | 5.7312 | 3.3406 | 5.7312 |
| 0.3 | 0.0664 | 0.1976 | 0.3586 | 4.5332 | 6.0618 | 3.0879 | 5.1153 | 3.0879 | 5.1153 |
| 0.4 | 0.0885 | 0.2394 | 0.4217 | 4.3256 | 5.5685 | 2.8819 | 4.6235 | 2.8819 | 4.6235 |
| 0.5 | 0.1106 | 0.2743 | 0.4698 | 4.1528 | 5.1668 | 2.7105 | 4.2231 | 2.7105 | 4.2231 |
| 0.6 | 0.1328 | 0.3038 | 0.5068 | 4.0065 | 4.8343 | 2.5655 | 3.8919 | 2.5655 | 3.8919 |
| 0.7 | 0.1549 | 0.3292 | 0.5357 | 3.8808 | 4.555 | 2.4412 | 3.614 | 2.4412 | 3.614 |
| 0.8 | 0.177 | 0.3513 | 0.5584 | 3.7714 | 4.3176 | 2.3333 | 3.3779 | 2.3333 | 3.3779 |
| 0.9 | 0.1992 | 0.3708 | 0.5765 | 3.6752 | 4.1134 | 2.2384 | 3.175 | 2.2384 | 3.175 |
| 1 | 0.2213 | 0.3881 | 0.5908 | 3.5897 | 3.9361 | 2.1544 | 2.999 | 2.1544 | 2.999 |
| 1.1 | 0.2434 | 0.4037 | 0.6024 | 3.5132 | 3.7807 | 2.0792 | 2.8448 | 2.0792 | 2.8448 |
| 1.2 | 0.2655 | 0.4177 | 0.6117 | 3.444 | 3.6433 | 2.0114 | 2.7087 | 2.0114 | 2.7087 |
| 1.3 | 0.2877 | 0.4305 | 0.6192 | 3.3811 | 3.5209 | 1.9499 | 2.5876 | 1.9499 | 2.5876 |
| 1.4 | 0.3098 | 0.4422 | 0.6253 | 3.3236 | 3.4112 | 1.8937 | 2.4792 | 1.8937 | 2.4792 |
| 1.5 | 0.3319 | 0.453 | 0.6302 | 3.2706 | 3.3121 | 1.842 | 2.3814 | 1.842 | 2.3814 |
| 1.6 | 0.354 | 0.463 | 0.6342 | 3.2216 | 3.2222 | 1.7944 | 2.2927 | 1.7944 | 2.2927 |
| 1.7 | 0.3762 | 0.4723 | 0.6375 | 3.176 | 3.1401 | 1.7501 | 2.2118 | 1.7501 | 2.2118 |
| 1.8 | 0.3983 | 0.481 | 0.6401 | 3.1335 | 3.0648 | 1.7089 | 2.1377 | 1.7089 | 2.1377 |
| 1.9 | 0.4204 | 0.4891 | 0.6422 | 3.0937 | 2.9953 | 1.6704 | 2.0695 | 1.6704 | 2.0695 |
| 2 | 0.4426 | 0.4968 | 0.6439 | 3.0562 | 2.9311 | 1.6342 | 2.0064 | 1.6342 | 2.0064 |

| Reference point | F multiplier | Absolute F |
|---|---|---|
| Fbar(3-7) | 1 | 0.2213 |
| FMax | 2.7482 | 0.6081 |
| F0.1 | 0.8271 | 0.183 |
| F35%SPR | 1.2509 | 0.2768 |
| Flow | -99 | |
| Fmed | 1.2729 | 0.2817 |
| Fhigh | 6.5473 | 1.4488 |

Weights in kilograms

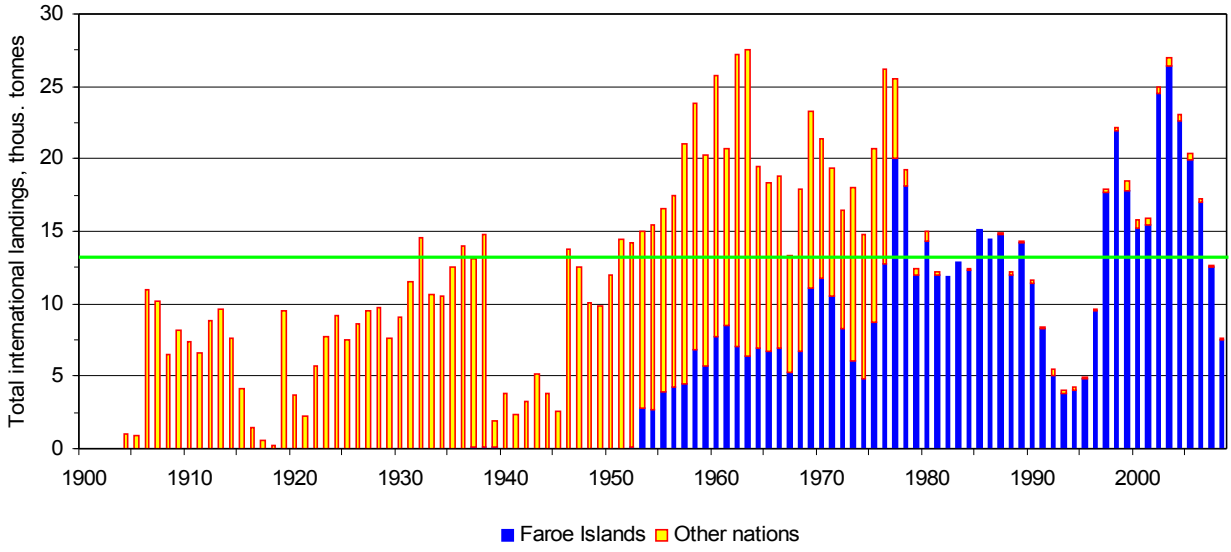



**Figure 5.1. Haddock in ICES Division Vb. Landings by all nations 1904-2008. Horisontal line average for the whole period.**

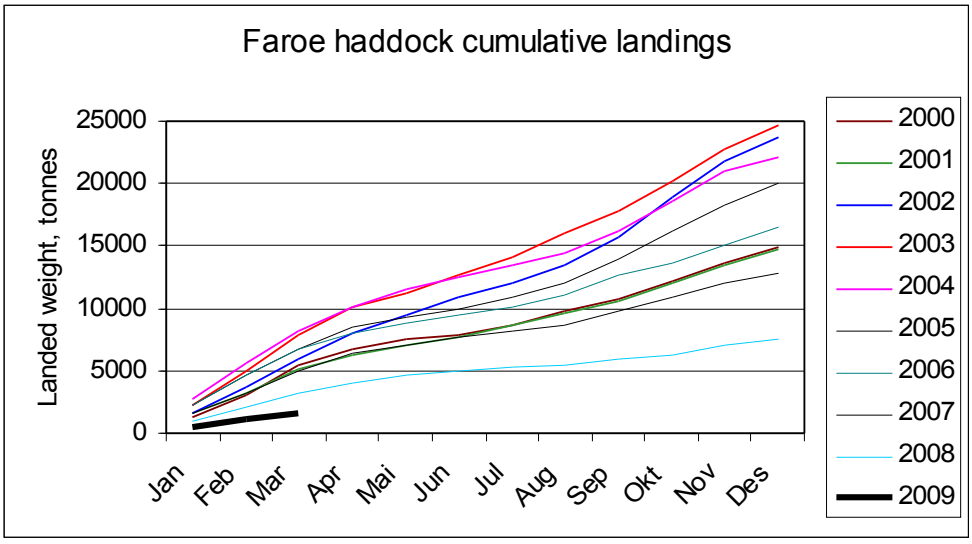



**Figure 5.2. Faroe haddock. Cumulative Faroese landings from Vb.**

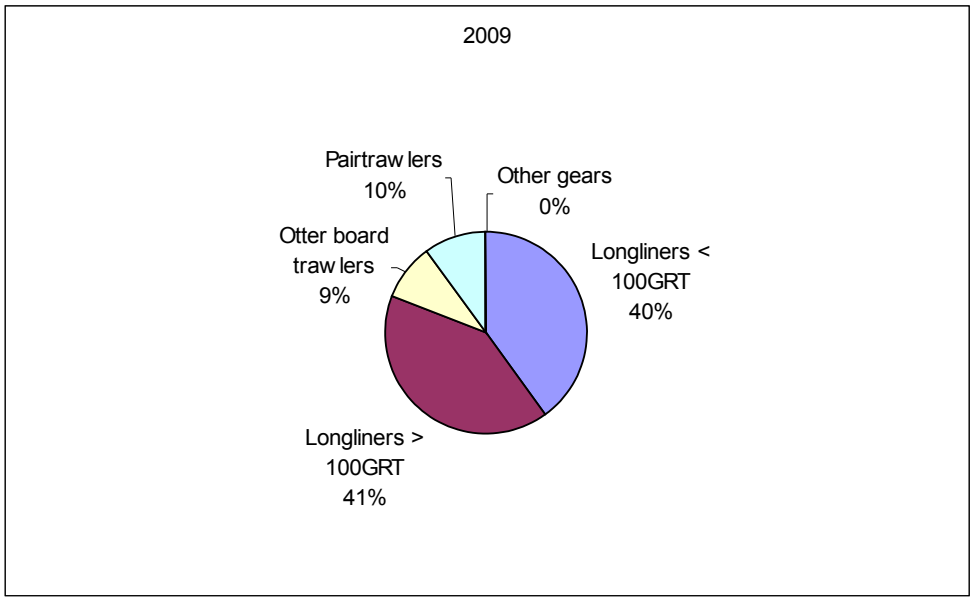



**Figure 5.3. Faroe haddock. Contribution (%) by fleet to the total Faroese landings 2009.**

**Figure 5.4. Faroe haddock. LN(catch@age in numbers) for YC's 1948 onwards.**

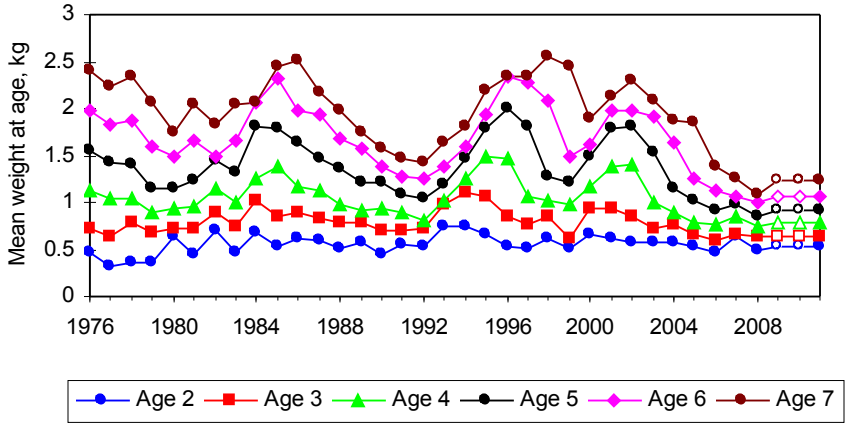



**Figure 5.5. Faroe haddock. Mean weight at age (2-7). 2009-2011 are predicted values used in the short term prediction (open symbols).**

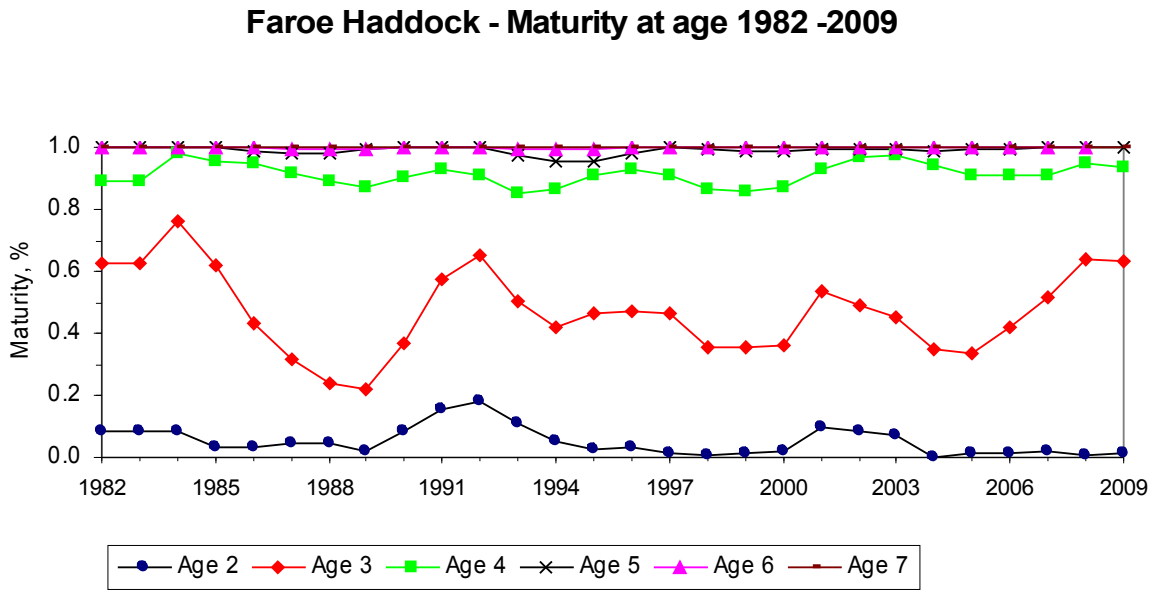



**Figure 5.6. Faroe haddock. Maturity at age since 1982. Running 3-years average of survey observations.**

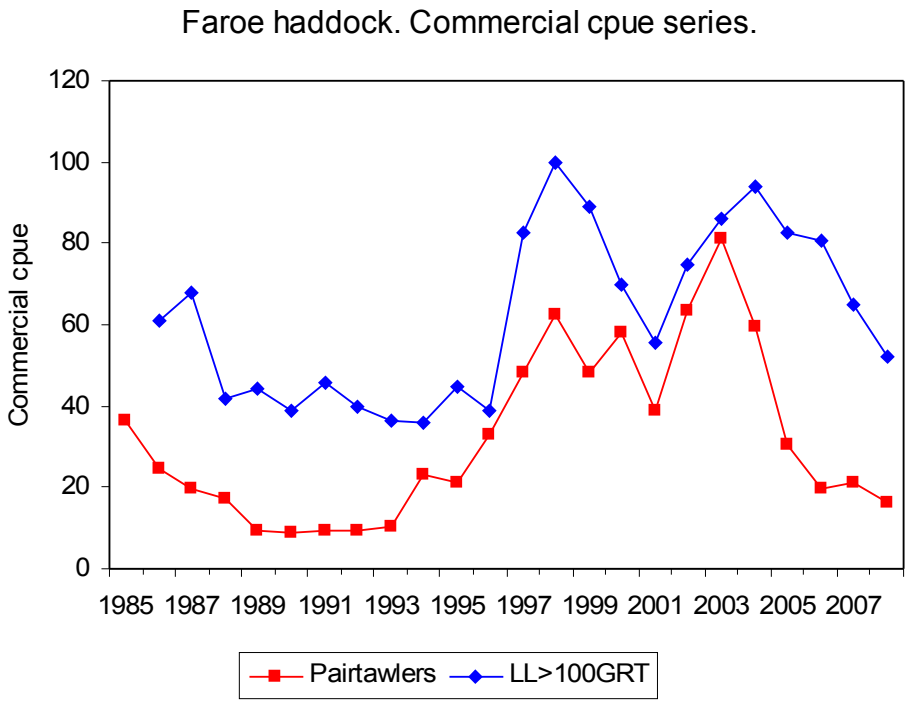



**Figure 5.7. Pair trawlers > 1000 HP and longliners > 100 HP.**

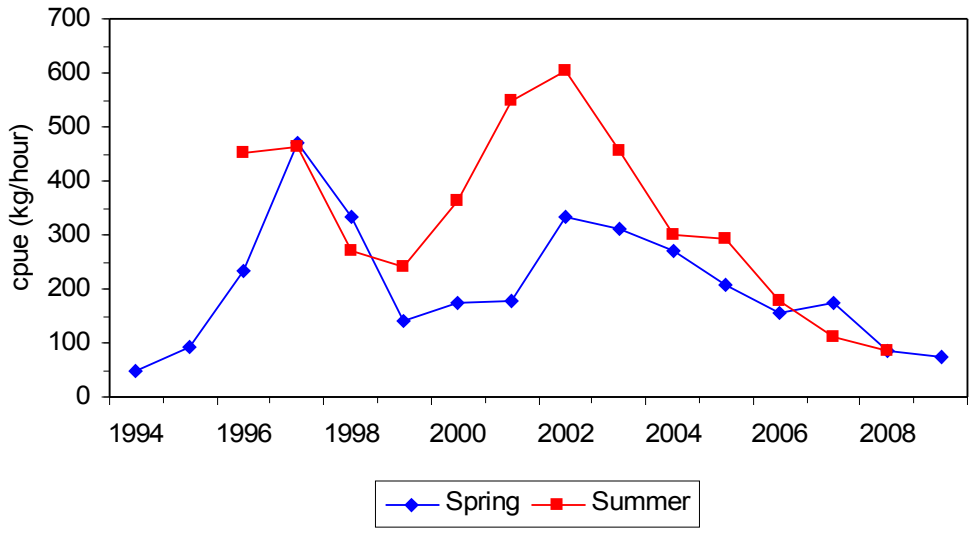
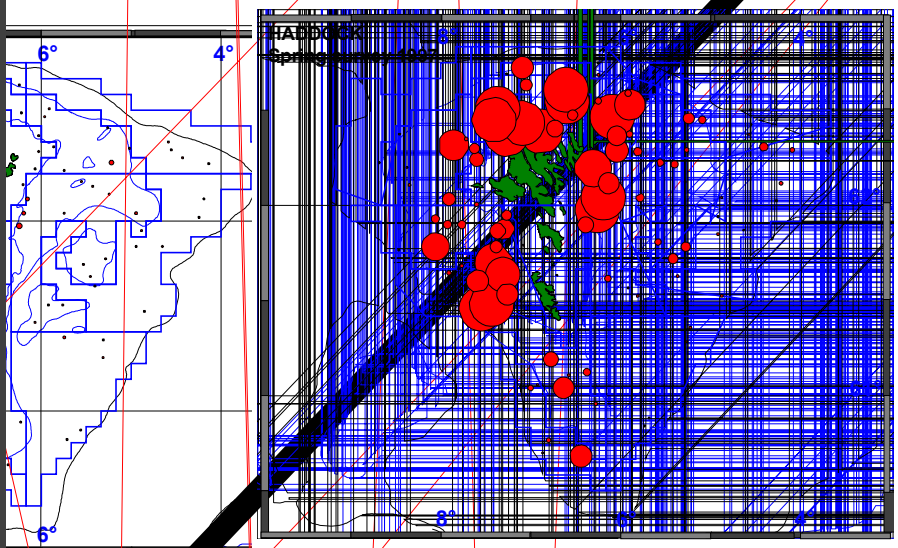
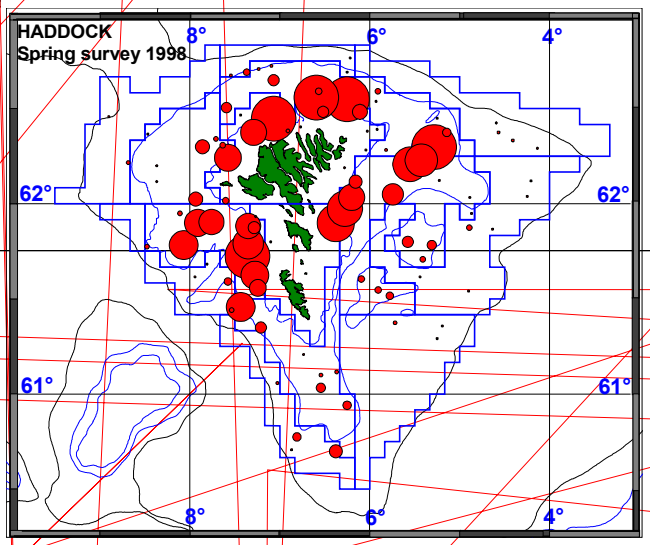
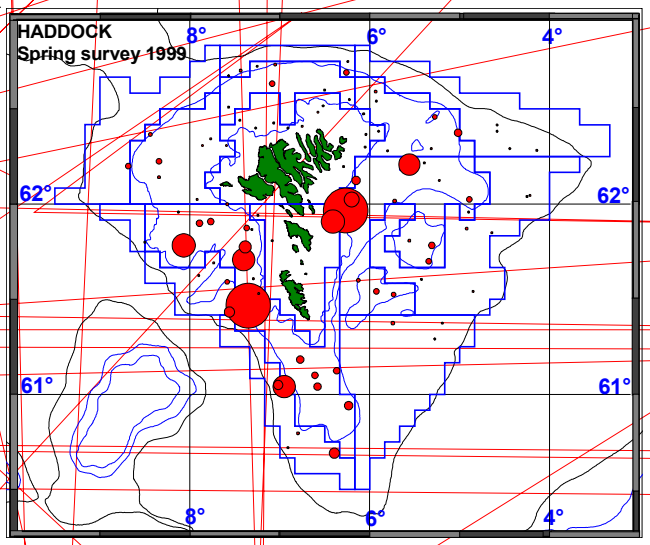
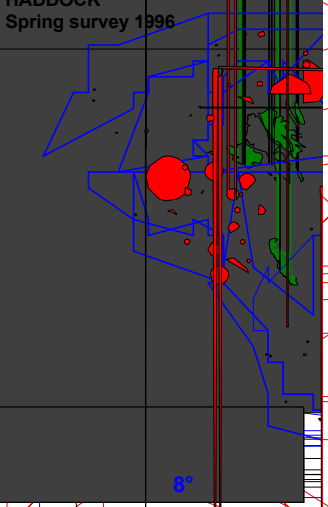


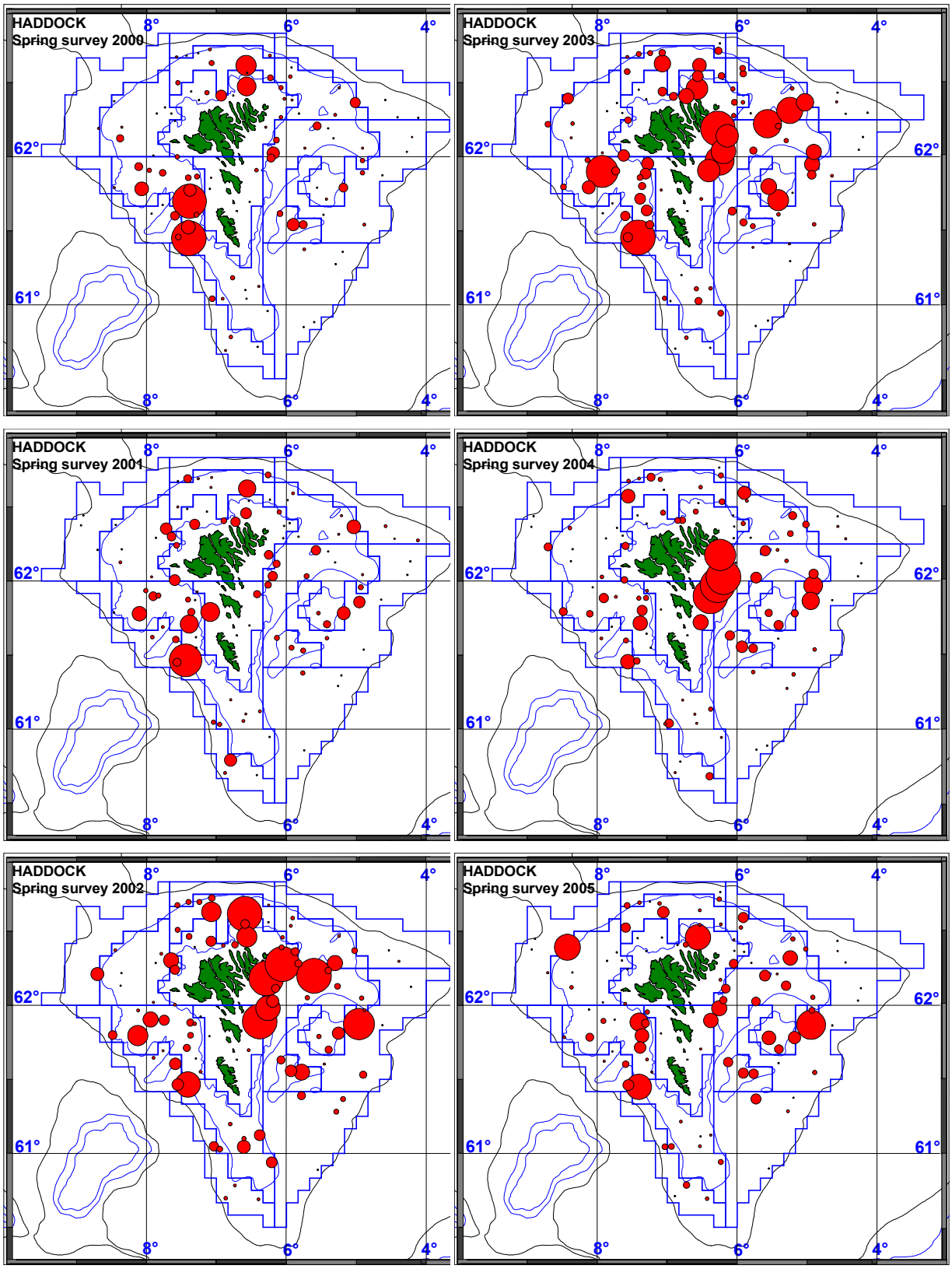

**Figure 5.8. Faroe haddock. CPUE (kg/trawlhour) in the spring and summer surveys.**

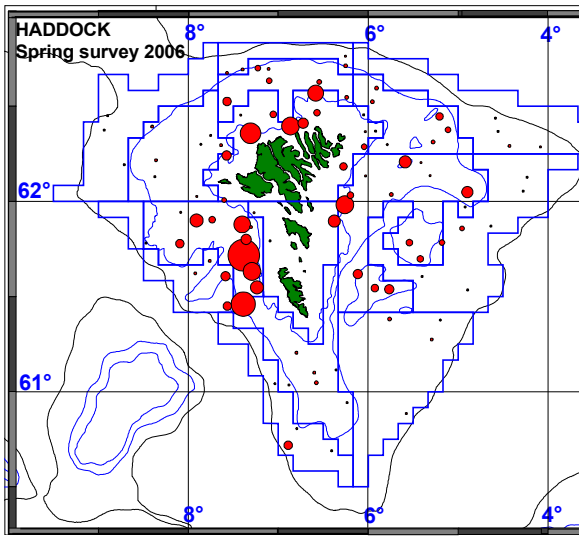

6°
4°
6°
8°

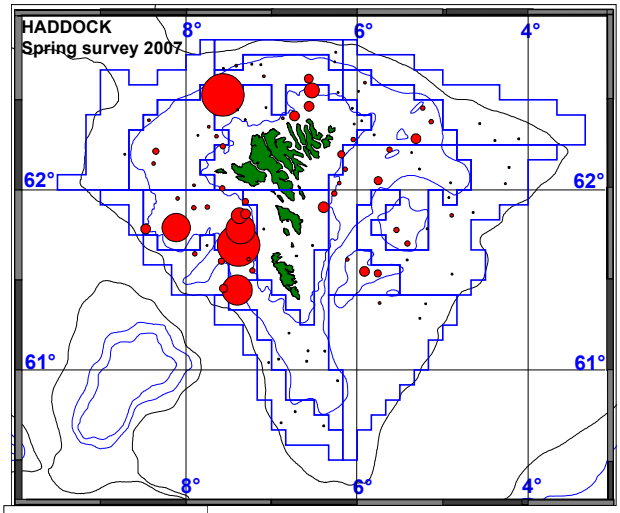

HADDOCK
Spring survey 1998
8°
6°
4°
62°
62°
61°
61°
8°
6°
4°

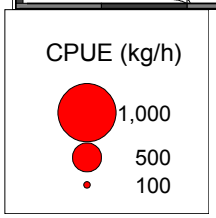

HADDOCK
Spring survey 1999
8°
6°
4°
62°
62°
61°
61°
8°
6°
4°

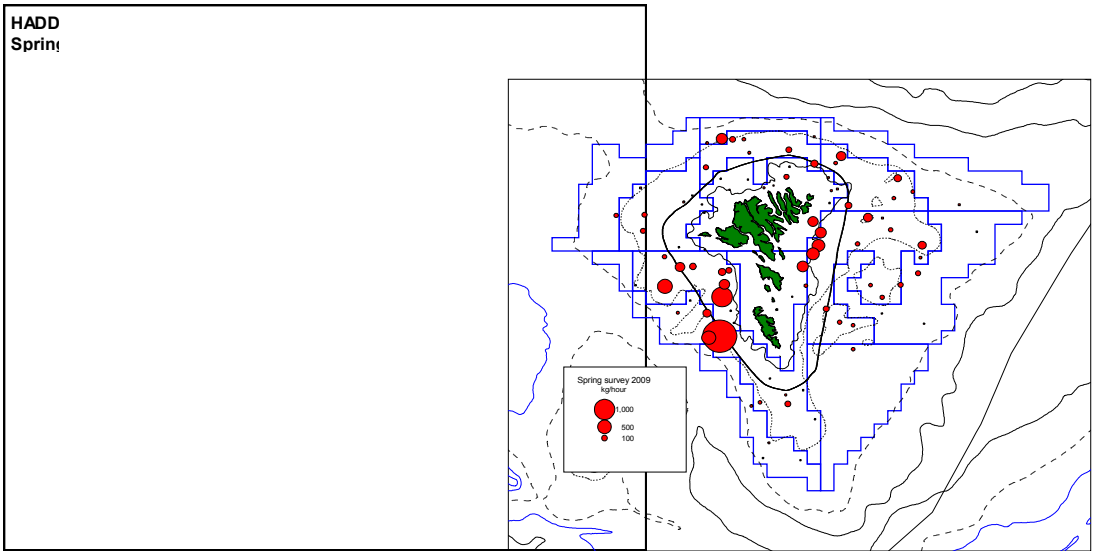

HADDOCK
Spring survey 1996
8°


HADDOCK
Spring survey 2000
HADDOCK
Spring survey 2003
HADDOCK
Spring survey 2001
HADDOCK
Spring survey 2004
HADDOCK
Spring survey 2002
HADDOCK
Spring survey 2005
8°
6°
4°
62°
61°


HADDOCK
Spring survey 2006
8°
6°
4°
62°
61°


HADDOCK
Spring survey 2007
8°
6°
4°
62°
61°


CPUE (kg/h)
1,000
500
100


HADD
Sprin
Spring survey 2009
kg/hour
1,000
500
100

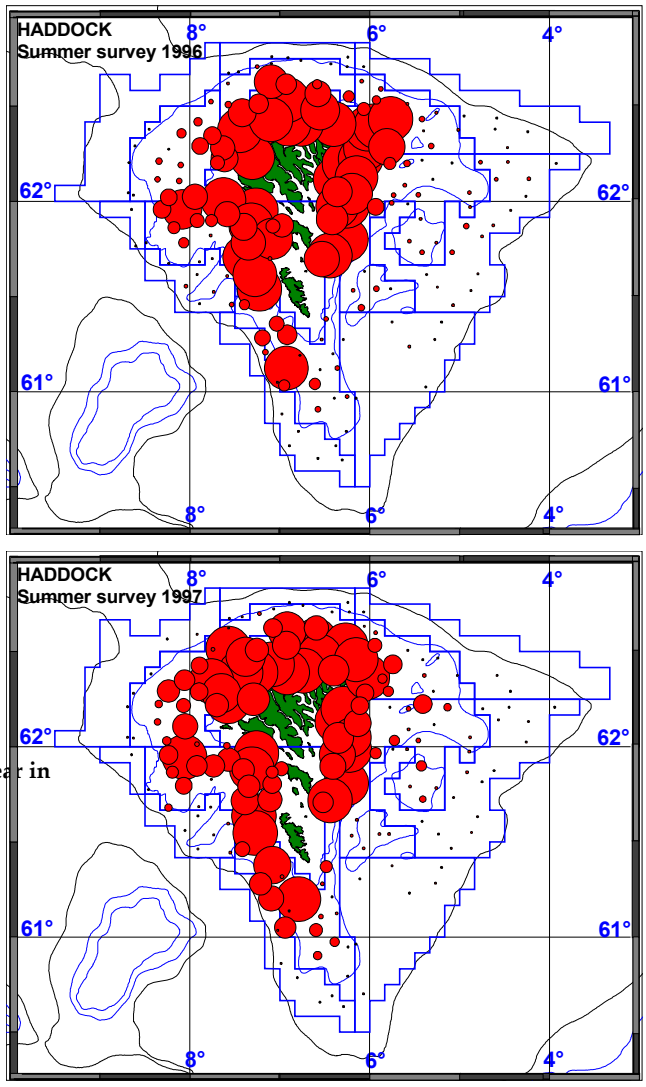
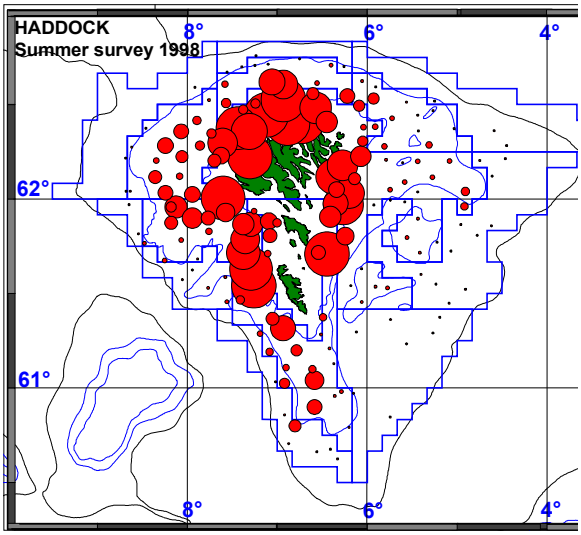
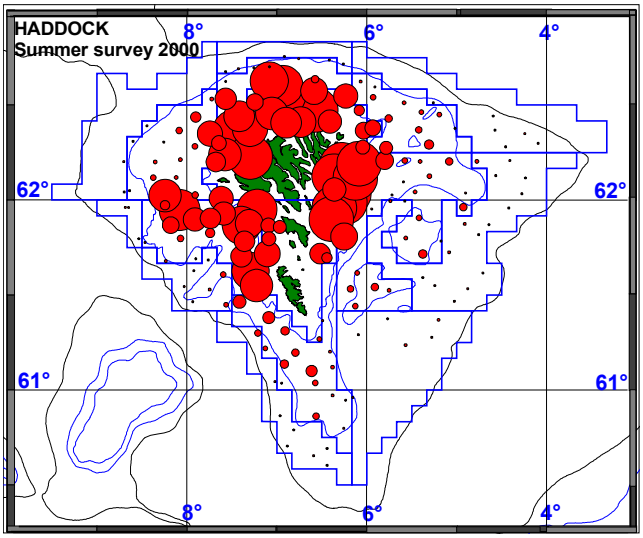
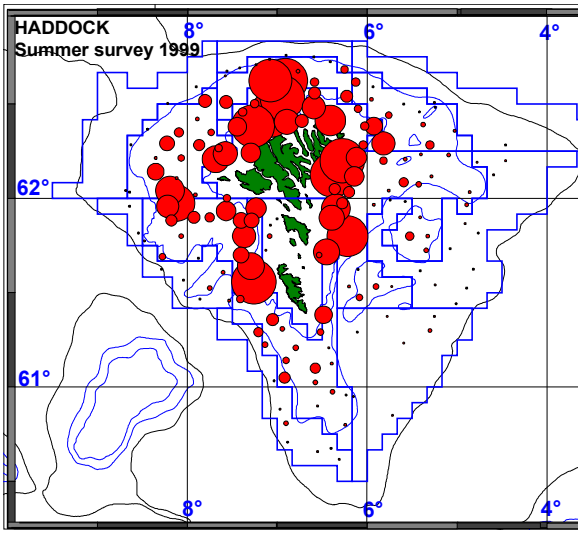
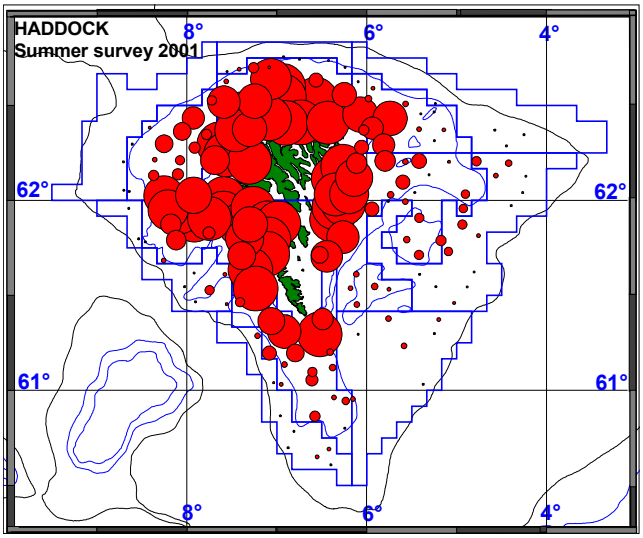


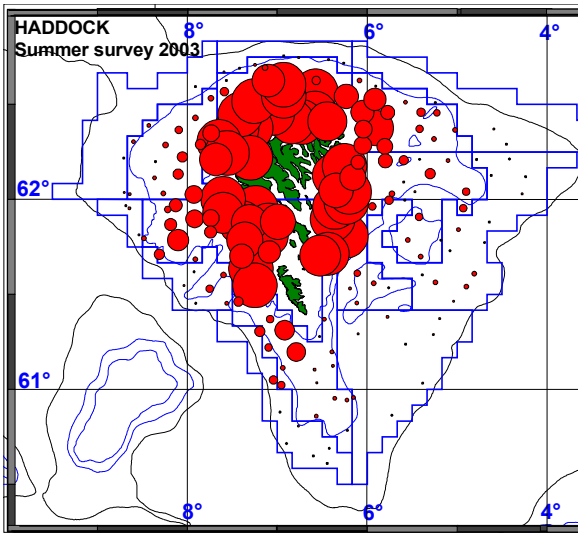

**Figure 5.9. Distribution of Faroe haddock catches by year in the spring surveys 1994-2009.**

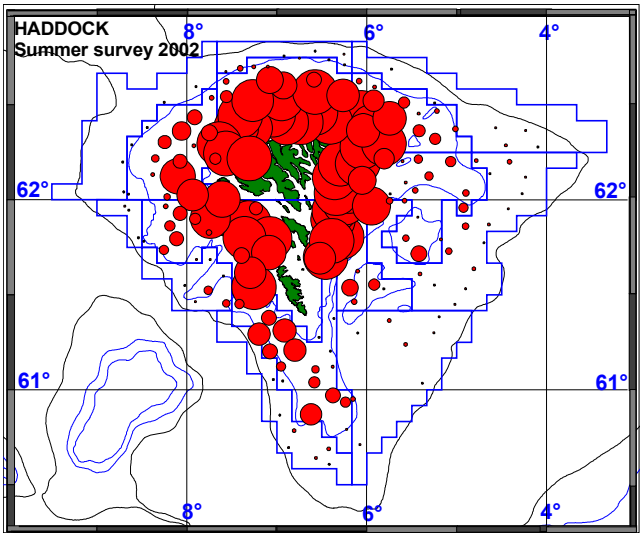

HADDOCK
Summer survey 1998
8°
6°
4°
62°
61°

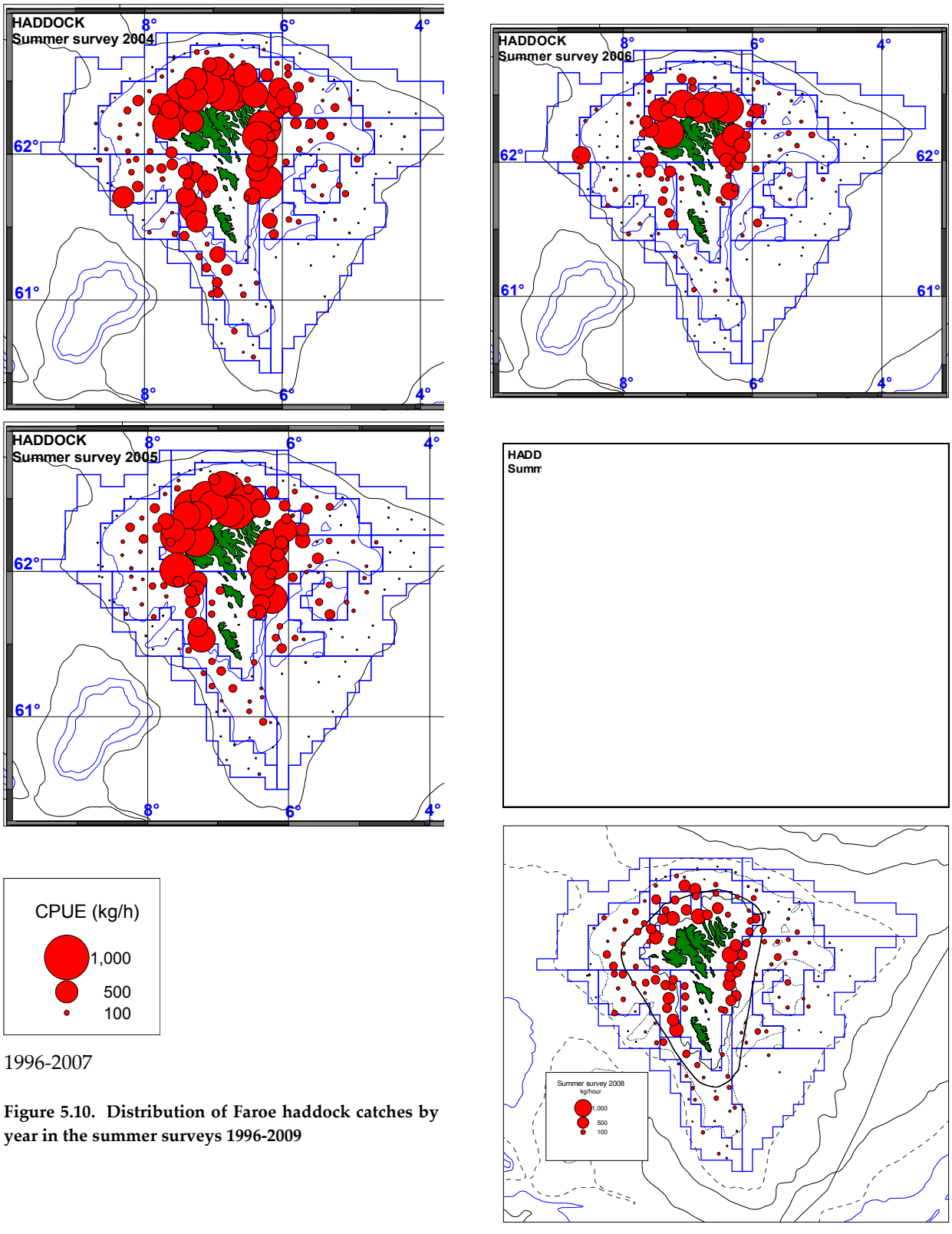

HADDOCK
Summer survey 2000
8°
6°
4°
62°
61°


HADDOCK
Summer survey 1999
8°
6°
4°
62°
61°


HADDOCK
Summer survey 2001
8°
6°
4°
62°
61°


HADDOCK
Summer survey 2003
8°
6°
4°
62°
61°


HADDOCK
Summer survey 2002
8°
6°
4°
62°
61°




1996-2007

**Figure 5.10. Distribution of Faroe haddock catches by year in the summer surveys 1996-2009**

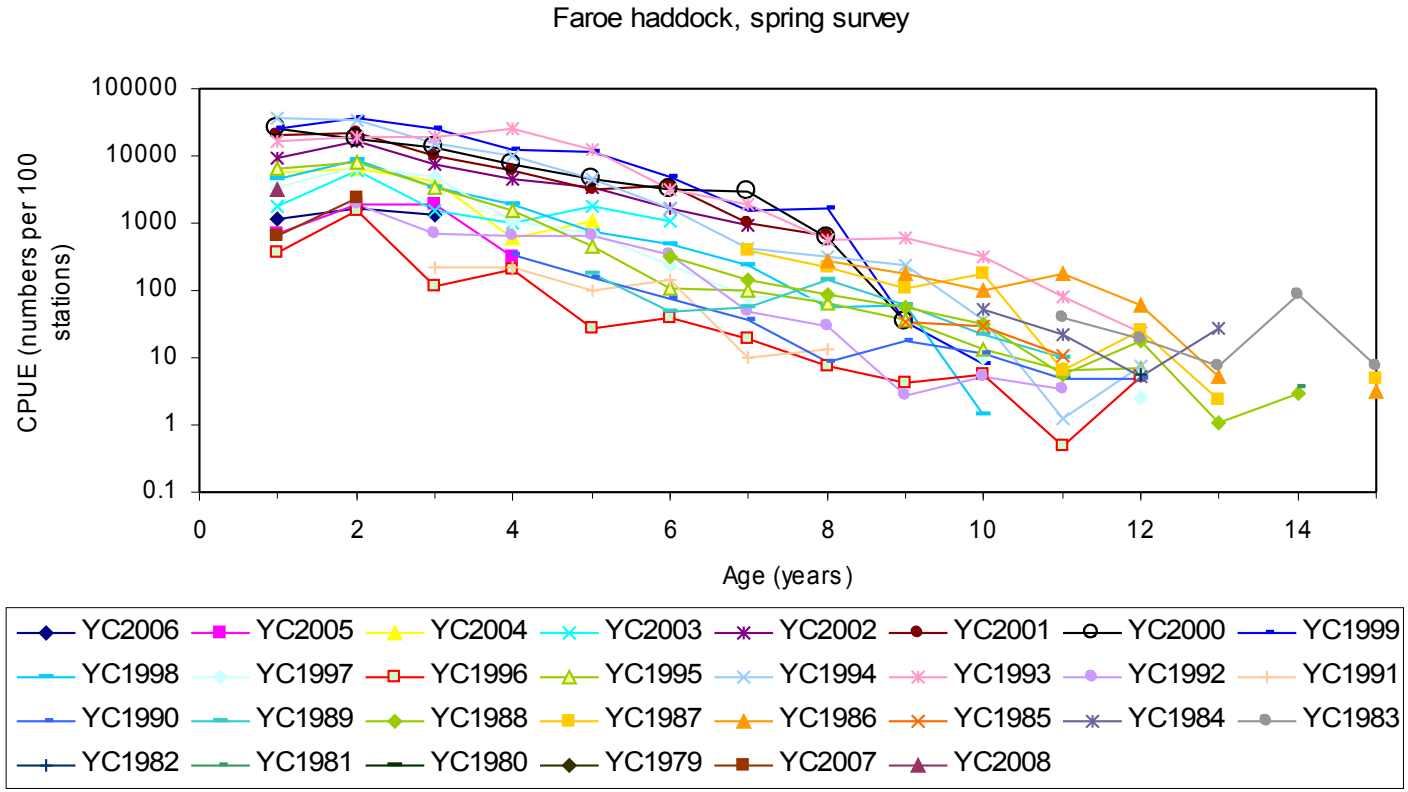



**Figure 5.11. Faroe haddock. LN (c@age in numbers) in the spring survey.**

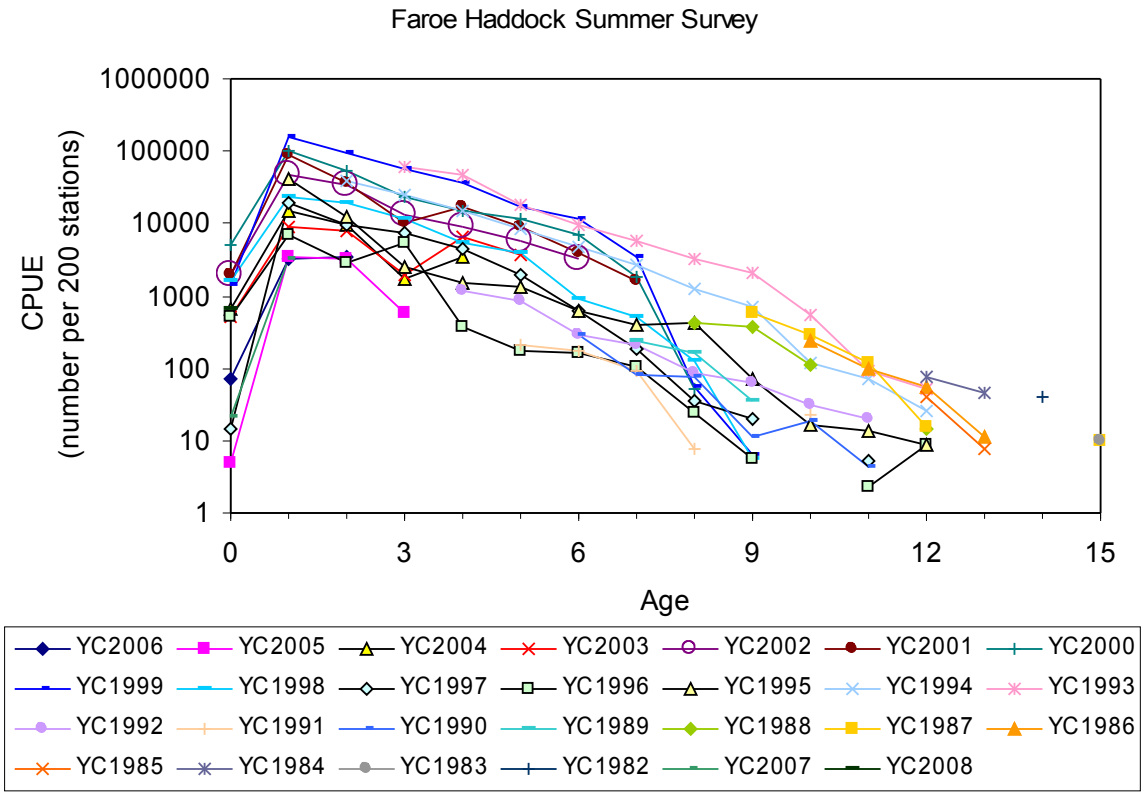



**Figure 5.12. Faroe haddock. LN (c@age in numbers) in the summer survey.**

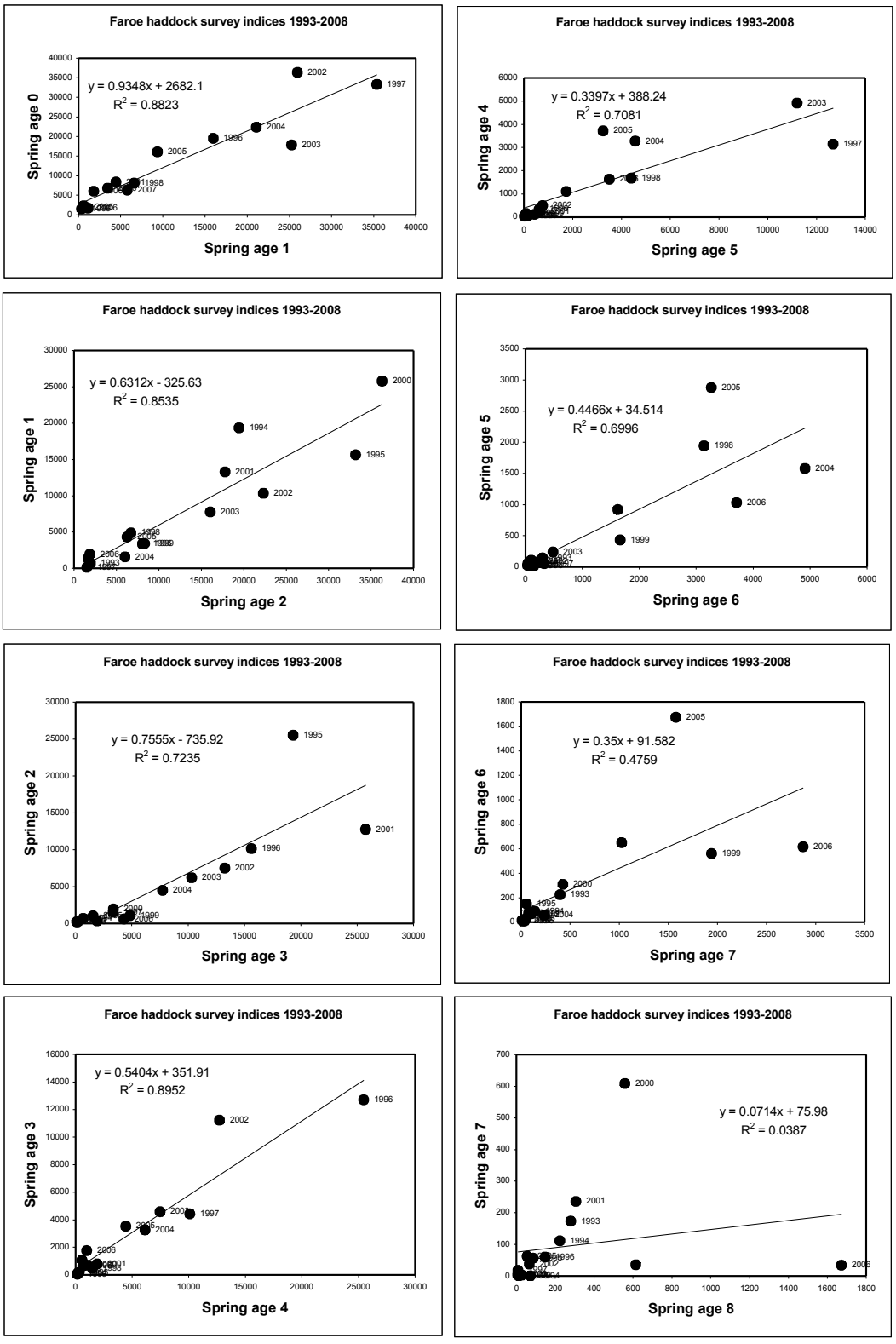



**Figure 5.13.** Faroe haddock. Comparison between spring survey indices (shifted) at age and the indices of the same YC one year later.

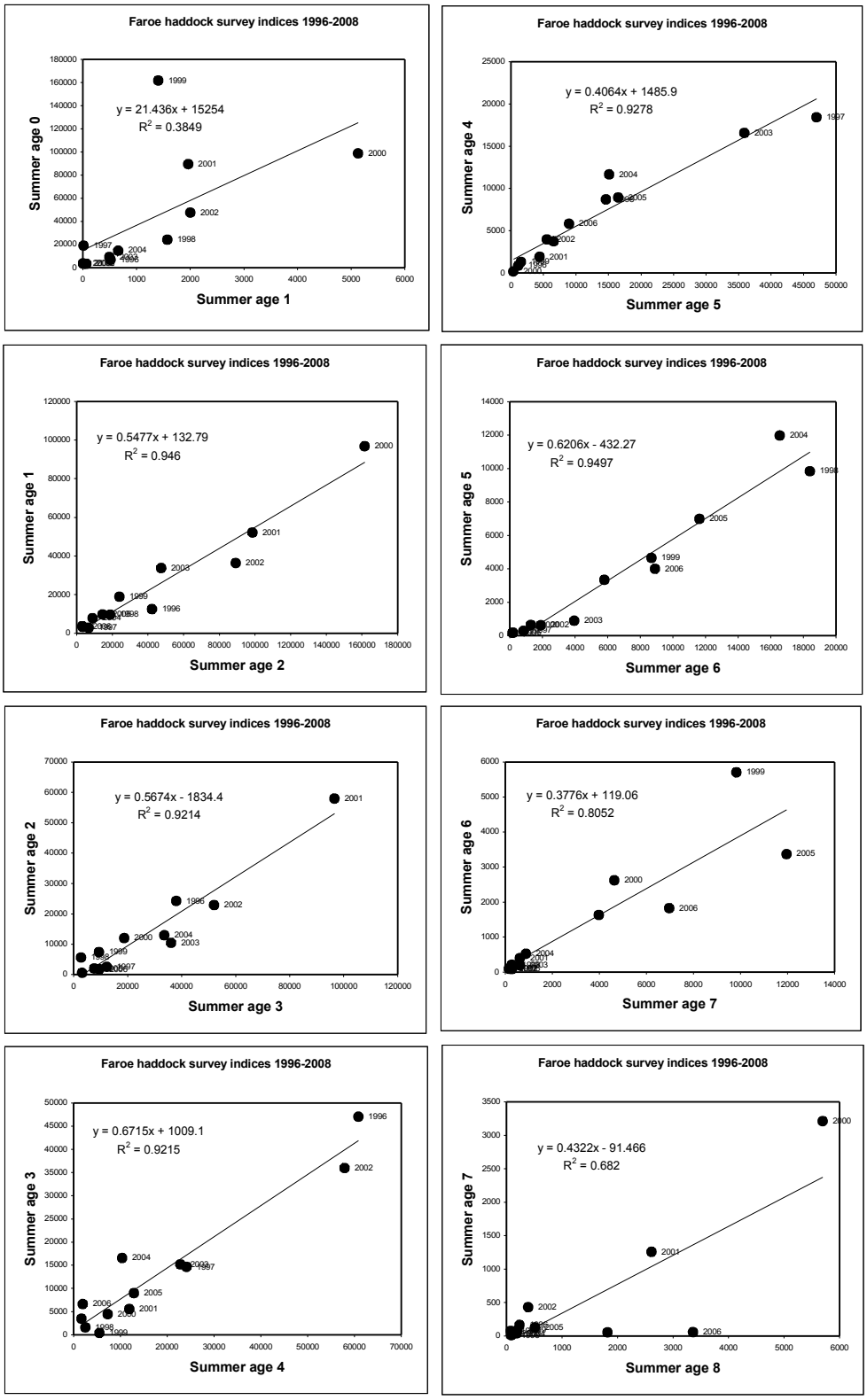



**Figure 5.14.** Faroe haddock. Comparison between summer survey indices at age and the indices of the same YC one year later.

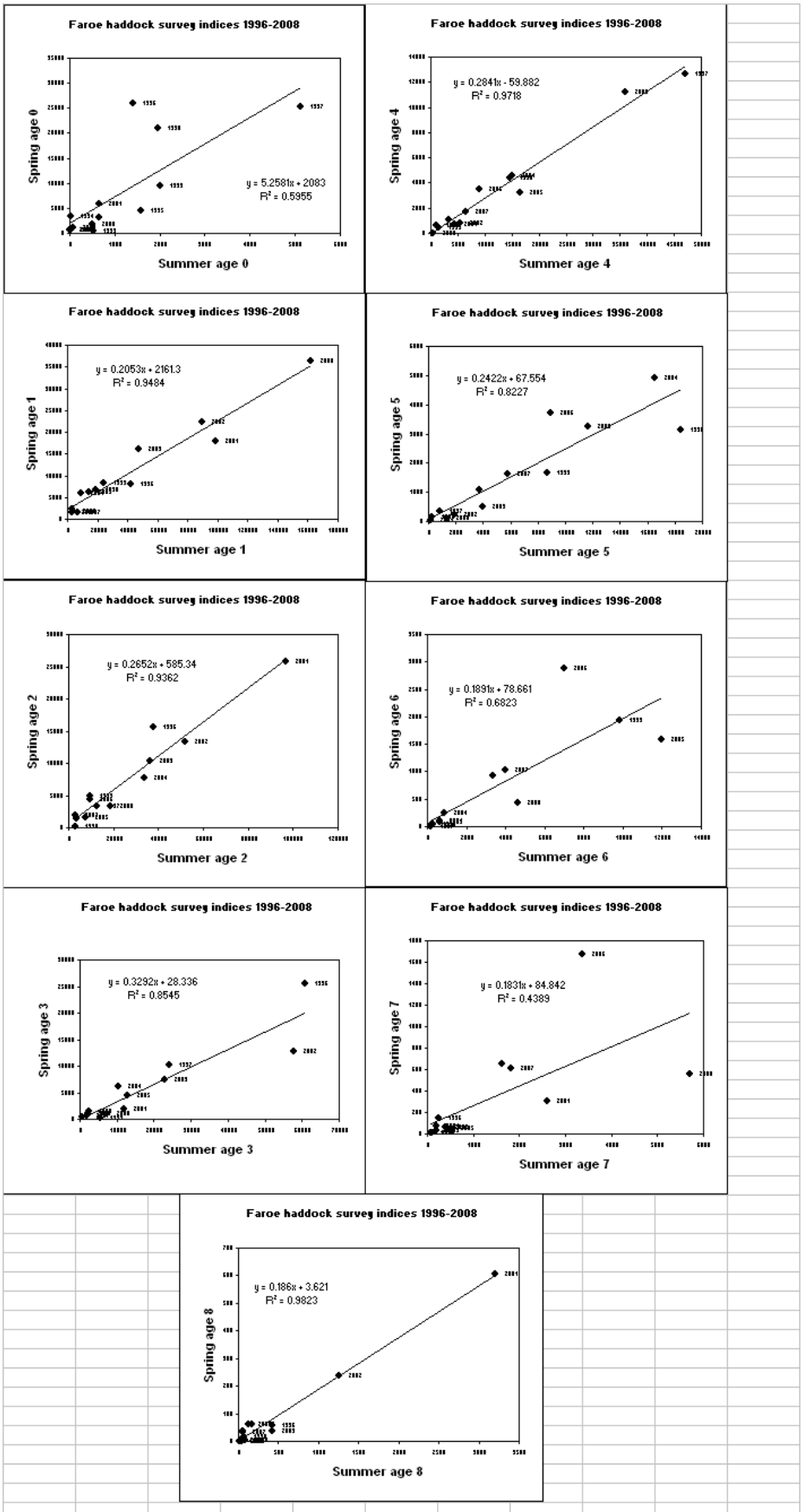



**Figure 5.15.** Faroe haddock. Comparison between indices at age from the spring (shifted) and summer surveys.

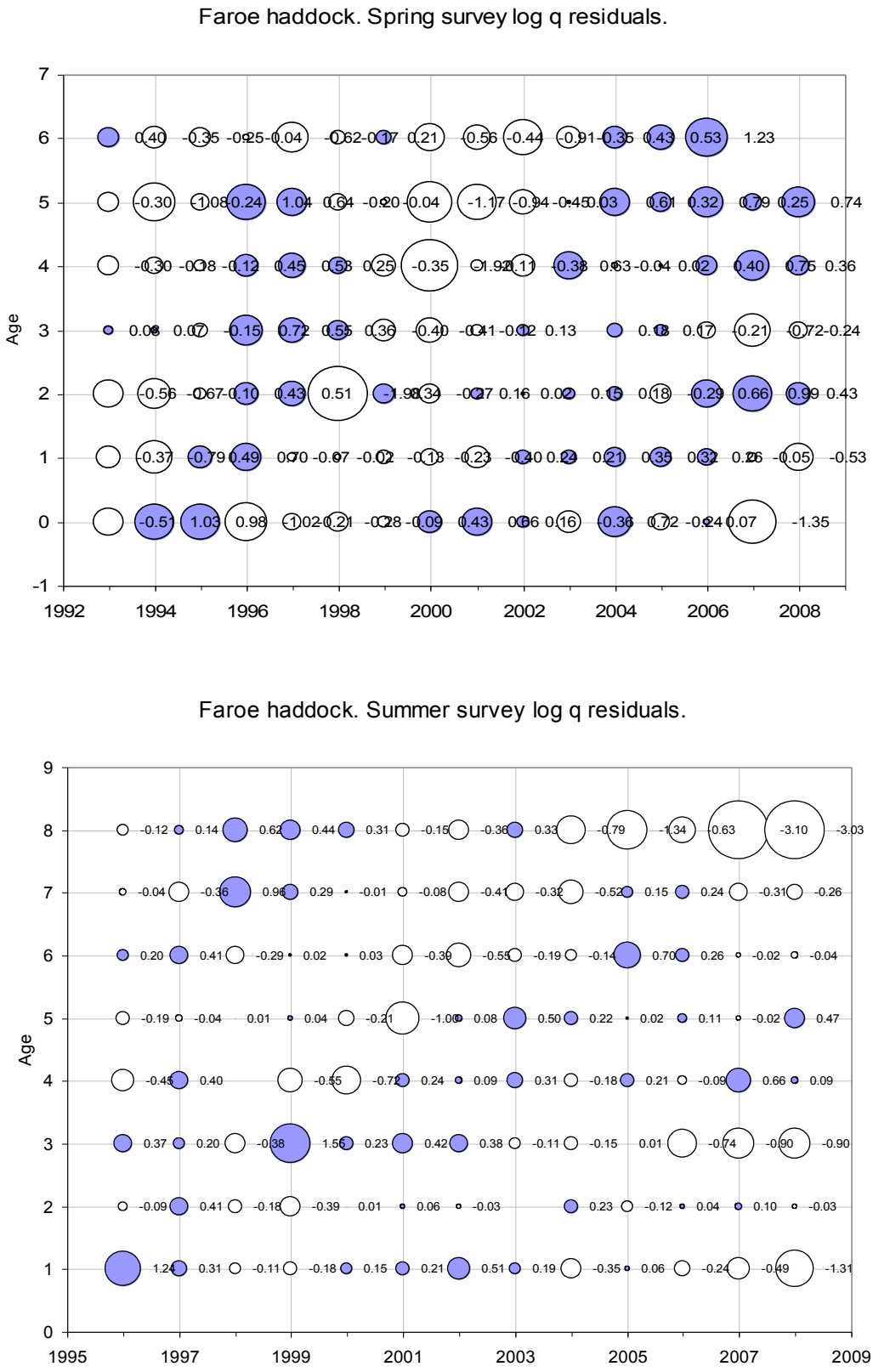



**Figure 5.16. Faroe haddock survey log q residuals.**

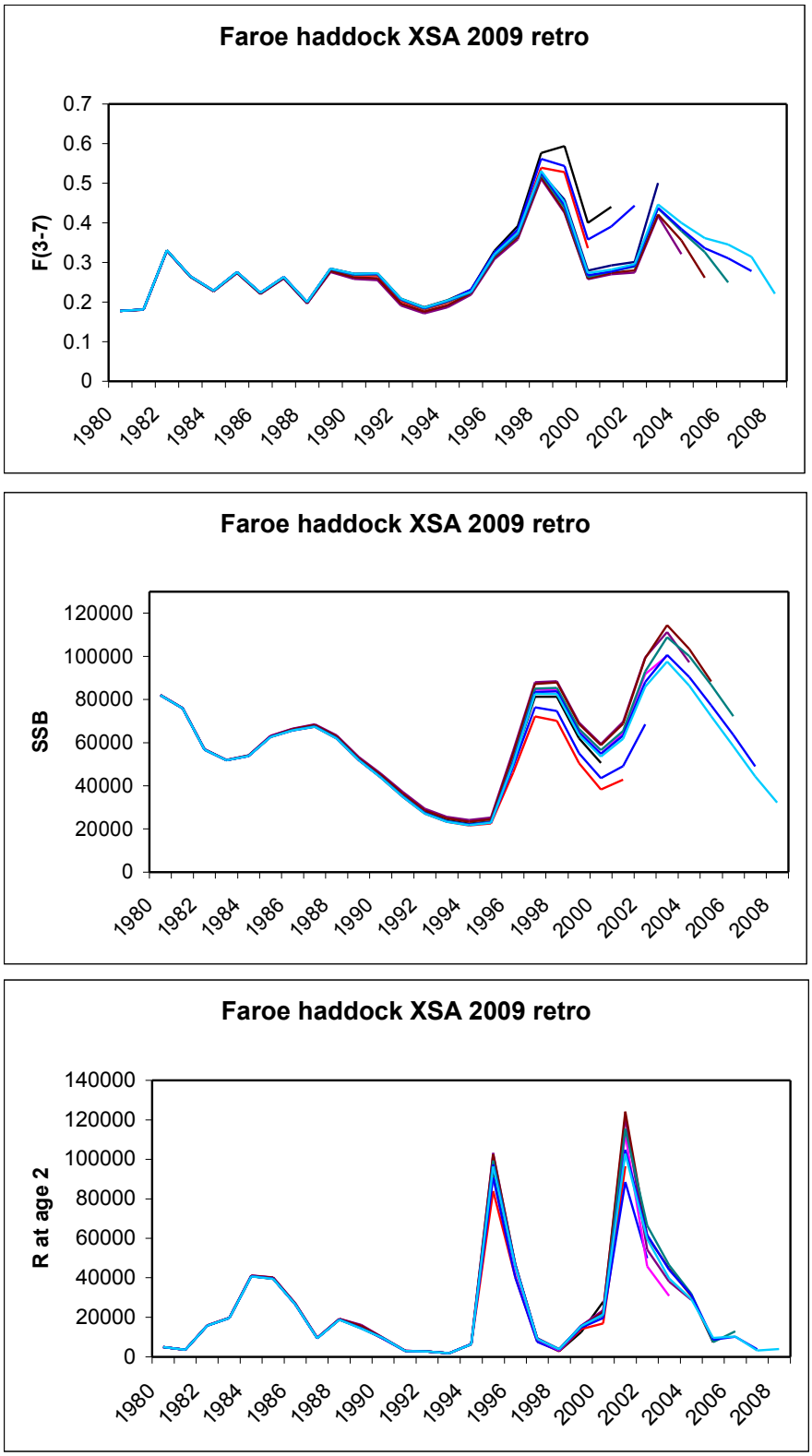



**Figure 5.17.** Faroe haddock. Retrospective analysis on the 2009 XSA.

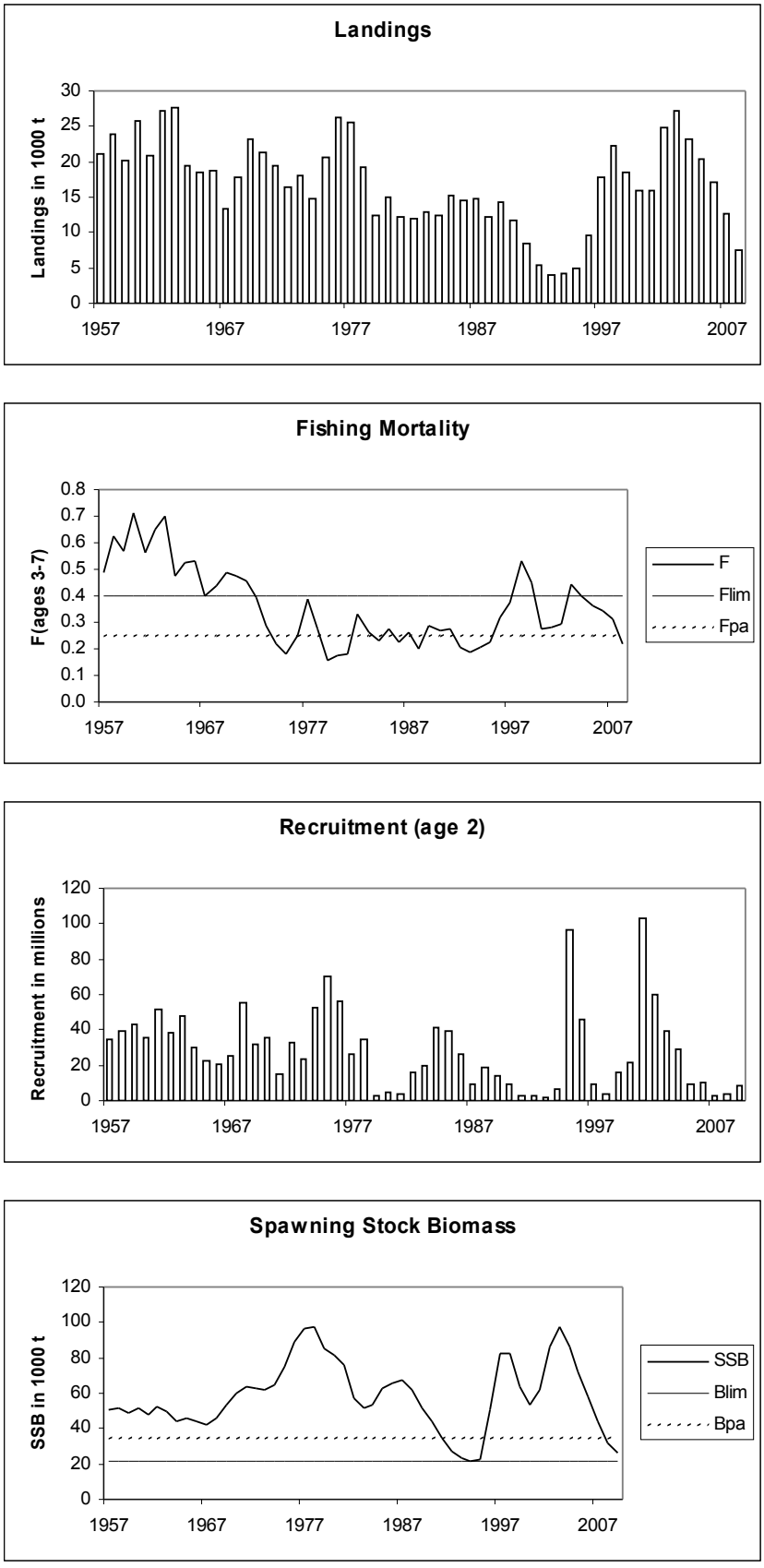



**Figure 5.18. Faroe haddock (Division Vb) standard graphs from the 2009 assessment.**

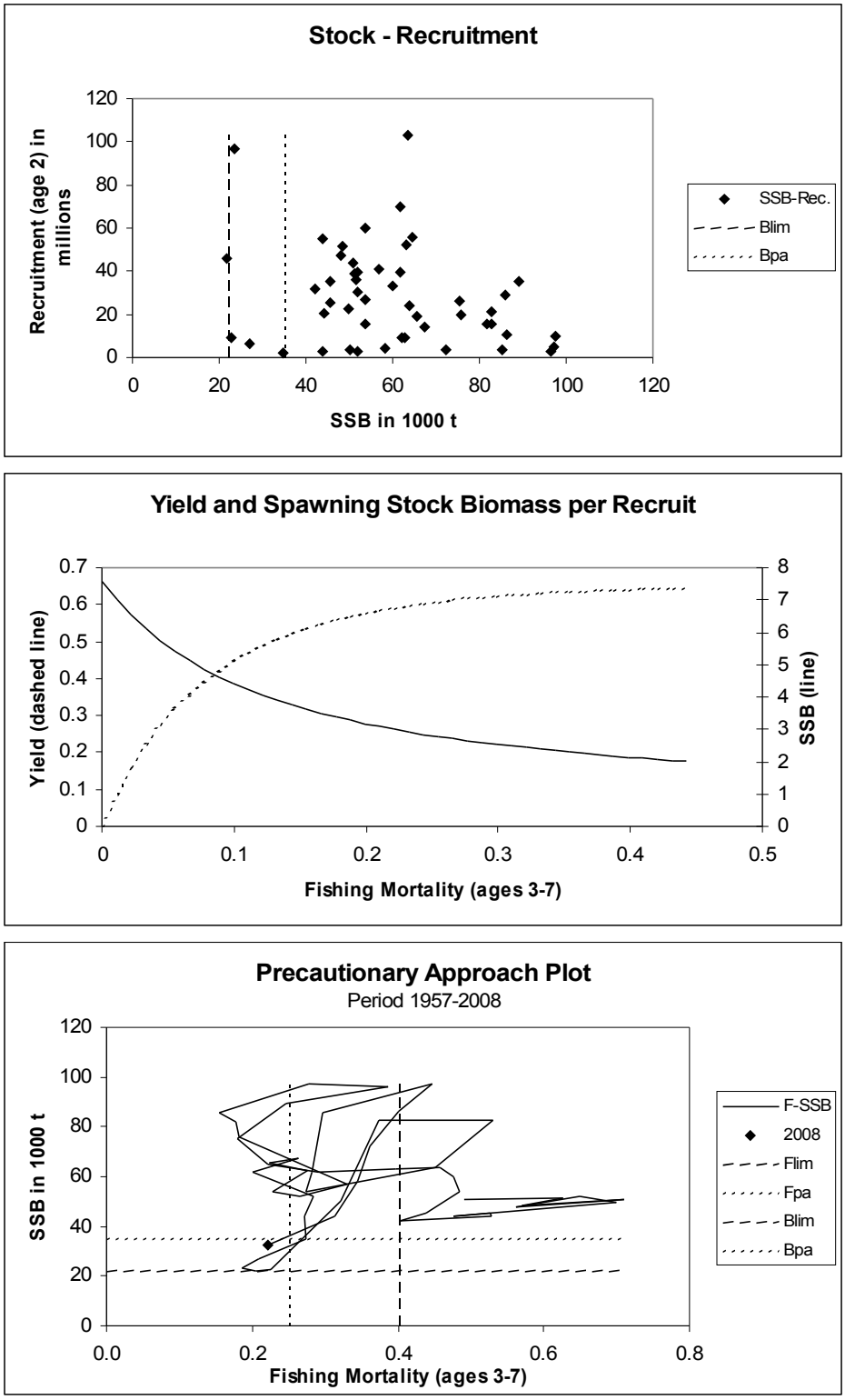



**Figure 5.18 (cont.). Faroe haddock (Division Vb) standard graphs from the 2009 assessment.**

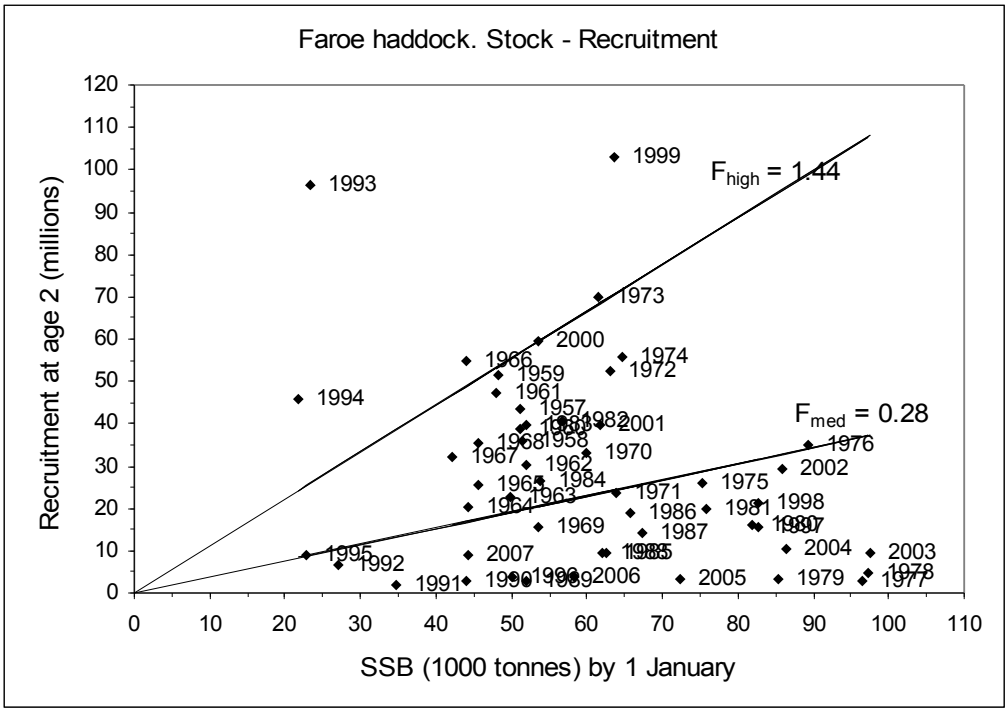
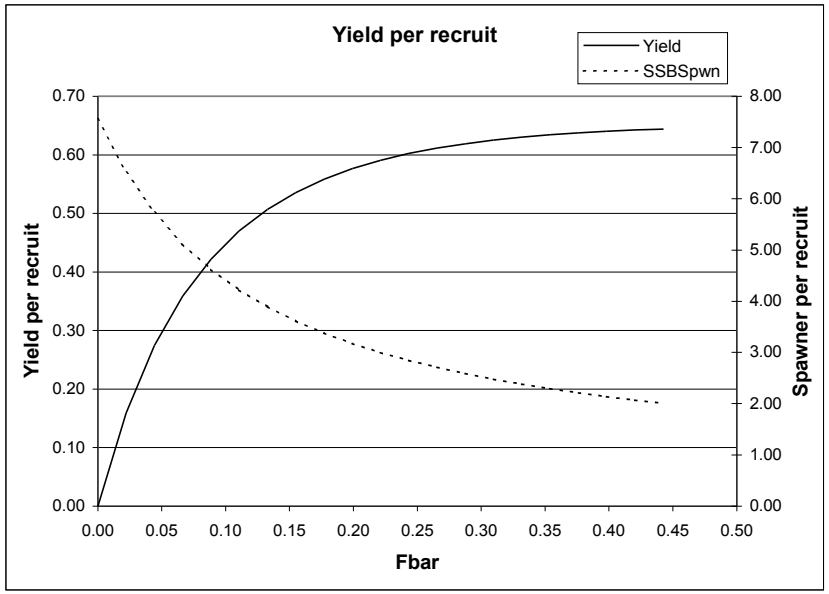


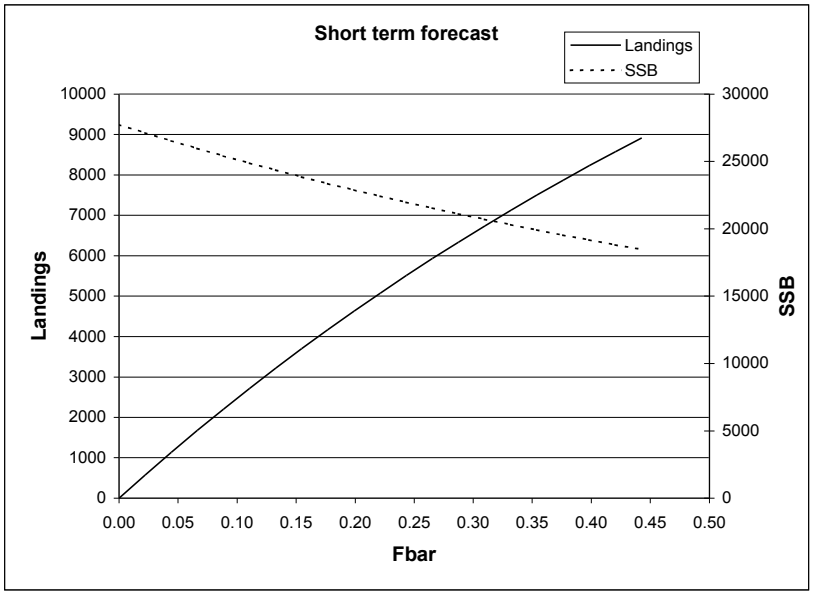

**Figure 5.19. Faroe haddock. SSB-R plot.**




MFYPR version 1
Run: jr2
Time and date: 21:53 4/24/2009

| Reference point | F multiplier | Absolute F |
|---|---|---|
| Fbar(3-7) | 1 | 0.2213 |
| FMax | 2.7482 | 0.6081 |
| F0.1 | 0.8271 | 0.183 |
| F35%SPR | 1.2509 | 0.2768 |
| Flow | -99 | |
| Fmed | 1.2729 | 0.2817 |
| Fhigh | 6.5473 | 1.4488 |

Weights in kilograms




MFDP version 1
Run: jr1
Index file 24/04/2009
Time and date: 21:37 4/24/2009
Fbar age range: 3-7

.

**Figure 5.20. Faroe haddock. Prediction output.**

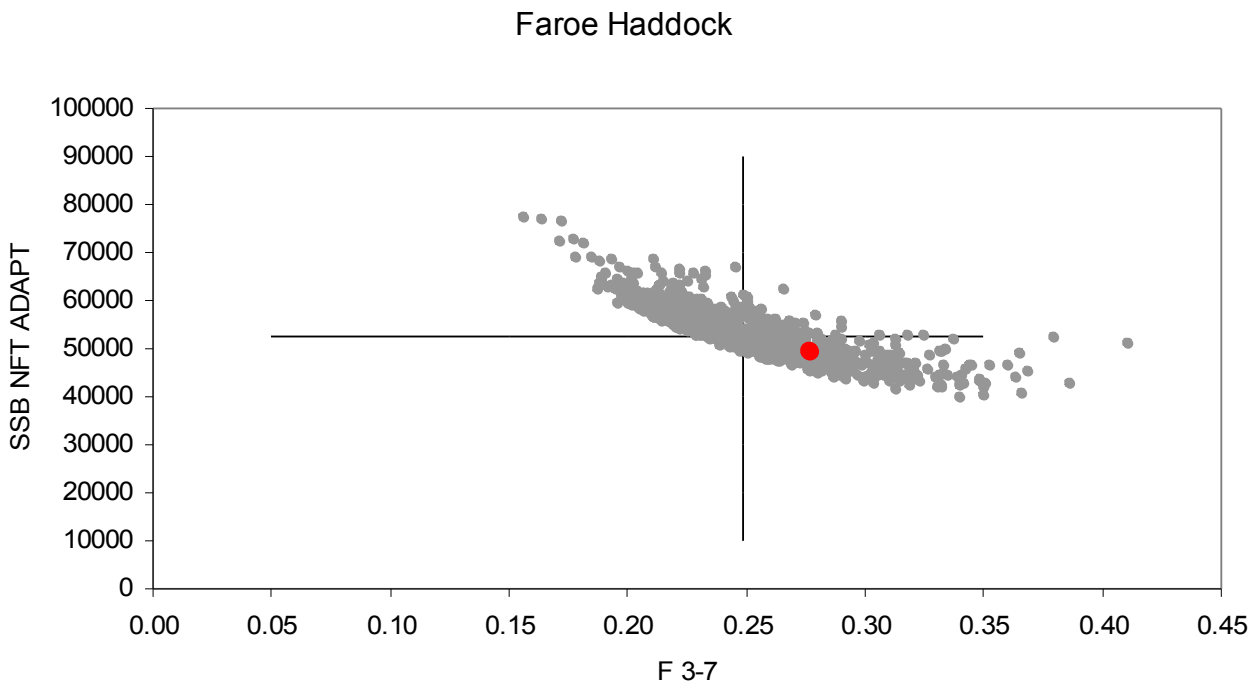



**Figure 5.21. The F's and SSB's from a 1000 bootstraps of the ADAPT. Inserted are the point values of F and SSB from the accepted XSA 2008!.**

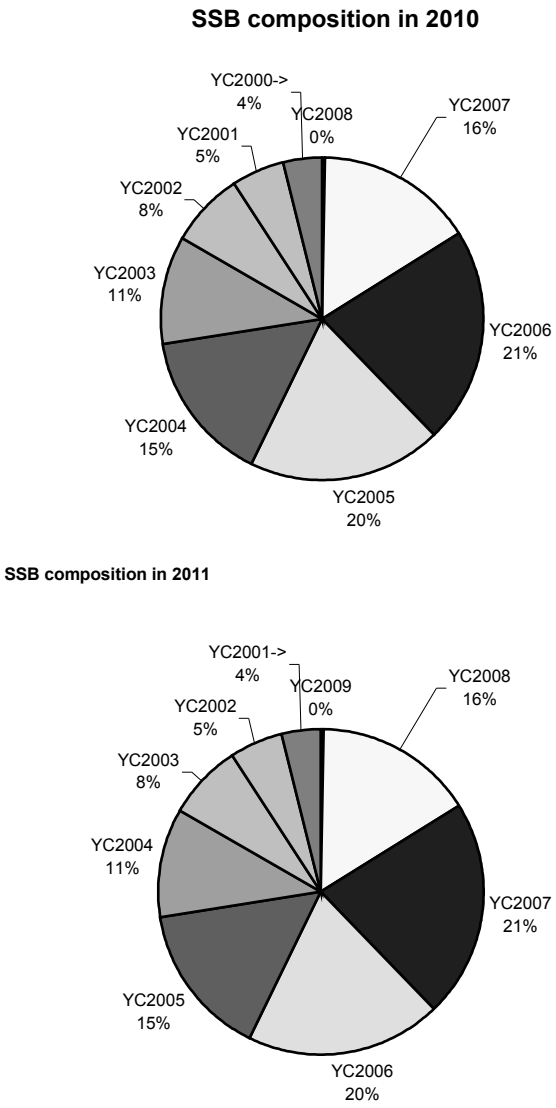



**Figure 5.22. Faroe haddock. Projected composition of the number by year-classes in the SSB's in 2010 and 2011.**