5 Faroe haddock

Executive summary

Being an update assessment, the changes compared to last year are additions of new data from 2011 and some minor revisions of recent landings data with corresponding revisions of the catch at age data. The main assessment tool is XSA tuned with 2 research vessel bottom trawl surveys. The results are in line with those from 2012, showing a very low SSB mainly due to poor recruitment but also due to higher than recommended fishing mortalities in recent years. SSB is now estimated well below B_{lim} and is predicted to stay below B_{lim} in 2013-2015 with status quo fishing mortality. Fishing mortality in 2012 is estimated at 0.25 and the average fishing mortality 2010-2012 at 0.32 (F_{MSY} and F_{pa} = 0.25). Landings in 2012 were only 2 600 t, the lowest in the assessment series back to 1957. This years assessment indicates that the 2012 assessment underestimated the 2011 recruitment by around 12% (12 mio. versus 14 mio.), under-estimated the fishing mortality in 2011 by 31% (0.26 versus 0.34) and overestimated the 2011 total- and spawning stock biomasses by 55% and 11%, respectively (23 and 15 thous. t versus 21 and 13 thous. t).

5.1 Stock description and management units

Haddock in Faroese Waters, i.e. ICES Sub-Divisions Vb1 and Vb2 and in the southern part of ICES Division IIa, close to the border of Sub-Division 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. A more detailed description of haddock in Faroese waters is given in the stock annex. Figure 5.9 show the age-aggregated distribution in 2012 and 2013 as seen in the two regular groundfish surveys in the area; the distribution by year for the whole survey series is in the annex. These figures also clearly illustrate the drastic decrease in the stock biomass in recent years.

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 drastically since and amounted in 2012 to only about 2 600 t. Most of the landings are taken from the Faroe Plateau; the 2012 landings from the Faroe Bank (Sub-Division Vb2), where the area shallower than 200 m depths has been closed to almost all fishing since the fiscal year 2008-2009, amounted to only about 134 t (Tables 5.1 and 5.2). The cumulative landings by month (Figure 5.2) suggest that landings in 2013 may be at the same low level as in 2012.

Faroese vessels have taken almost the entire catch since the late 1970s (Figure 5.1). Due to the dispute on mackerel quota share, there has been no agreement on mutual fishery rights between the Faroe Islands and Norway and EU, respectively, since 2011 and therefore there was no fishery by those parties in Vb in 2012. 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. This was also the case in 2012, where the share by longliners was 81% and that by trawlers 19%; the longliners smaller than 110 GRT caught almost half of the total landings (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 (Vb1). The sampling intensity in 2012 is shown in Table 5.4 and it was somewhat lower than last. This is partially caused by shortage of resources (people, money) but also because the total catches are so small that it is difficult to obtain enough samples. There is a need to improve the sampling level. From late 2011, a landing site has been established in Tórshavn close to the Marine Research Institute and it is the intention that technicians from the Institute will be sampling these landings regularly; this will improve the sampling level in coming years.

The normal procedure has been 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; this year, the samples had to be treated 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 and all fleets from the Faroe Bank have been added to the respective fleets on the Faroe Plateau. No catch-at-age data were available from the minor catches by other nations fishing in Faroese waters. Therefore, catches by trawlers from Greenland and Iceland were assumed to have the same age composition as the Faroese trawlers. 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 very small year classes are disturbing this consistency, both in numbers and mean weights at age. The recent very small year classes need to be very carefully inspected when the FBAR is calculated. 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 periods 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 (See the 2005 NWWG report). 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 this period, weights have shown cyclical changes, and have decreased during the most recent years to very low values in 2006; since then the mean weights have increased again. In the 3 latest years the weights have been fluctuated without a clear trend and a simple average of these years will be used in the short term predictions (figure 5.5). 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 1982–2013. 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 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 directly in the 2013 assessment but catch per unit effort for some selected fleets (logbook data) is used as additional information on the status of the stock (see section 5.4.1.1).

5.4 Methods

This assessment is an update of the 2012 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. All other input files (VPA) are the same except for the addition of the 2012 data.

5.4.1.1 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 but as additional information on stock trends (for details see the stock annex). 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). Both series, however, indicate that the stock is very low.

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 in 2012 and 2013 is shown in Figure 5.9 and the distributions in the whole survey series are shown in the annex (spring surveys 1994-2012and summer surveys 1996-2011). 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 with a smoother 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 in recent years, the length distributions have been used more directly for calculation of indices at age (ages 0-2). LN(numbers at age) for the surveys are presented in Figures 5.10-5.11 and show consistent patterns. Further analyses of the performances of the two series are shown in the annex. In general there is a good relationship between the indices for one year class in two successive years. The same applies when comparing the corresponding indices at age from the two surveys .

A SPALY (same procedure as last year) run, with the same settings of the XSA as in 2012 and tuned with the two surveys combined (Table 5.8), with 2012 data included and some minor revisions of recent catch figures, gave similar 2011 estimates as the 2012 assessment (Table 5.9), although this years assessment indicates that the 2012 assessment underestimated the 2011 recruitment by around 12% (12 mio. versus 14 mio.), undererestimated the fishing mortality in 2011 by 31% (0.26 versus 0.34) and overestimated the 2011 total- and spawning stock biomasses by 55% and 11%, respectively (23 and 15 thous. t versus 21 and 13 thous. t).

The log q residuals for the two surveys are shown in Figure 5.12.

The retrospective analysis of fishing mortality, recruitment and spawning stock biomass of this XSA is shown in Figure 5.13. 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 development of recent small year classes should be carefully inspected.

It has been questioned if a rather heavy shrinkage of 0.5 is the most appropriate for a stock like Faroe haddock where biological parameters and fishing mortality (catchability) are closely linked to productivity changes in the ecosystem. In order to investigate the possible effect of the shrinkage, the 2010 NWWG carried out an exploratory XSA without shrinkage (Shr. 2.0). Based on that it was concluded to carry on with a shrinkage of 0.5 and this shrinkage was also applied this year.

Results. The fishing mortalities from the final XSA run are given in Table 5.10 and in Figure 5.14. 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 0.46. Since then the fishing mortality decreased to below the F_{MSY} and F_{pa} in 2008 but in the 2013 assessment the 2009 fishing mortality point value is estimated just above the FMSY and those in 2010 and 2011 at 0.37 and 0.34, respectively. The 2012 point estimate is 0.26, close to F_{MSY} and F_{pa}.

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 5.16. From Figure 5.15, showing the recruit/spawning stock relationship, and from Table 5.17, $\mathbf{F}_{med}$, and $\mathbf{F}_{high}$ were calculated at 0.23 and 0.88, respectively. The F_{max} of 0.61 should not be used since it is very poorly determined due to the flat YPR curve. $F_{0.1}$ is estimated at 0.22. The F35%SPR was estimated at 0.24.

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 σ of about 0.3 to account for the uncertainties in the assessment.

The working group in 2012 investigated possible candidates for F_{MSY}. Based on

Medium-term projections the NWWG suggested, that FMSY preliminary could be set at 0.25 and the MSY $B_{trigger}$ at 40 thous. t (same as B_{pa}) These values were accepted by

ACOM. No further analysis have been conducted this year, but it is anticipated that such work will be untertaken in connection with the next benchmark assessment. See the stock annex for more details.

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 5.14. According to this assessment, the period up to the mid 1970s was characterized by relative high and stable landings, recruitment and spawning stock biomass and the stock was able to withstand relatively high fishing mortalities. Since then the spawning stock biomass has shown large fluctuations due to cyclical changes in recruitment, growth and maturity (Figures 5.5 and 5.6). The fishing mortality seem not to be the decisive factor in this development since it most of the period has fluctuated around the F_{pa}

The most recent increase in the spawning stock is due to new strong year classes entering the stock of which the 1999 year class is the highest on record (102 mio. at age 2). Also the YC's from 2000 and 2001 are estimated well above average and the 2002 YC above average, but the more recent YC's are all estimated or predicted to be very small except the 2009 YC, which is estimated to be slightly below the half of the average for the whole series back to 1957 and the 2012 YC which is estimated as approximately one third of the average. During the last decade or so, the fishing mortality has increased in years with high stock biomass, even above f_{lim}.

5.7 Short term forecast

Input data

The input data for the short-term predictions are estimated in accordance with the procedures last year and given in Tables 5.13-14. All year classes up to 2011 are taken directly from the 2013 final XSA, the 2012 year class at age 2 is estimated from the 2013 XSA age 1 applying a natural mortality of 0.2 in a forward calculation of the numbers using basic VPA equations. The YC 2013 at age 2 in 2015 is estimated as the geometric mean of the 2-year-olds since 2005. This procedure was introduces in 2011 . All available information suggests that using the recent short series with poor recruitment is more appropriate than the longer period used in the past. However, the choice of recruitment in 2015 has little effect on the short term prediction. The exploitation pattern used in the prediction was derived from averaging the 2010–2012 fishing mortality matrices from the final VPA without re-scaling to 2011 since the fishing mortalities fluctuate without a trend. 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 increased again since 2007. After inspection of the mean weights at age since 1976, the mean weight-at-age for ages 4-10 in 2013-2015 was set equal to the average weights for 2010-2012 since the recent weights fluctuate without any clear trend.The maturity ogive for 2013 is estimated as the average of the observed maturities in the Faroese Groundfish Spring Survey 2012-2013, and the ogives in 2014-2015 are estimated as the average of the 2011-2013 values.

5.7.1 Results

Although the allocated number of fishing days for the fishing year 2012-2013was reduced for some fleets as compared to the year before (see section 2), it should not be

unrealistic to assume fishing mortalities in 2013 as the average of some recent years, here the average of F(2010-2012), since not all allocated days were actually used; however, possible changes in the catchability of the fleets (which seems to be linked to productivity changes in the environment) could undermine this assumption; price differences between cod and haddock may also influence this assumption. The landings in 2013 are then predicted to be about 3 700 t, and continuing with this fishing mortality will result in 2014 landings of about 2 900 t. The SSB will stay at 14 600 t in 2013, will decline to 11 800 t in 2014 and increase to 13 000 t in 2015 i.e. will be far below the B_{lim} (22 000t) in the next few years. The results of the short-term prediction are shown in Table 5.15 and in Figure 5.16. The contribution by year-classes to the age composition of the predicted 2014 and 2015 SSB's is shown in Figure 5.17. It should be noted that the YC 2012 which not yet have entered the fishery, contribute by 40% of the SSB in 2015.

5.8 Medium term forecasts and yield per recruit

No medium term projections were made this year; however, last years projections, which were the basis for suggested MSY reference points, are presented in the stock annex.

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 1977–2011 period. The maturity o-gives are averages for the years 1982-2011. The exploitation pattern is the same as in the short term prediction.

The results are given in Table 5.16, in Figure 5.20 and under Reference points (section 5.5).

5.9 Uncertainties in assessment and forecast

Retrospective analyses indicate periods with tendencies to overestimate spawning stock biomass and underestimate fishing mortality and vice versa. Similar things can be seen with the recruitment. This years assessment indicates that the 2012 assessment underestimated the 2011 recruitment by around 12% (12 mio. versus 14 mio.), undererestimated the fishing mortality in 2011 by 31% (0.26 versus 0.34) and overestimated the 2011 total- and spawning stock biomasses by 55% and 11%, respectively (23 and 15 thous. t versus 21 and 13 thous. t).

Recruitment estimates from surveys are not very consistent for small cohorts..

The sampling of the catches for length measurements, otolith readings and length-weight relationships has improved as compared to 2007-2009, and was considered to be adequate in 2010; however, the level of sampling decreased again in 2011-2012 and although it is regarded to be adequate for the assessment, there is a need to improve it again (see 5.2).

5.10 Comparison with previous assessment and forecast

As explained previously in the report, this assessment is an update of the 2012 assessment. The only changes are minor revisions of recent landings according to revised data and corresponding revisions of the c@age input. All other input files (VPA and tuning fleets) are the same except for the addition of the 2012 data.

Following differences in the 2011 estimates were observed as compared to last year:

Comparisons between 2012 and 2013 assessment of 2011 data

The year of comparison is 2011

	R at age 2 (thousands)	Total B (tonnes)	SSB (tonnes)	Landings (tonnes)	F (3-7)
2012 spaly	12339	22564	15177	3489	0.2614
2013 spaly	13828	21438	13492	3540	0.3433
%-change	12	-5	-11	1	31

5.11 Management plans and evaluations

There is no explicit management plan for this stock. A management system based on number of fishing days, closed areas and other technical measures was introduced in 1996 with the purpose to ensuring sustainable fisheries. There has been some work with establishing a management plan with a harvest control role for cod, haddock and saithe including a recovery plan, but the proposal has not yet been officially accepted. 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 on average 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 allocated fishing days, gear specifications, closed areas during spawning times, closed areas for longlining close to land and large areas closed to trawling. As a consequence, around 80% of the haddock 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, and since 2011 no agreement has been made between the Faroe Islands and EU and Norway, respectively, due to the dispute on mackerel quota sharing. 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 2000-2012 and Working Group estimates in Vb.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 [2]
Faroe Islands	13,620	13,457	20,776 [8]	21,615	18,995	18,172	15,600	11,689	6,728	4,895	4,932	3,350	2,475
France[1]	6	8	2	4	1	+	12 [7]	4 [7]	3 [7]	2 [7]	1	3	
Germany	1	2	6	1	6		1						
Greenland	22	0	4 [6]				1	9 [5]		6 [7]	12	+	1 [6]
Iceland			4										3
Norway	355	257	227	265	229	212	57	61	26	8	5		
Russia					16				10				
Spain					49								
UK (Engl. and W	19	4	11 [7]	14	8	1	1						
UK (Scotland)[11]				185	186	126	106	35	60	64			
United Kingdom											73		
Total	14,023	13,728	21,030	22,084	19,490	18,511	15,778	11,798	6,827	4,975	5,023	3,353	2,479
Working Group e	15,821	15,890	24,933	27,072	23,101	20,455	17,154	12,631	7,388	5,197	5,202	3,540	2,613

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 Faroe Marine Research Institute

9) Included in Vb2

10) Includes 14 reported as Vb

Table 5.2 Faroe Bank (Sub-division Vb2) HADDOCK. Nominal catches (tonnes) by countries, 2000-2012.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 [2]
Faroe Islands	1,565 [5]	1,948	3,698	4,934	3,594	2,444	1,375	810	556	192	178	194	134
France1						+							
Norway	48	66	28	54	17	45	1	8		3	1		
UK (Engl. and Wales)	:	:	:	:	:	[1]							
UK (Scotland)3	185	148	177	[4]	:	[4]		15	5	27 [4]			
Total	1,798	2,162	3,903	4,988	3,611	1,944	1,376	833	561	222	179	194	134

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 1985-2012 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	2009	2010	2011	2012
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	4	6	7	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	27	27	40	41
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	30	47	35	34
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	13	4	4	6
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	2	2	3	5
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	5	3	2	2
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	18	11	9	5
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	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	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	0	0	0	0

Table 5.4

Catch at age 2012

Age	Vb LLiners < 100GRT	Vb LLiners > 100GRT	Vb OB trawl	Vb Pair trawl.	Vb Others	Vb All Faroese fleets	Vb Foreign Trawlers	Vb Total All fleets
1	1	0	0	0	0	0	0	0
2	6	1	0	1	0	8	0	8
3	648	146	69	89	16	951	1	952
4	265	145	33	66	8	508	1	509
5	65	51	12	27	3	155	0	155
6	39	45	10	19	2	113	0	113
7	40	60	7	15	2	122	0	122
8	32	38	6	16	2	93	0	93
9	58	74	11	27	3	170	0	170
10	30	30	3	8	1	70	0	70
11	9	18	1	3	1	32	0	32
12	2	4	0	1	0	7	0	7
13	1	3	0	0	0	4	0	4
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
Total no.	1195	615	153	271	37	2233	3	2235
Catch, t.	1133	751	139	289	39	2351	3	2354

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 tr; Pair Trawl. = Pair trawlers

Comm. Sampling 2012	Vb1 Open Boats	Vb1 LLiners < 100GRT	Vb1 LLiners > 100GRT	Vb1 OB. trawl.	Vb1 Pair trawl.	Vb1 All Faroese Fleets	Vb2 All Faroese LLiners	Vb2 All Faroese trawlers	Vb2 All Faroese Fleets	Vb Total
No. samples	3	8	23	9	24	67	0	0	0	67
No. lengths	664	1562	5192	1995	5652	15065	0	0	0	15065
No. weights	664	1562	5192	1995	5447	14860	0	0	0	14860
No. ages	180	179	478	179	360	1376	0	0	0	1376

Tabel 5.5 Faroe haddock. Catch number-at-age

Run title : FAROE HADDOCK (ICES DIVISION Vb) HAD_IND

At 19/04/2013 13:54

Table 1 Catch numbers at age Numbers*10**-3

YEAR,	1957,	1958,	1959,	1960,	1961,	1962,
AGE						
0,	0,	0,	0,	0,	0,	0,
1,	45,	116,	525,	854,	941,	784,
2,	4133,	6255,	3971,	6061,	7932,	9631,
3,	7130,	8021,	7663,	10659,	7330,	13977,
4,	8442,	5679,	4544,	6655,	5134,	5233,
5,	1615,	3378,	2056,	2482,	1937,	2361,
6,	894,	1299,	1844,	1559,	1305,	1407,
7,	585,	817,	721,	1169,	838,	868,
8,	227,	294,	236,	243,	236,	270,
9,	94,	125,	98,	85,	59,	72,
+gp,	58,	105,	47,	28,	13,	22,
TOTALNUM,	23223,	26089,	21705,	29795,	25725,	34625,
TONSLAND,	20995,	23871,	20239,	25727,	20831,	27151,
SOPCOF %,	89,	90,	90,	88,	88,	89,

Table 1 Catch numbers at age Numbers*10**-3

YEAR,	1963,	1964,	1965,	1966,	1967,	1968,	1969,	1970,	1971,	1972,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	356,	46,	39,	90,	70,	49,	95,	57,	55,	43,
2,	13552,	2284,	1368,	1081,	1425,	5881,	2384,	1728,	717,	750,
3,	8907,	7457,	4286,	3304,	2405,	4097,	7539,	4855,	4393,	3744,
4,	7403,	3899,	5133,	4804,	2599,	2812,	4567,	6581,	4727,	4179,
5,	2242,	2360,	1443,	2710,	1785,	1524,	1565,	1624,	3267,	2706,
6,	1539,	1120,	1209,	1112,	1426,	1526,	1485,	1383,	1292,	1171,
7,	860,	728,	673,	740,	631,	923,	1224,	1099,	864,	696,
8,	257,	198,	1345,	180,	197,	230,	378,	326,	222,	180,
9,	75,	49,	43,	54,	52,	68,	114,	68,	147,	113,
+gp,	23,	7,	8,	9,	13,	12,	20,	10,	102,	95,
TOTALNUM,	35214,	18148,	15547,	14084,	10603,	17122,	19371,	17731,	15786,	13677,
TONSLAND,	27571,	19490,	18479,	18766,	13381,	17852,	23272,	21361,	19393,	16485,
SOPCOF %,	89,	101,	94,	109,	101,	102,	108,	102,	97,	96,

Table 1 Catch numbers at age Numbers*10**-3

YEAR,	1973,	1974,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	665,	253,	94,	40,	0,	0,	1,	0,	0,	0,
2,	3311,	5633,	7337,	4396,	255,	32,	1,	143,	74,	539,
3,	8416,	2899,	7952,	7858,	4039,	1022,	1162,	58,	455,	934,
4,	1240,	3970,	2097,	6798,	5168,	4248,	1755,	3724,	202,	784,
5,	2795,	451,	1371,	1251,	4918,	4054,	3343,	2583,	2586,	298,
6,	919,	976,	247,	1189,	2128,	1841,	1851,	2496,	1354,	2182,
7,	1054,	466,	352,	298,	946,	717,	772,	1568,	1559,	973,
8,	150,	535,	237,	720,	443,	635,	212,	660,	608,	1166,
9,	68,	68,	419,	258,	731,	243,	155,	99,	177,	1283,
+gp,	11,	147,	187,	318,	855,	312,	74,	86,	36,	214,
TOTALNUM,	18629,	15398,	20293,	23126,	19483,	13104,	9326,	11417,	7051,	8373,
TONSLAND,	18035,	14773,	20715,	26211,	25555,	19200,	12424,	15016,	12233,	11937,
SOPCOF %,	97,	97,	117,	107,	98,	99,	104,	100,	109,	92,

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

Table 1	Catch numbers at age									Numbers*10**-3
YEAR,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	0,	25,	0,	0,	0,	0,	0,	0,	0,	0,
2,	441,	1195,	985,	230,	283,	655,	63,	105,	77,	40,
3,	1969,	1561,	4553,	2549,	1718,	444,	1518,	1275,	1044,	154,
4,	383,	2462,	2196,	4452,	3565,	2463,	658,	1921,	1774,	776,
5,	422,	147,	1242,	1522,	2972,	3036,	2787,	768,	1248,	1120,
6,	93,	234,	169,	738,	1114,	2140,	2554,	1737,	651,	959,
7,	1444,	42,	91,	39,	529,	475,	1976,	1909,	1101,	335,
8,	740,	861,	61,	130,	83,	151,	541,	885,	698,	373,
9,	947,	388,	503,	71,	48,	18,	133,	270,	317,	401,
+gp,	795,	968,	973,	712,	334,	128,	81,	108,	32,	162,
TOTALNUM,	7234,	7883,	10773,	10443,	10646,	9510,	10311,	8978,	6942,	4320,
TONSLAND,	12894,	12378,	15143,	14477,	14882,	12178,	14325,	11726,	8429,	5476,
SOPCOF %,	106,	106,	106,	101,	102,	97,	100,	102,	106,	106,

Table 1	Catch numbers at age									Numbers*10**-3
YEAR,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	43,	1,	0,	1,	0,	0,	9,	73,	19,	0,
2,	113,	277,	804,	326,	77,	106,	174,	1461,	4380,	1515,
3,	298,	191,	452,	5234,	2913,	1055,	1142,	3061,	3128,	14039,
4,	274,	307,	235,	1019,	10517,	5269,	942,	210,	2423,	2879,
5,	554,	153,	226,	179,	710,	9856,	4677,	682,	173,	1200,
6,	538,	423,	132,	163,	116,	446,	6619,	2685,	451,	133,
7,	474,	427,	295,	161,	123,	99,	226,	2846,	1151,	239,
8,	131,	383,	290,	270,	93,	87,	26,	79,	1375,	843,
9,	201,	125,	262,	234,	220,	95,	20,	1,	17,	1095,
+gp,	185,	301,	295,	394,	516,	502,	192,	71,	18,	33,
TOTALNUM,	2811,	2588,	2991,	7981,	15285,	17515,	14027,	11169,	13135,	21976,
TONSLAND,	4026,	4252,	4948,	9642,	17924,	22210,	18482,	15821,	15890,	24933,
SOPCOF %,	103,	100,	103,	100,	103,	101,	100,	103,	100,	100,

Table 1	Catch numbers at age									Numbers*10**-3
YEAR,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,	2012,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	0,	3,	0,	0,	0,	6,	0,	0,	0,	0,
2,	133,	243,	85,	247,	76,	66,	27,	389,	170,	8,
3,	3436,	2007,	1671,	446,	982,	204,	329,	445,	773,	952,
4,	13551,	4802,	3852,	2566,	547,	918,	402,	426,	324,	509,
5,	2224,	10426,	6753,	3949,	2732,	424,	555,	279,	198,	155,
6,	949,	1163,	6127,	5423,	3309,	1471,	514,	484,	186,	113,
7,	163,	409,	542,	3278,	2758,	1706,	1133,	553,	280,	122,
8,	334,	89,	147,	136,	1117,	1254,	739,	718,	353,	93,
9,	858,	166,	28,	63,	89,	320,	285,	444,	367,	170,
+gp,	924,	811,	154,	70,	9,	39,	48,	159,	187,	113,
TOTALNUM,	22572,	20119,	19359,	16178,	11619,	6408,	4032,	3897,	2838,	2235,
TONSLAND,	27072,	23101,	20455,	17154,	12631,	7388,	5197,	5202,	3540,	2613,
SOPCOF %,	100,	99,	100,	100,	100,	101,	100,	101,	101,	102,

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

Run title : FAROE HADDOCK (ICES DIVISION Vb) HAD_IND

At 19/04/2013 13:54

Table 2 Catch weights at age (kg) YEAR,	1957,	1958,	1959,	1960,	1961,	1962,
AGE						
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.2500,	.2500,	.2500,	.2500,	.2500,	.2500,
2,	.4700,	.4700,	.4700,	.4700,	.4700,	.4700,
3,	.7300,	.7300,	.7300,	.7300,	.7300,	.7300,
4,	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,
6,	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,
8,	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,
+gp,	3.5500,	3.5500,	3.5500,	3.5500,	3.5500,	3.5500,
SOPCOFAC,	.8937,	.8983,	.9034,	.8832,	.8832,	.8929,

Table 2 Catch weights at age (kg) YEAR,	1963,	1964,	1965,	1966,	1967,	1968,	1969,	1970,	1971,	1972,
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,	.8915,	1.0111,	.9383,	1.0885,	1.0117,	1.0246,	1.0787,	1.0249,	.9688,	.9597,

Table 2 Catch weights at age (kg) YEAR,	1973,	1974,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.2500,	.2500,	.2500,	.2500,	.0000,	.0000,	.3000,	.0000,	.0000,	.0000,
2,	.4700,	.4700,	.4700,	.4700,	.3110,	.3570,	.3570,	.6430,	.4520,	.7000,
3,	.7300,	.7300,	.7300,	.7300,	.6330,	.7900,	.6720,	.7130,	.7250,	.8960,
4,	1.1300,	1.1300,	1.1300,	1.1300,	1.0440,	1.0350,	.8940,	.9410,	.9570,	1.1500,
5,	1.5500,	1.5500,	1.5500,	1.5500,	1.4260,	1.3980,	1.1560,	1.1570,	1.2370,	1.4440,
6,	1.9700,	1.9700,	1.9700,	1.9700,	1.8250,	1.8700,	1.5900,	1.4930,	1.6510,	1.4980,
7,	2.4100,	2.4100,	2.4100,	2.4100,	2.2410,	2.3500,	2.0700,	1.7390,	2.0530,	1.8290,
8,	2.7600,	2.7600,	2.7600,	2.7600,	2.2050,	2.5970,	2.5250,	2.0950,	2.4060,	1.8870,
9,	3.0700,	3.0700,	3.0700,	3.0700,	2.5700,	3.0140,	2.6960,	2.4650,	2.7250,	1.9610,
+gp,	3.5500,	3.5500,	3.5500,	3.5500,	2.5910,	2.9200,	3.5190,	3.3100,	3.2500,	2.8560,
SOPCOFAC,	.9690,	.9678,	1.1696,	1.0741,	.9784,	.9947,	1.0380,	1.0017,	1.0870,	.9238,

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

Table 2	Catch weights at age (kg)									
YEAR,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.3590,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.4700,	.6810,	.5280,	.6080,	.6050,	.5010,	.5800,	.4380,	.5470,	.5250,
3,	.7400,	1.0110,	.8590,	.8870,	.8310,	.7810,	.7790,	.6990,	.6930,	.7240,
4,	1.0100,	1.2550,	1.3910,	1.1750,	1.1260,	.9740,	.9230,	.9390,	.8840,	.8170,
5,	1.3200,	1.8120,	1.7770,	1.6310,	1.4620,	1.3630,	1.2070,	1.2040,	1.0860,	1.0380,
6,	1.6600,	2.0610,	2.3260,	1.9840,	1.9410,	1.6800,	1.5640,	1.3840,	1.2760,	1.2490,
7,	2.0500,	2.0590,	2.4400,	2.5190,	2.1730,	1.9750,	1.7460,	1.5640,	1.4770,	1.4300,
8,	2.2600,	2.1370,	2.4010,	2.5830,	2.3470,	2.3440,	2.0860,	1.8180,	1.5740,	1.5640,
9,	2.5400,	2.3680,	2.5320,	2.5700,	3.1180,	2.2480,	2.4240,	2.1680,	1.9300,	1.6330,
+gp,	3.0400,	2.6860,	2.6860,	2.9220,	2.9330,	3.2950,	2.5140,	2.3350,	2.1530,	2.1260,
SOPCOFAC,	1.0554,	1.0593,	1.0559,	1.0141,	1.0197,	.9695,	1.0025,	1.0195,	1.0635,	1.0554,

Table 2	Catch weights at age (kg)									
YEAR,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.3600,	.0000,	.0000,	.3600,	.0000,	.0000,	.2780,	.2800,	.2800,	.0000,
2,	.7550,	.7540,	.6660,	.5340,	.5190,	.6220,	.5040,	.6610,	.6080,	.5840,
3,	.9820,	1.1030,	1.0540,	.8580,	.7710,	.8460,	.6240,	.9360,	.9400,	.8570,
4,	1.0270,	1.2540,	1.4890,	1.4590,	1.0660,	1.0160,	.9740,	1.1660,	1.3740,	1.4050,
5,	1.1920,	1.4650,	1.7790,	1.9930,	1.7990,	1.2830,	1.2200,	1.4830,	1.7790,	1.7990,
6,	1.3780,	1.5930,	1.9400,	2.3300,	2.2700,	2.0800,	1.4900,	1.6160,	1.9710,	1.9740,
7,	1.6430,	1.8040,	2.1820,	2.3510,	2.3400,	2.5560,	2.4560,	1.8930,	2.1190,	2.3010,
8,	1.7960,	2.0490,	2.3570,	2.4690,	2.4750,	2.5720,	2.6580,	2.8210,	2.3730,	2.3700,
9,	1.9710,	2.2250,	2.4900,	2.7770,	2.5010,	2.4520,	2.5980,	3.7490,	2.7500,	2.6260,
+gp,	2.2400,	2.4230,	2.6780,	2.5820,	2.6760,	2.7530,	2.9530,	3.1960,	3.9660,	3.1300,
SOPCOFAC,	1.0320,	.9969,	1.0331,	1.0043,	1.0250,	1.0106,	.9973,	1.0349,	.9960,	1.0010,

Table 2	Catch weights at age (kg)									
YEAR,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,	2012,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.3670,	.0000,	.0000,	.0000,	.4910,	.0000,	.0000,	.0000,	.0000,
2,	.5710,	.5740,	.5380,	.4750,	.6280,	.6360,	.4820,	.6920,	.5530,	.6190,
3,	.7150,	.7700,	.6490,	.6010,	.6690,	.7540,	.7340,	.8700,	.8150,	.7860,
4,	1.0080,	.8870,	.7970,	.7680,	.8590,	.8600,	.9850,	1.1490,	1.0860,	1.0690,
5,	1.5370,	1.1590,	1.0200,	.9110,	.9690,	.9910,	1.1300,	1.3080,	1.3030,	1.4050,
6,	1.9110,	1.6380,	1.2450,	1.1260,	1.0600,	1.0820,	1.2640,	1.3860,	1.3870,	1.6160,
7,	2.0910,	1.8700,	1.8430,	1.3740,	1.2450,	1.1510,	1.3570,	1.4290,	1.4690,	1.6560,
8,	2.3010,	2.4380,	2.0610,	2.1580,	1.4750,	1.3790,	1.5450,	1.5680,	1.5380,	1.6750,
9,	2.4060,	2.3570,	2.2630,	2.2110,	2.2660,	1.7270,	1.7920,	1.7400,	1.7020,	1.7270,
+gp,	2.5350,	2.4170,	2.5790,	2.5690,	2.2560,	2.4350,	2.1540,	1.8410,	1.8620,	1.9050,
SOPCOFAC,	1.0049,	.9929,	.9988,	.9987,	.9999,	1.0065,	.9955,	1.0076,	1.0060,	1.0190,

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

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

   At 19/04/2013  13:54


      Table  5    Proportion mature at age
      YEAR,       1957,    1958,    1959,    1960,    1961,    1962,

      AGE
        0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
        1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
        2,        .0600,   .0600,   .0600,   .0600,   .0600,   .0600,
        3,        .4800,   .4800,   .4800,   .4800,   .4800,   .4800,
        4,        .9100,   .9100,   .9100,   .9100,   .9100,   .9100,
        5,       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,
        7,       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,
        9,       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,
```

```
Table  5    Proportion mature at age
YEAR,       1963,    1964,    1965,    1966,    1967,    1968,    1969,    1970,    1971,    1972,

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,       1973,    1974,    1975,    1976,    1977,    1978,    1979,    1980,    1981,    1982,

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,   .0800,
  3,        .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .4800,   .6200,
  4,        .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .9100,   .8900,
  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 YEAR,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0800,	.0800,	.0300,	.0300,	.0500,	.0500,	.0200,	.0800,	.1600,	.1800,
3,	.6200,	.7600,	.6200,	.4300,	.3200,	.2400,	.2200,	.3700,	.5800,	.6500,
4,	.8900,	.9800,	.9600,	.9500,	.9100,	.8900,	.8700,	.9000,	.9300,	.9100,
5,	1.0000,	1.0000,	1.0000,	.9900,	.9800,	.9800,	.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 Proportion mature at age YEAR,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.1100,	.0500,	.0300,	.0300,	.0100,	.0100,	.0100,	.0200,	.0900,	.0800,
3,	.5000,	.4200,	.4700,	.4700,	.4700,	.3600,	.3500,	.3600,	.5400,	.4900,
4,	.8500,	.8600,	.9100,	.9300,	.9100,	.8700,	.8600,	.8700,	.9300,	.9700,
5,	.9700,	.9600,	.9600,	.9800,	1.0000,	.9900,	.9900,	.9900,	1.0000,	1.0000,
6,	.9900,	.9900,	.9900,	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,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,	2012,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0700,	.0000,	.0100,	.0100,	.0200,	.0100,	.0100,	.0300,	.0900,	.1400,
3,	.4500,	.3500,	.3400,	.4200,	.5200,	.6400,	.6100,	.6500,	.7400,	.7900,
4,	.9700,	.9400,	.9100,	.9100,	.9100,	.9500,	.9300,	.9600,	.9700,	1.0000,
5,	.9900,	.9900,	.9900,	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 5.8 Faroe haddock. 2013 tuning file.

```
FAROE Haddock (ICES SUBDIVISION VB)       COMB-SURVEY-SPALY-13-jr.txt
102
SUMMER SURVEY
1996 2012
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   8968.12  8908.60  6973.94 3364.52  125.74
200    3908.73  7047.44  1676.69   1520.65  4177.57  5114.12 2491.34  552.65
200    4682.23  1967.06  1153.27   2544.21   995.53  3105.84 3178.90 1379.37
200   10461.67  1394.00   410.40   1336.32  1270.33   933.93 2228.54 1224.04
200   24598.14  3779.02  1315.66   1091.24   571.38   809.59  763.94 1276.77
200     642.08 10501.38  1670.76    406.26   355.99   208.31  223.15  290.88
200    2359.69   405.59  5655.72   1081.33   205.64   135.56  147.14   95.56
SPRING SURVEY SHIFTED
1993 2012
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  3267.40   1577.20
100   1191.70   1873.30   4202.40   1008.90   3511.30  3712.50   2875.00
100    667.90   2182.60    820.20   1694.90    599.50  1665.00   1463.80
100   4119.00   2079.00   1125.10    405.90    916.80   371.50    924.90
100   6945.00   4655.30    638.10    418.70    196.20   280.20    265.90
100    101.10   6015.40   1923.10    897.70    248.00   160.60    327.00
100    420.00    367.60   4957.20    908.00    227.80   142.50    293.30
100   3419.90   1232.21    302.60   4022.40    619.60   120.30    103.78
```

Table 5.9 Faroe haddock 2013 xsa.

```
Lowestoft VPA Version 3.1

  19/04/2013  13:51

Extended Survivors Analysis

FAROE HADDOCK (ICES DIVISION Vb)                 HAD_IND

CPUE data from file D:\Vpa\vpa2013\input-files\comb-survey-spaly-13-jr.txt

Catch data for  56 years. 1957 to 2012. Ages  0 to  10.

     Fleet,            First, Last, First, Last, Alpha,  Beta
                     ,    year, year,  age ,  age
SUMMER SURVEY        ,   1996, 2012,   1,     8,   .600,   .700
SPRING SURVEY SHIFTE,   1993, 2012,   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   40 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,  2003,  2004,  2005,  2006,  2007,  2008,  2009,  2010,  2011,  2012

     0,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000
     1,  .000,  .000,  .000,  .000,  .000,  .002,  .000,  .000,  .000,  .000
     2,  .004,  .010,  .011,  .037,  .027,  .027,  .012,  .076,  .014,  .020
     3,  .083,  .067,  .084,  .074,  .203,  .093,  .184,  .279,  .212,  .099
     4,  .336,  .159,  .177,  .180,  .122,  .297,  .266,  .386,  .337,  .211
     5,  .547,  .471,  .352,  .278,  .295,  .132,  .295,  .299,  .311,  .266
     6,  .683,  .625,  .565,  .535,  .399,  .256,  .233,  .455,  .334,  .293
     7,  .629,  .725,  .681,  .687,  .578,  .369,  .321,  .424,  .523,  .383
     8,  .570,  .876,  .631,  .355,  .529,  .570,  .269,  .347,  .530,  .326
     9,  .505,  .628,  .774,  .616,  .417,  .280,  .240,  .257,  .299,  .529
```

Table 5.9 Faroe haddock 2013 xsa (cont.)

XSA population numbers (Thousands)

	AGE								
YEAR ,	0,	1,	2,	3,	4,	5,	6,	7,	8,	9,
2003 ,	1.27E+04,	3.45E+04,	4.19E+04,	4.78E+04,	5.24E+04,	5.84E+03,	2.12E+03,	3.86E+02,	8.50E+02,	2.39E+03,
2004 ,	1.12E+04,	1.04E+04,	2.83E+04,	3.42E+04,	3.60E+04,	3.07E+04,	2.77E+03,	8.76E+02,	1.68E+02,	3.93E+02,
2005 ,	4.76E+03,	9.14E+03,	8.53E+03,	2.29E+04,	2.62E+04,	2.51E+04,	1.57E+04,	1.21E+03,	3.47E+02,	5.74E+01,
2006 ,	4.05E+03,	3.90E+03,	7.49E+03,	6.90E+03,	1.73E+04,	1.80E+04,	1.45E+04,	7.29E+03,	5.03E+02,	1.51E+02,
2007 ,	3.74E+03,	3.31E+03,	3.19E+03,	5.91E+03,	5.25E+03,	1.18E+04,	1.11E+04,	6.94E+03,	3.01E+03,	2.88E+02,
2008 ,	8.78E+03,	3.06E+03,	2.71E+03,	2.55E+03,	3.95E+03,	3.80E+03,	7.19E+03,	6.12E+03,	3.19E+03,	1.45E+03,
2009 ,	2.06E+04,	7.19E+03,	2.50E+03,	2.16E+03,	1.90E+03,	2.40E+03,	2.73E+03,	4.56E+03,	3.46E+03,	1.48E+03,
2010 ,	6.76E+02,	1.69E+04,	5.88E+03,	2.02E+03,	1.47E+03,	1.19E+03,	1.46E+03,	1.77E+03,	2.71E+03,	2.17E+03,
2011 ,	2.44E+03,	5.53E+02,	1.38E+04,	4.47E+03,	1.25E+03,	8.19E+02,	7.23E+02,	7.60E+02,	9.49E+02,	1.57E+03,
2012 ,	1.55E+04,	1.99E+03,	4.53E+02,	1.12E+04,	2.96E+03,	7.32E+02,	4.92E+02,	4.24E+02,	3.69E+02,	4.57E+02,

Estimated population abundance at 1st Jan 2013

, 0.00E+00, 1.27E+04, 1.63E+03, 3.64E+02, 8.28E+03, 1.96E+03, 4.59E+02, 3.00E+02, 2.37E+02, 2.18E+02,

Taper weighted geometric mean of the VPA populations:

, 2.30E+04, 1.93E+04, 1.66E+04, 1.38E+04, 9.21E+03, 5.59E+03, 3.41E+03, 1.93E+03, 9.53E+02, 4.52E+02,

Standard error of the weighted Log(VPA populations) :

, 1.1955, 1.2007, 1.1633, 1.0329, 1.0355, 1.0209, .9785, .9738, 1.1105, 1.3743,

Log catchability residuals.

Fleet : SUMMER SURVEY

Age ,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002
0 ,	No data for this fleet at this age									
1 ,	99.99,	99.99,	99.99,	1.05,	.12,	-.30,	-.37,	-.03,	.00,	.26
2 ,	99.99,	99.99,	99.99,	-.08,	.40,	-.18,	-.39,	.02,	.06,	-.04
3 ,	99.99,	99.99,	99.99,	.36,	.20,	-.40,	1.55,	.23,	.42,	.38
4 ,	99.99,	99.99,	99.99,	-.38,	.48,	.08,	-.48,	-.64,	.32,	.18
5 ,	99.99,	99.99,	99.99,	-.08,	.07,	.15,	.18,	-.10,	-.88,	.22
6 ,	99.99,	99.99,	99.99,	.22,	.44,	-.27,	.09,	.09,	-.36,	-.50
7 ,	99.99,	99.99,	99.99,	-.01,	-.34,	.98,	.29,	.07,	-.01,	-.38
8 ,	99.99,	99.99,	99.99,	-.07,	.17,	.62,	.44,	.28,	-.06,	-.28

Age ,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,	2012
0 ,	No data for this fleet at this age									
1 ,	.03,	-.43,	.17,	-.41,	-.13,	.13,	.08,	.08,	-.14,	-.12
2 ,	-.06,	.26,	-.01,	.36,	.89,	-.22,	-.49,	-.31,	-.18,	-.01
3 ,	-.13,	-.22,	.04,	-.63,	-.57,	-.18,	-.99,	.31,	-.29,	-.06
4 ,	.40,	-.12,	.21,	.02,	-.60,	.31,	.38,	.51,	-.35,	-.31
5 ,	.63,	.36,	.12,	.15,	-.18,	-.59,	.22,	.13,	.03,	-.43
6 ,	-.12,	-.07,	.76,	.28,	.14,	-.01,	-.26,	.37,	-.37,	-.44
7 ,	-.26,	-.42,	.25,	.33,	.01,	.25,	.16,	.10,	-.22,	-.15
8 ,	.35,	-.71,	-1.18,	-.49,	-.69,	.19,	-.20,	.14,	-.18,	-.48

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,	-4.8755,	-5.2522,	-5.7225,	-5.7255,	-5.8346,	-5.8309,	-5.8309,	-5.8309,
S.E(Log q),	.3417,	.3333,	.5630,	.3923,	.3611,	.3470,	.3448,	.4918,

Table 5.9 Faroe haddock 2013 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,     .97,     .424,      4.99,     .95,     17,     .34,   -4.88,
  2,    1.00,     .060,      5.27,     .95,     17,     .34,   -5.25,
  3,     .93,     .659,      5.98,     .85,     17,     .53,   -5.72,
  4,     .90,    1.614,      6.06,     .94,     17,     .34,   -5.73,
  5,     .90,    1.935,      6.10,     .96,     17,     .30,   -5.83,
  6,     .91,    1.717,      6.02,     .96,     17,     .30,   -5.83,
  7,    1.00,     .062,      5.80,     .94,     17,     .35,   -5.79,
  8,    1.06,    -.639,      5.92,     .90,     17,     .51,   -5.96,


 Fleet : SPRING SURVEY SHIFTE

  Age  ,  1993,  1994,  1995,  1996,  1997,  1998,  1999,  2000,  2001,  2002
     0 ,  -.68,   .86,   .79, -1.20,  -.38,  -.45,  -.26,   .24,   .42,   .01
     1 ,  -.57,  -.97,   .31,   .50,  -.27,  -.21,  -.32,  -.42,  -.60,  -.01
     2 ,  -.67,  -.77,  -.19,   .34,   .41, -2.08,   .25,  -.36,   .07,  -.09
     3 ,  -.15,  -.16,  -.38,   .50,   .34,   .12,  -.63,  -.63,  -.34,  -.08
     4 ,  -.34,  -.22,  -.16,   .41,   .51,   .23,  -.39, -1.95,  -.13,  -.40
     5 ,  -.32, -1.11,  -.28,  1.00,   .60,  -.21,  -.05, -1.21,  -.96,  -.46
     6 ,   .20,  -.58,  -.49,  -.29,  -.86,  -.43,   .00,  -.77,  -.68, -1.13
     7 , No data for this fleet at this age
     8 , No data for this fleet at this age


  Age  ,  2003,  2004,  2005,  2006,  2007,  2008,  2009,  2010,  2011,  2012
     0 ,  -.43,   .85,  -.40,   .29,  -.21,   .75,   .42,  -.39,  -.25,   .00
     1 ,   .05,   .27,   .44,   .08,   .40,   .43,   .38,  -.22,   .41,   .33
     2 ,   .00,   .11,  -.28,   .86,   .06,   .54,   .04,   .35,   .38,  1.01
     3 ,  -.24,  -.11,  -.02,  -.32,   .49,  -.21,   .07,  1.00,   .15,   .61
     4 ,   .61,  -.08,  -.09,   .41,  -.22,   .66,  -.19,   .42,   .45,   .47
     5 ,   .02,   .60,   .28,   .67,   .30,  -.22,   .11,   .26,   .53,   .43
     6 ,  -.55,   .23,   .33,   .98,   .44,   .27,  -.03,  1.02,  1.50,   .81
     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,  -5.9198,  -5.2253,  -5.8067,  -5.9460,  -6.2358,  -6.3840,  -6.4862,
S.E(Log q),    .5656,    .4268,    .6606,    .4184,    .5829,    .6055,    .7095,
```

Table 5.9 Faroe haddock 2013 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,     .94,     .675,      6.14,     .88,     20,     .54,   -5.92,
  1,    1.22,   -3.281,      4.29,     .92,     20,     .42,   -5.23,
  2,    1.02,    -.170,      5.74,     .82,     20,     .69,   -5.81,
  3,     .99,     .166,      5.99,     .91,     20,     .42,   -5.95,
  4,     .88,    1.439,      6.53,     .89,     20,     .50,   -6.24,
  5,     .96,     .445,      6.47,     .85,     20,     .59,   -6.38,
  6,     .90,     .853,      6.62,     .81,     20,     .64,   -6.49,


 Terminal year survivor and F summaries :

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

 Year class = 2012

 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,     12670.,   .580,       .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,
     12670.,       .58,      .00,    1,    .000,   .000


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

 Year class = 2011

 Fleet,                 Estimated,    Int,       Ext,    Var,    N, Scaled,
Estimated
     ,                 Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,      1442.,   .352,       .000,    .00,   1,  .496,     .000
 SPRING SURVEY SHIFTE,      1846.,   .349,       .280,    .80,   2,  .504,     .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,
      1633.,       .25,      .17,    3,    .667,   .000
```

Table 5.9 Faroe haddock 2013 xsa (cont.)

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

 Year class = 2010

 Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,
Estimated
      ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,       337.,   .245,       .065,    .27,   2,  .534,     .021
 SPRING SURVEY SHIFTE,       493.,   .310,       .353,   1.14,   3,  .334,     .015

   F shrinkage mean  ,       229.,    .50,,,,                        .131,
    .031

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
       364.,       .18,      .17,    6,    .974,   .020


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

 Year class = 2009

 Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,
Estimated
      ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,      7844.,   .226,       .086,    .38,   3,  .490,     .104
 SPRING SURVEY SHIFTE,     10871.,   .251,       .204,    .81,   4,  .398,     .076

   F shrinkage mean  ,      3999.,    .50,,,,                        .112,     .195

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
      8282.,       .16,      .15,    8,    .935,   .099


  Age  4   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       ,      1613.,   .199,       .102,    .51,   4,  .513,     .251
 SPRING SURVEY SHIFTE,      2871.,   .233,       .097,    .42,   5,  .366,     .149

   F shrinkage mean  ,      1407.,    .50,,,,                        .121,     .283

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
      1960.,       .15,      .11,   10,    .784,   .211
```

Table 5.9 Faroe haddock 2013 xsa (cont.)

```
 Age  5   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       ,       353.,   .181,       .138,    .76,   5,  .547,     .335
 SPRING SURVEY SHIFTE,       719.,   .224,       .164,    .73,   6,  .324,     .178

   F shrinkage mean  ,       457.,    .50,,,,                        .129,     .268

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
       459.,       .14,      .13,   12,    .943,   .266


1
 Age  6   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       ,       254.,   .168,       .158,    .94,   6,  .587,     .339
 SPRING SURVEY SHIFTE,       459.,   .221,       .093,    .42,   7,  .283,     .201

   F shrinkage mean  ,       255.,    .50,,,,                        .130,     .337

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
       300.,       .13,      .11,   14,    .830,   .293


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

 Year class = 2005

 Fleet,                 Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                  Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,       233.,   .155,       .163,   1.05,   7,  .635,     .388
 SPRING SURVEY SHIFTE,       277.,   .214,       .236,   1.10,   7,  .227,     .335

   F shrinkage mean  ,       196.,    .50,,,,                        .138,     .446

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
       237.,       .13,      .12,   15,    .893,   .383
```

Table 5.9 Faroe haddock 2013 xsa (cont.)

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

 Year class = 2004

 Fleet,                 Estimated,    Int,       Ext,    Var,    N, Scaled,
Estimated
      ,                 Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,       212.,   .167,       .129,    .77,   8,  .640,     .335
 SPRING SURVEY SHIFTE,       393.,   .218,       .118,    .54,   7,  .164,     .194

   F shrinkage mean  ,       147.,    .50,,,,                        .196,     .452

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
       218.,       .15,      .11,   16,    .744,   .326


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

 Year class = 2003

 Fleet,                 Estimated,    Int,       Ext,    Var,    N, Scaled,
Estimated
      ,                 Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,       171.,   .146,       .098,    .67,   8,  .559,     .642
 SPRING SURVEY SHIFTE,       190.,   .209,       .097,    .47,   7,  .195,     .593

   F shrinkage mean  ,       444.,    .50,,,,                        .246,
.298

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
       221.,       .15,      .13,   16,    .863,   .529
```

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

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

    At 19/04/2013  13:54

                  Terminal Fs derived using XSA (With F shrinkage)

       Table  8    Fishing mortality (F) at age
       YEAR,       1957,    1958,    1959,    1960,    1961,    1962,

       AGE
         0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,        .0010,   .0024,   .0132,   .0150,   .0219,   .0149,
         2,        .1394,   .1939,   .1066,   .2074,   .1875,   .3232,
         3,        .3707,   .4378,   .3860,   .4599,   .4162,   .5866,
         4,        .6163,   .5737,   .4782,   .6926,   .4209,   .5980,
         5,        .3909,   .5386,   .4195,   .5260,   .4387,   .3480,
         6,        .4380,   .6346,   .6458,   .6591,   .5879,   .6706,
         7,        .6340,   .9504,   .9184,  1.2130,   .9483,  1.0499,
         8,        .5599,   .7839,   .8206,   .9667,   .8742,   .9736,
         9,        .5321,   .7028,   .6625,   .8198,   .6600,   .7351,
        +gp,       .5321,   .7028,   .6625,   .8198,   .6600,   .7351,
      FBAR  3- 7,   .4900,   .6270,   .5696,   .7101,   .5624,   .6506,
```

```
    Table  8    Fishing mortality (F) at age
    YEAR,       1963,    1964,    1965,    1966,    1967,    1968,    1969,    1970,    1971,    1972,

    AGE
      0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
      1,        .0106,   .0018,   .0017,   .0032,   .0012,   .0014,   .0024,   .0033,   .0015,   .0016,
      2,        .3801,   .0876,   .0691,   .0610,   .0641,   .1261,   .0860,   .0551,   .0526,   .0253,
      3,        .5639,   .3723,   .2354,   .2370,   .1873,   .2647,   .2363,   .2528,   .1936,   .4226,
      4,        .7261,   .5193,   .4767,   .4515,   .2971,   .3483,   .5320,   .3344,   .4186,   .2853,
      5,        .5591,   .5369,   .3678,   .5006,   .2997,   .2847,   .3330,   .3639,   .2754,   .4517,
      6,        .4026,   .6107,   .5882,   .5421,   .5406,   .4540,   .4975,   .5561,   .5560,   .1495,
      7,       1.2493,   .3375,   .9618,   .9128,   .6906,   .8367,   .8277,   .8740,   .8385,   .6721,
      8,       1.1139,  1.2027,  2.3618,   .7509,   .6634,   .5851,  1.0631,   .5430,   .4224,   .4066,
      9,        .8185,   .6472,   .9619,   .6373,   .5022,   .5057,   .6566,   .5386,   .5061,   .3957,
    +gp,        .8185,   .6472,   .9619,   .6373,   .5022,   .5057,   .6566,   .5386,   .5061,   .3957,
FBAR  3- 7,     .7002,   .4753,   .5260,   .5288,   .4031,   .4377,   .4853,   .4762,   .4564,   .3962,
```

```
                Terminal Fs derived using XSA (With F shrinkage)

    Table  8    Fishing mortality (F) at age
    YEAR,       1973,    1974,    1975,    1976,    1977,    1978,    1979,    1980,    1981,    1982,

    AGE
      0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
      1,        .0114,   .0033,   .0015,   .0014,   .0000,   .0000,   .0002,   .0000,   .0000,   .0000,
      2,        .1677,   .1266,   .1230,   .0908,   .0108,   .0010,   .0004,   .0325,   .0237,   .0383,
      3,        .4320,   .2172,   .2650,   .1878,   .1128,   .0547,   .0458,   .0285,   .1373,   .4617,
      4,        .2392,   .3730,   .2412,   .3810,   .1815,   .1665,   .1255,   .2025,   .1314,   .3708,
      5,        .3143,   .1279,   .2116,   .2216,   .5273,   .2115,   .1913,   .2749,   .2112,   .2917,
      6,        .2703,   .1714,   .0957,   .2871,   .7246,   .3820,   .1408,   .2136,   .2264,   .2775,
      7,        .1951,   .2134,   .0859,   .1601,   .3904,   .5760,   .2721,   .1702,   .2004,   .2524,
      8,        .2907,   .1433,   .1599,   .2539,   .3788,   .4968,   .3303,   .3954,   .0920,   .2266,
      9,        .2633,   .2068,   .1595,   .2621,   .4437,   .3690,   .2130,   .2526,   .1730,   .2854,
    +gp,        .2633,   .2068,   .1595,   .2621,   .4437,   .3690,   .2130,   .2526,   .1730,   .2854,
FBAR  3- 7,     .2902,   .2206,   .1799,   .2475,   .3873,   .2781,   .1551,   .1779,   .1814,   .3308,
```

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

Table 8 Fishing mortality (F) at age YEAR,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0006,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0252,	.0329,	.0280,	.0096,	.0337,	.0393,	.0050,	.0124,	.0289,	.0167,
3,	.1917,	.1167,	.1694,	.0940,	.0926,	.0680,	.1206,	.1310,	.1648,	.0744,
4,	.3480,	.3895,	.2392,	.2491,	.1845,	.1862,	.1361,	.2207,	.2715,	.1775,
5,	.3498,	.2171,	.3474,	.2597,	.2621,	.2366,	.3324,	.2331,	.2182,	.2752,
6,	.1383,	.3335,	.4162,	.3587,	.3080,	.3060,	.3206,	.3569,	.3171,	.2598,
7,	.2991,	.0853,	.2083,	.1572,	.4745,	.2081,	.5169,	.4232,	.4035,	.2673,
8,	.3101,	.2929,	.1720,	.5177,	.5844,	.2379,	.3883,	.4625,	.2683,	.2303,
9,	.2907,	.2651,	.2781,	.3103,	.3651,	.2361,	.3410,	.3414,	.2974,	.2432,
+gp,	.2907,	.2651,	.2781,	.3103,	.3651,	.2361,	.3410,	.3414,	.2974,	.2432,
FBAR 3- 7,	.2654,	.2284,	.2761,	.2238,	.2643,	.2010,	.2853,	.2730,	.2750,	.2108,

Table 8 Fishing mortality (F) at age YEAR,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0060,	.0000,	.0000,	.0001,	.0000,	.0000,	.0004,	.0006,	.0003,	.0000,
2,	.0709,	.0488,	.0094,	.0080,	.0094,	.0319,	.0125,	.0791,	.0486,	.0283,
3,	.1660,	.1644,	.1050,	.0777,	.0917,	.1723,	.5564,	.3158,	.2425,	.2169,
4,	.1836,	.2577,	.3127,	.3637,	.2211,	.2383,	.2295,	.1830,	.4447,	.3690,
5,	.1855,	.1479,	.3070,	.4178,	.4673,	.3329,	.3450,	.2589,	.2257,	.4137,
6,	.2056,	.2108,	.1839,	.3806,	.5286,	.6107,	.3916,	.3410,	.2727,	.2714,
7,	.1974,	.2501,	.2231,	.3577,	.5567,	1.2947,	.7360,	.2900,	.2392,	.2267,
8,	.1582,	.2425,	.2688,	.3276,	.3615,	1.0316,	1.8972,	.6243,	.2213,	.2767,
9,	.1869,	.2229,	.2604,	.3623,	.4874,	.7837,	.7071,	.3096,	.2586,	.2757,
+gp,	.1869,	.2229,	.2604,	.3623,	.4874,	.7837,	.7071,	.3096,	.2586,	.2757,
FBAR 3- 7,	.1876,	.2062,	.2263,	.3195,	.3731,	.5298,	.4517,	.2777,	.2850,	.2996,

Table 8 Fishing mortality (F) at age YEAR,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,	2012,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0003,	.0000,	.0000,	.0000,	.0022,	.0000,	.0000,	.0000,	.0000,
2,	.0035,	.0095,	.0111,	.0371,	.0267,	.0273,	.0120,	.0759,	.0137,	.0197,
3,	.0828,	.0670,	.0840,	.0741,	.2030,	.0927,	.1842,	.2787,	.2123,	.0989,
4,	.3363,	.1594,	.1774,	.1795,	.1224,	.2971,	.2663,	.3856,	.3367,	.2111,
5,	.5466,	.4710,	.3522,	.2785,	.2953,	.1315,	.2950,	.2994,	.3107,	.2664,
6,	.6831,	.6247,	.5653,	.5346,	.3985,	.2561,	.2333,	.4549,	.3343,	.2931,
7,	.6288,	.7253,	.6810,	.6865,	.5780,	.3686,	.3211,	.4236,	.5225,	.3828,
8,	.5699,	.8765,	.6306,	.3553,	.5288,	.5701,	.2690,	.3468,	.5297,	.3263,
9,	.5047,	.6279,	.7742,	.6161,	.4170,	.2795,	.2399,	.2568,	.2995,	.5291,
+gp,	.5047,	.6279,	.7742,	.6161,	.4170,	.2795,	.2399,	.2568,	.2995,	.5291,
FBAR 3- 7,	.4555,	.4095,	.3720,	.3506,	.3194,	.2292,	.2600,	.3684,	.3433,	.2505,

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

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

    At 19/04/2013  13:54


                Terminal Fs derived using XSA (With F shrinkage)

    Table 10    Stock number at age (start of year)              Numbers*10**-3
    YEAR,       1957,    1958,    1959,    1960,    1961,    1962,

    AGE
      0,        64927,   54061,   77651,   58761,   71715,   45400,
      1,        47944,   53158,   44261,   63576,   48109,   58715,
      2,        35106,   39212,   43417,   35763,   51279,   38537,
      3,        25440,   25003,   26445,   31954,   23796,   34806,
      4,        20280,   14377,   13213,   14717,   16517,   12850,
      5,         5517,    8965,    6632,    6706,    6028,    8877,
      6,         2786,    3055,    4284,    3570,    3245,    3182,
      7,         1377,    1472,    1326,    1839,    1512,    1476,
      8,          585,     598,     466,     433,     448,     480,
      9,          252,     274,     224,     168,     135,     153,
    +gp,          154,     227,     106,      54,      29,      46,
     TOTAL,    204367,  200401,  218024,  217540,  222811,  204522,
```

```
Table 10    Stock number at age (start of year)              Numbers*10**-3
YEAR,       1963,    1964,    1965,    1966,    1967,    1968,    1969,    1970,    1971,    1972,

AGE
  0,        33843,   30192,   37948,   81923,   47768,   53237,   23136,   49622,   35418,   78970,
  1,        37170,   27709,   24719,   31069,   67073,   39109,   43587,   18942,   40627,   28998,
  2,        47362,   30110,   22644,   20203,   25356,   54852,   31975,   35600,   15457,   33213,
  3,        22837,   26515,   22585,   17302,   15563,   19470,   39587,   24022,   27583,   12006,
  4,        15850,   10638,   14961,   14613,   11176,   10566,   12234,   25590,   15275,   18608,
  5,         5786,    6278,    5182,    7604,    7617,    6798,    6106,    5884,   14996,    8229,
  6,         5132,    2708,    3005,    2937,    3774,    4622,    4187,    3583,    3348,    9322,
  7,         1332,    2809,    1204,    1366,    1398,    1800,    2403,    2084,    1682,    1572,
  8,          423,     313,    1641,     377,     449,     574,     638,     860,     712,     595,
  9,          148,     114,      77,     127,     146,     189,     262,     180,     409,     382,
+gp,            45,      16,      14,      21,      36,      33,      45,      26,     281,     319,
 TOTAL,    169929,  137402,  133981,  177542,  180356,  191249,  164161,  166394,  155788,  192214,
```

```
                Terminal Fs derived using XSA (With F shrinkage)

Table 10    Stock number at age (start of year)              Numbers*10**-3
YEAR,       1973,    1974,    1975,    1976,    1977,    1978,    1979,    1980,    1981,    1982,

AGE
  0,       104851,   83629,   39129,   52363,    4153,    7377,    5208,   23623,   29264,   60809,
  1,        64656,   85845,   68469,   32036,   42872,    3400,    6040,    4264,   19341,   23959,
  2,        23703,   52334,   70055,   55973,   26193,   35100,    2784,    4944,    3491,   15835,
  3,        26514,   16410,   37750,   50717,   41849,   21214,   28709,    2279,    3918,    2791,
  4,         6442,   14092,   10812,   23712,   34414,   30608,   16444,   22453,    1813,    2796,
  5,        11454,    4152,    7946,    6955,   13263,   23499,   21216,   11875,   15014,    1302,
  6,         4289,    6849,    2992,    5265,    4562,    6409,   15571,   14346,    7385,    9952,
  7,         6573,    2680,    4724,    2226,    3235,    1810,    3581,   11074,    9487,    4822,
  8,          657,    4427,    1772,    3549,    1553,    1792,     833,    2233,    7648,    6356,
  9,          325,     402,    3141,    1237,    2254,     870,     893,     490,    1231,    5711,
+gp,            52,     865,    1396,    1515,    2613,    1109,     424,     423,     249,     947,
 TOTAL,    249514,  271686,  248186,  235548,  176961,  133190,  101703,   98005,   98841,  135280,
```

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

Table 10 Stock number at age (start of year)							Numbers*10**-3			
YEAR,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,
AGE										
0,	58845,	39503,	14077,	27990,	21022,	14013,	4455,	3989,	2723,	9645,
1,	49786,	48179,	32343,	11525,	22916,	17212,	11473,	3647,	3266,	2230,
2,	19616,	40761,	39423,	26480,	9436,	18762,	14092,	9393,	2986,	2674,
3,	12477,	15661,	32291,	31385,	21472,	7469,	14769,	11480,	7596,	2375,
4,	1440,	8434,	11410,	22318,	23390,	16025,	5714,	10718,	8246,	5274,
5,	1580,	833,	4677,	7355,	14244,	15924,	10892,	4083,	7037,	5146,
6,	796,	912,	549,	2706,	4644,	8973,	10290,	6396,	2648,	4632,
7,	6174,	568,	535,	296,	1547,	2794,	5410,	6114,	3665,	1579,
8,	3067,	3748,	427,	356,	207,	788,	1858,	2641,	3279,	2004,
9,	4149,	1842,	2290,	294,	173,	95,	509,	1032,	1362,	2053,
+gp,	3461,	4567,	4401,	2930,	1198,	669,	308,	410,	137,	825,
TOTAL,	161391,	165006,	142421,	133634,	120250,	102725,	79768,	59903,	42943,	38436,

Table 10 Stock number at age (start of year)							Numbers*10**-3			
YEAR,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,
AGE										
0,	142295,	67513,	13553,	5564,	23051,	31668,	152303,	89597,	62540,	42172,
1,	7897,	116501,	55275,	11096,	4555,	18873,	25928,	124695,	73356,	51204,
2,	1826,	6426,	95382,	45255,	9084,	3730,	15452,	21220,	102026,	60042,
3,	2153,	1392,	5011,	77365,	36757,	7368,	2958,	12493,	16051,	79568,
4,	1805,	1493,	967,	3693,	58605,	27458,	5078,	1388,	7459,	10311,
5,	3616,	1230,	945,	579,	2102,	38466,	17713,	3305,	946,	3914,
6,	3200,	2459,	869,	569,	312,	1078,	22575,	10271,	2089,	618,
7,	2925,	2133,	1631,	592,	318,	151,	479,	12494,	5979,	1302,
8,	989,	1966,	1360,	1068,	339,	149,	34,	188,	7654,	3854,
9,	1303,	691,	1263,	851,	630,	193,	44,	4,	82,	5022,
+gp,	1194,	1656,	1413,	1422,	1464,	1006,	413,	293,	87,	150,
TOTAL,	169202,	203462,	177669,	148055,	137218,	130140,	242976,	275947,	278270,	258158,

Table 10 Stock number at age (start of year)							Numbers*10**-3				
YEAR,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,	2012,	2013,
AGE											
0,	12725,	11169,	4765,	4046,	3737,	8778,	20629,	676,	2435,	15475,	0,
1,	34527,	10418,	9145,	3901,	3313,	3059,	7187,	16890,	553,	1994,	12670,
2,	41922,	28268,	8527,	7487,	3194,	2712,	2499,	5884,	13828,	453,	1633,
3,	47787,	34202,	22924,	6904,	5906,	2546,	2161,	2022,	4465,	11168,	364,
4,	52442,	36016,	26187,	17257,	5249,	3947,	1900,	1472,	1253,	2957,	8282,
5,	5837,	30675,	25142,	17954,	11807,	3803,	2401,	1192,	819,	732,	1960,
6,	2119,	2767,	15680,	14474,	11127,	7195,	2730,	1464,	723,	492,	459,
7,	386,	876,	1213,	7294,	6944,	6116,	4560,	1770,	760,	424,	300,
8,	850,	168,	347,	503,	3006,	3189,	3463,	2708,	949,	369,	237,
9,	2393,	393,	57,	151,	288,	1450,	1477,	2167,	1567,	457,	218,
+gp,	2551,	1899,	311,	166,	29,	176,	247,	771,	793,	301,	366,
TOTAL,	203538,	156853,	114299,	80138,	54599,	42971,	49254,	37014,	28147,	34821,	26488,

Table 5.12. Faroe haddock. Stock summary of the 2013 VPA.

```
 At 19/04/2013  13:54   HAD_IND
Table 16          Summary (without SOP  correction)
Terminal Fs  derived using  XSA  (With F shrinkage)
```

	RECRUITS Age 0	RECRUITS Age 2	TOTALBIO	TOTSPBIO	LANDINGS	YIELD/SSB	FBAR (3-7)
1957	64927	35106	90264	51049	20995	0.4113	0.4900
1958	54061	39212	92975	51409	23871	0.4643	0.6270
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	0.5260
1966	81923	20203	68774	44027	18766	0.4262	0.5288
1967	47768	25356	77101	42086	13381	0.3179	0.4031
1968	53237	54852	87971	45495	17852	0.3924	0.4377
1969	23136	31975	94878	53583	23272	0.4343	0.4853
1970	49622	35600	92143	59958	21361	0.3563	0.4762
1971	35418	15457	92930	63920	19393	0.3034	0.4564
1972	78970	33213	91506	63133	16485	0.2611	0.3962
1973	104851	23703	98976	61621	18035	0.2927	0.2902
1974	83629	52334	116875	64630	14773	0.2286	0.2206
1975	39129	70055	138902	75404	20715	0.2747	0.1799
1976	52363	55973	143621	89219	26211	0.2938	0.2475
1977	4153	26193	121040	96374	25555	0.2652	0.3873
1978	7377	35100	120575	97230	19200	0.1975	0.2781
1979	5208	2784	99499	85398	12424	0.1455	0.1551
1980	23623	4944	87636	81901	15016	0.1833	0.1779
1981	29264	3491	78962	75845	12233	0.1613	0.1814
1982	60809	15835	68306	56804	11937	0.2101	0.3308
1983	58845	19616	63961	51811	12894	0.2489	0.2654
1984	39503	40761	100665	53820	12378	0.2300	0.2284
1985	14077	39423	93960	62594	15143	0.2419	0.2761
1986	27990	26480	98507	65591	14477	0.2207	0.2238
1987	21022	9436	87630	67287	14882	0.2212	0.2643
1988	14013	18762	77404	61890	12178	0.1968	0.2010
1989	4455	14092	69521	51720	14325	0.2770	0.2853
1990	3989	9393	53528	43681	11726	0.2684	0.2730
1991	2723	2986	38702	34609	8429	0.2435	0.2750
1992	9645	2674	29056	26915	5476	0.2035	0.2108
1993	142295	1826	28734	23156	4026	0.1739	0.1876
1994	67513	6426	27400	21533	4252	0.1975	0.2062
1995	13553	95382	87305	22673	4948	0.2182	0.2263
1996	5564	45255	112472	49455	9642	0.1950	0.3195
1997	23051	9084	107095	81785	17924	0.2192	0.3731
1998	31668	3730	92059	81653	22210	0.2720	0.5298
1999	152303	15452	79634	62608	18482	0.2952	0.4517
2000	89597	21220	108884	52480	15821	0.3015	0.2777
2001	62540	102026	145112	60466	15890	0.2628	0.2850
2002	42172	60042	151794	84323	24933	0.2957	0.2996
2003	12725	41922	138974	96244	27072	0.2813	0.4555
2004	11169	28268	125982	86542	23101	0.2669	0.4095
2005	4765	8527	89387	72891	20455	0.2806	0.3720
2006	4046	7487	65482	58362	17154	0.2939	0.3506
2007	3737	3194	47498	43230	12631	0.2922	0.3194
2008	8778	2712	34464	30393	7388	0.2431	0.2292
2009	20629	2499	25543	23600	5197	0.2202	0.2600
2010	676	5884	23074	18442	5202	0.2821	0.3684
2011	2435	13828	21438	13492	3540	0.2624	0.3433
2012	15475	453	16725	14641	2613	0.1785	0.2505
Arith. Mean	38677	26952	84295	55640	15988	0.2908	0.3565
Units	(Thousands)	(Tonnes)(	Tonnes)	(Tonnes)			

Table 5.13. Management options table - INPUT DATA descriptions.

Stock size

The stock in numbers 2013 is taken directly from the 2013 XSA. The yearclass 2012 at age 2 (in 2014) is estimated from the 2013 XSA age 1 applying a natural mortality of 0.2 in foreward calculation of the number using the standard VPA equation. The yearclass 2013 at age 2 (in 2015) is estimated as the geomean of the yearclasses since 2005.

Age	2013	2014	2015
2	1633	10373	3923
3	364		
4	8282		
5	1960		
6	459		
7	300		
8	237		
9	218		
10+	368		

Numbers in thousands (predicted values rounded).

Proportion mature at age

The proportion mature at age in 2013 is estimated as the average of the observed data in 2012 and 2013. For 2014 and 2015, the average of 2011 to 2013 is used.

Age	2013	2014	2015
2	0.16	0.13	0.13
3	0.78	0.77	0.77
4	0.99	0.98	0.98
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

Table 5.13. Management options table - INPUT DATA descriptions (cont.).

Catch&Stock weights at age

Catch and stock weights at age for all ages and for each of the years 2013-2015 are simply the average of the estimated point-values for 2010-2012 not re-scaled to 2012 since weights have been fluctuating without any trend during the last 3 years (no model was available to predict future mean weights at age).

Age	2013	2014	2015
2	0.621	0.621	0.621
3	0.824	0.824	0.824
4	1.101	1.101	1.101
5	1.339	1.339	1.339
6	1.463	1.463	1.463
7	1.518	1.518	1.518
8	1.594	1.594	1.594
9	1.723	1.723	1.723
10+	1.869	1.869	1.869

Exploitation pattern

The exploitation pattern 2013 is estimated like last year as the average fishing mortality matrix in the 3 preceding years (2010-2012) from the final VPA in 2013, but without re-scaling to the terminal year (2012) since fishing mortalities have been fluctuating without any trend during the last 3 years; the same exploitation pattern was used for all 3 years.

Age	2013	2014	2015
2	0.0364	0.0364	0.0364
3	0.1966	0.1966	0.1966
4	0.3111	0.3111	0.3111
5	0.2922	0.2922	0.2922
6	0.3608	0.3608	0.3608
7	0.4430	0.4430	0.4430
8	0.4009	0.4009	0.4009
9	0.3618	0.3618	0.3618
10+	0.3618	0.3618	0.3618

Table 5.14 Faroe haddock. Management option table - Input data

MFDP version 1
Run: jr1
Time and date: 13:09 25/04/2013
Fbar age range: 3-7

2013

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	1633	0.2	0.16	0	0	0.621	0.0364	0.621
3	364	0.2	0.78	0	0	0.824	0.1966	0.824
4	8282	0.2	0.99	0	0	1.101	0.3111	1.101
5	1960	0.2	1	0	0	1.339	0.2922	1.339
6	459	0.2	1	0	0	1.463	0.3608	1.463
7	300	0.2	1	0	0	1.518	0.4430	1.518
8	237	0.2	1	0	0	1.594	0.4009	1.594
9	218	0.2	1	0	0	1.723	0.3618	1.723
10	368	0.2	1	0	0	1.869	0.3618	1.869

2014

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	10373	0.2	0.13	0	0	0.621	0.0364	0.621
3	.	0.2	0.77	0	0	0.824	0.1966	0.824
4	.	0.2	0.98	0	0	1.101	0.3111	1.101
5	.	0.2	1	0	0	1.339	0.2922	1.339
6	.	0.2	1	0	0	1.463	0.3608	1.463
7	.	0.2	1	0	0	1.518	0.4430	1.518
8	.	0.2	1	0	0	1.594	0.4009	1.594
9	.	0.2	1	0	0	1.723	0.3618	1.723
10	.	0.2	1	0	0	1.869	0.3618	1.869

2015

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	3923	0.2	0.13	0	0	0.621	0.0364	0.621
3	.	0.2	0.77	0	0	0.824	0.1966	0.824
4	.	0.2	0.98	0	0	1.101	0.3111	1.101
5	.	0.2	1	0	0	1.339	0.2922	1.339
6	.	0.2	1	0	0	1.463	0.3608	1.463
7	.	0.2	1	0	0	1.518	0.4430	1.518
8	.	0.2	1	0	0	1.594	0.4009	1.594
9	.	0.2	1	0	0	1.723	0.3618	1.723
10	.	0.2	1	0	0	1.869	0.3618	1.869

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 23/04/2013
Time and date: 13:09 25/04/2013
Fbar age range: 3-7

2013				
Biomass	SSB	FMult	FBar	Landings
15628	14618	1	0.3207	3651

2014					2015	
Biomass	**SSB**	**FMult**	**FBar**	**Landings**	**Biomass**	**SSB**
17677	11820	0	0	0	19577	15825
.	11820	0.1	0.0321	329	19248	15502
.	11820	0.2	0.0641	649	18928	15188
.	11820	0.3	0.0962	960	18618	14884
.	11820	0.4	0.1283	1263	18316	14589
.	11820	0.5	0.1604	1556	18023	14302
.	11820	0.6	0.1924	1842	17738	14023
.	11820	0.7	0.2245	2119	17462	13753
.	11820	0.8	0.2566	2389	17193	13490
.	11820	0.9	0.2887	2651	16932	13235
.	11820	1	0.3207	2906	16678	12987
.	11820	1.1	0.3528	3154	16431	12746
.	11820	1.2	0.3849	3395	16191	12512
.	11820	1.3	0.417	3630	15958	12285
.	11820	1.4	0.449	3858	15731	12064
.	11820	1.5	0.4811	4080	15511	11849
.	11820	1.6	0.5132	4296	15296	11641
.	11820	1.7	0.5452	4506	15088	11438
.	11820	1.8	0.5773	4710	14885	11241
.	11820	1.9	0.6094	4909	14688	11050
.	11820	2	0.6415	5103	14496	10863

Input units are thousands and kg - output in tonnes

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

MFYPR version 1
Run: jak2
Index file 23/04/2013
Time and date: 13:45 25/04/2013
Fbar age range: 3-7

Age	M	Mat	PF	PM	SWt	Sel	CWt
2	0.2	0.05	0	0	0.563	0.0364	0.563
3	0.2	0.50	0	0	0.799	0.1966	0.799
4	0.2	0.92	0	0	1.061	0.3111	1.061
5	0.2	0.99	0	0	1.368	0.2922	1.368
6	0.2	1.00	0	0	1.650	0.3608	1.650
7	0.2	1.00	0	0	1.912	0.4430	1.912
8	0.2	1.00	0	0	2.136	0.4009	2.136
9	0.2	1.00	0	0	2.369	0.3618	2.369
10	0.2	1.00	0	0	2.675	0.3618	2.675

Weights in kilograms

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

MFYPR version 1
Run: jak2
Time and date: 13:45 25/04/2013
Yield per results

FMult	Fbar	CatchNos	Yield	StockNos	Biomass	SpwnNosJan	SSBJan	SpwnNosSpwn	SSBSpwn
0	0	0	0	5.5167	8.3314	4.0986	7.4042	4.0986	7.4042
0.1	0.0321	0.1155	0.1976	4.9415	6.9685	3.5264	6.0443	3.5264	6.0443
0.2	0.0641	0.2004	0.3262	4.5191	5.9988	3.107	5.0774	3.107	5.0774
0.3	0.0962	0.2656	0.4131	4.1952	5.279	2.7861	4.3604	2.7861	4.3604
0.4	0.1283	0.3173	0.4734	3.9386	4.727	2.5323	3.8111	2.5323	3.8111
0.5	0.1604	0.3595	0.5161	3.7298	4.2923	2.3264	3.3791	2.3264	3.3791
0.6	0.1924	0.3946	0.5468	3.5563	3.9423	2.1556	3.0317	2.1556	3.0317
0.7	0.2245	0.4243	0.5691	3.4095	3.6553	2.0116	2.7473	2.0116	2.7473
0.8	0.2566	0.4499	0.5856	3.2835	3.4162	1.8883	2.5108	1.8883	2.5108
0.9	0.2887	0.4721	0.5977	3.1739	3.2142	1.7814	2.3113	1.7814	2.3113
1	0.3207	0.4917	0.6067	3.0776	3.0415	1.6877	2.141	1.6877	2.141
1.1	0.3528	0.5091	0.6134	2.9922	2.8922	1.6049	1.9941	1.6049	1.9941
1.2	0.3849	0.5248	0.6183	2.9157	2.7619	1.5309	1.8662	1.5309	1.8662
1.3	0.417	0.5389	0.6219	2.8468	2.6473	1.4646	1.7539	1.4646	1.7539
1.4	0.449	0.5517	0.6245	2.7843	2.5456	1.4046	1.6546	1.4046	1.6546
1.5	0.4811	0.5634	0.6264	2.7273	2.4548	1.35	1.5661	1.35	1.5661
1.6	0.5132	0.5741	0.6276	2.6751	2.3732	1.3002	1.4867	1.3002	1.4867
1.7	0.5452	0.584	0.6284	2.627	2.2995	1.2545	1.4152	1.2545	1.4152
1.8	0.5773	0.5932	0.6288	2.5825	2.2326	1.2123	1.3504	1.2123	1.3504
1.9	0.6094	0.6018	0.6289	2.5412	2.1715	1.1733	1.2915	1.1733	1.2915
2	0.6415	0.6097	0.6288	2.5027	2.1156	1.1372	1.2376	1.1372	1.2376

Reference point	F multiplier	Absolute F
Fbar(3-7)	1	0.3207
FMax	Not defined	
F0.1	0.6178	0.1981
F35%SPR	0.7639	0.245
Flow	-99	
Fmed	0.7521	0.2412
Fhigh	2.8728	0.9214

Weights in kilograms

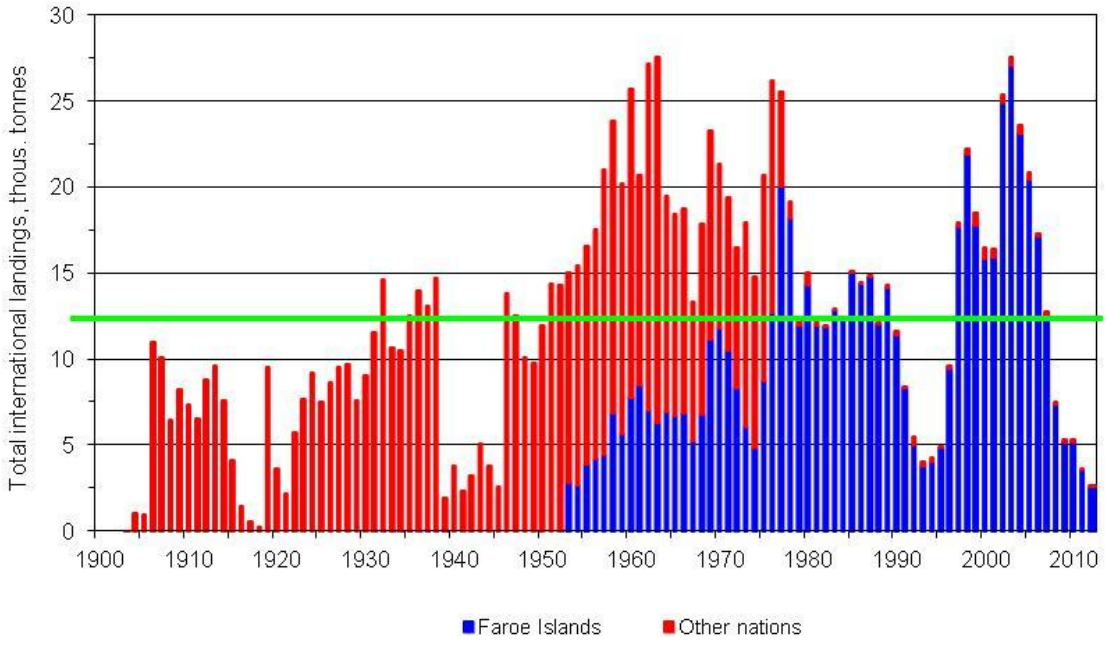


Figure 5.1. Haddock in ICES Division Vb. Landings by all nations 1904-2012. Horisontal line average for the whole period.

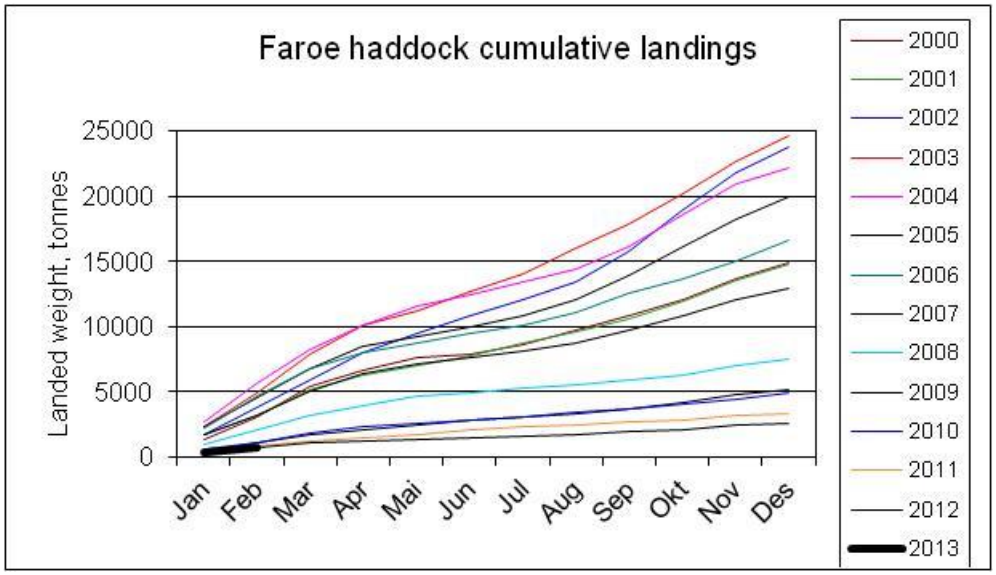


Figure 5.2. Faroe haddock. Cumulative Faroese landings from Vb.

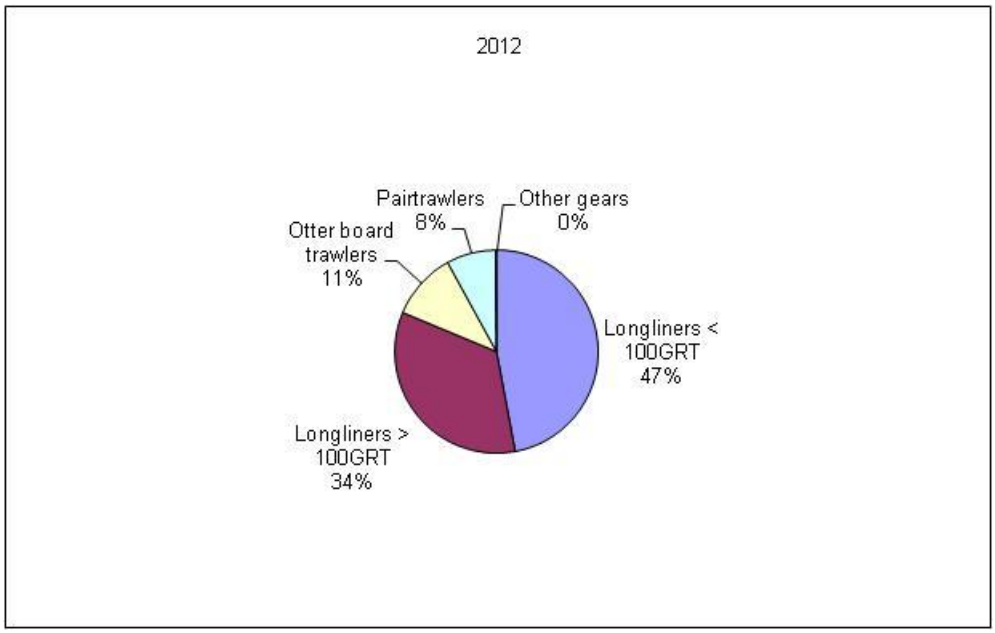


Figure 5.3. Faroe haddock. Contribution (%) by fleet to the total Faroese landings 2012.

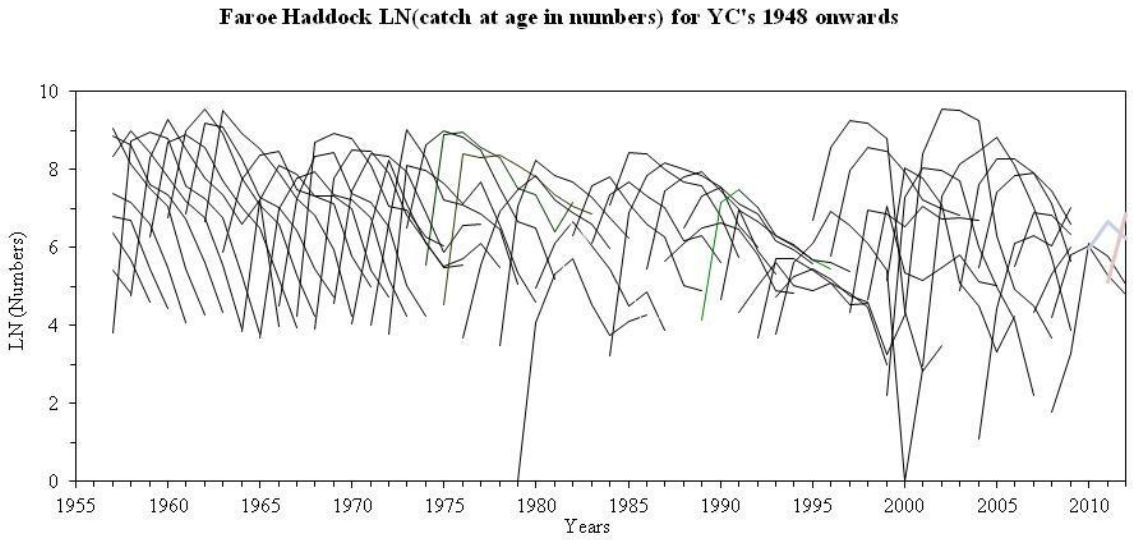


Figure 5.4.

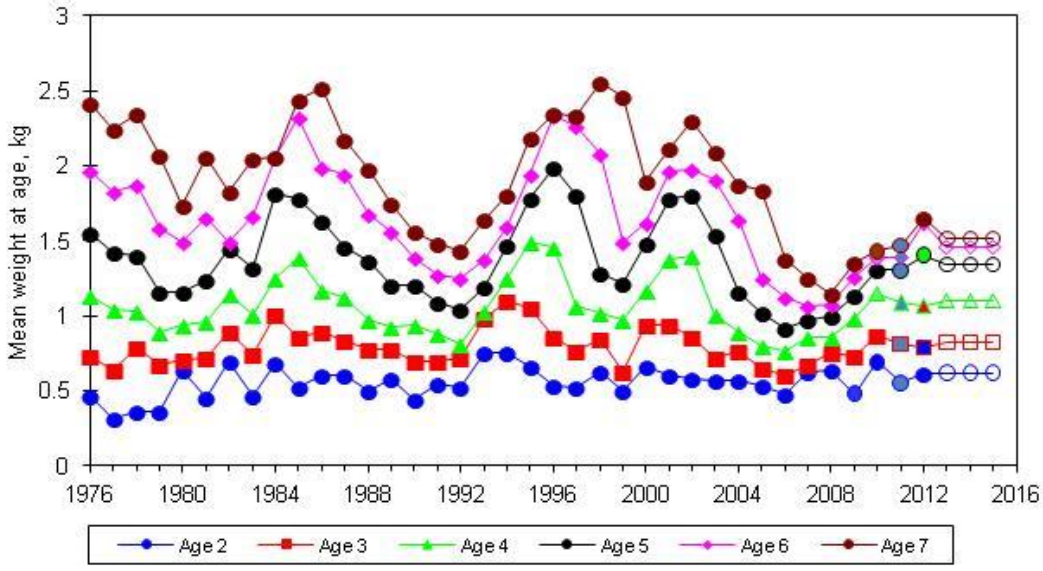


Figure 5.5. Faroe haddock. Mean weight at age (2-7). 2013-2015 are predicted values used in the short term prediction (open symbols).

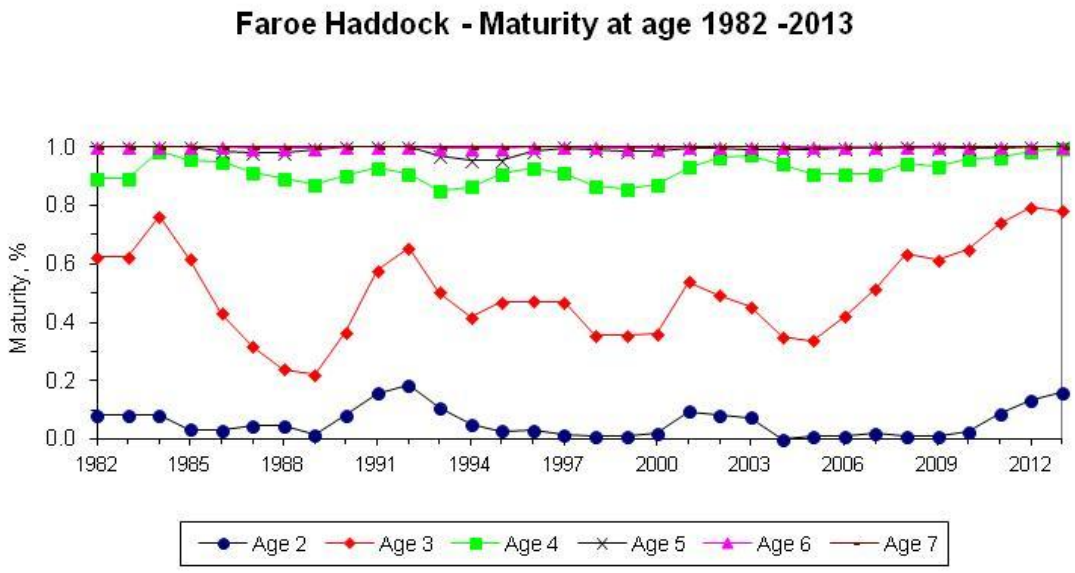


Figure 5.6. Faroe haddock. Maturity at age since 1982. Running 3-years average of survey observations.

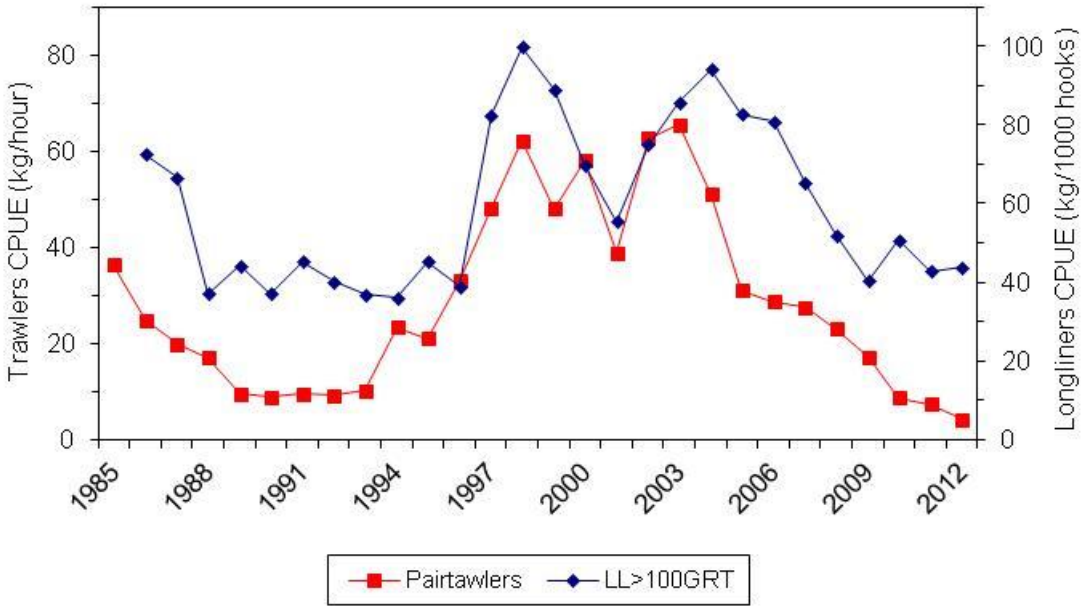


Figure 5.7. Commercial Cpue's for Pairtrawlers > 1000 HP and longliners > 100 HP.

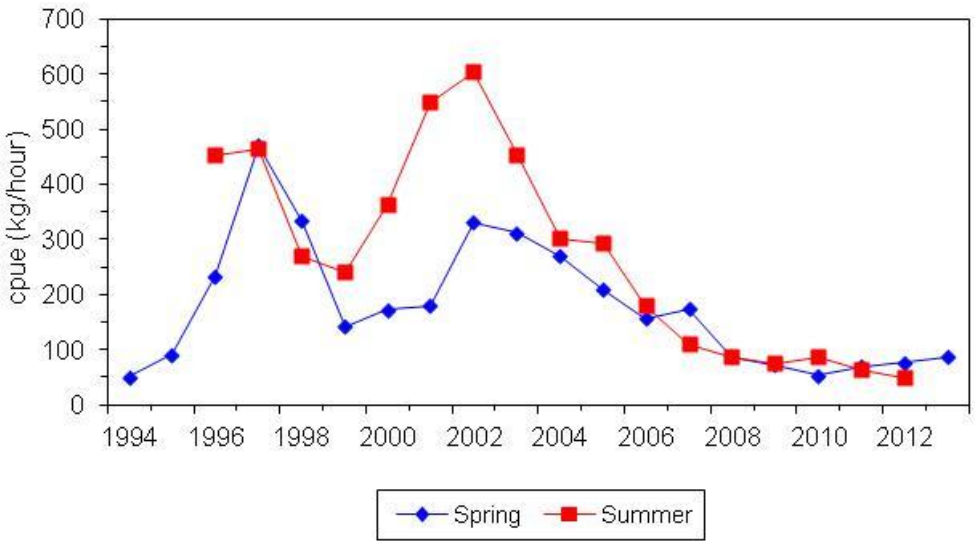


Figure 5.8. Faroe haddock. CPUE (kg/trawlhour) in the spring and summer surveys.

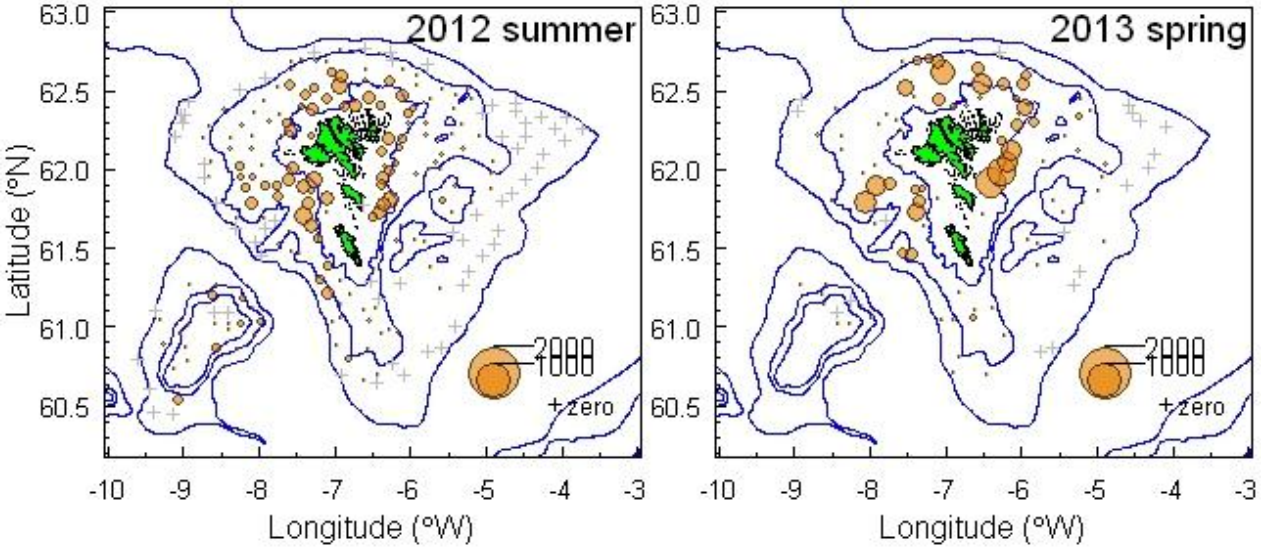


Figure 5.9. Distribution of Faroe haddock catches in the summer survey 2012 and in the spring survey 2013. In the annex, the catch distributions for all years are given.

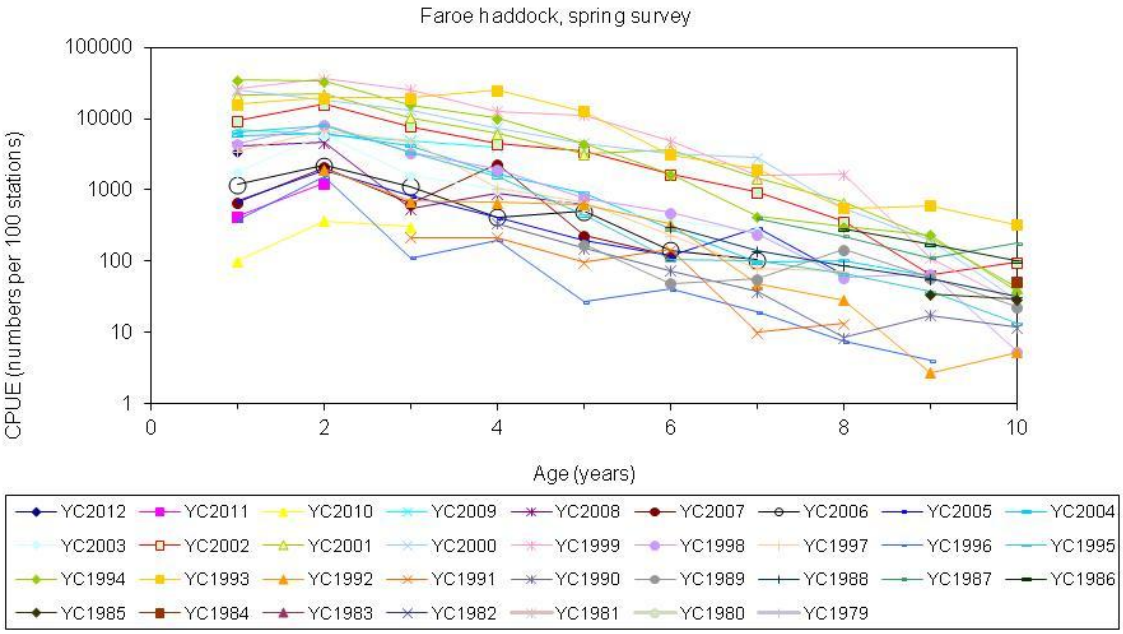


Figure 5.10. Faroe haddock. LN (c@age in numbers) in the spring survey.

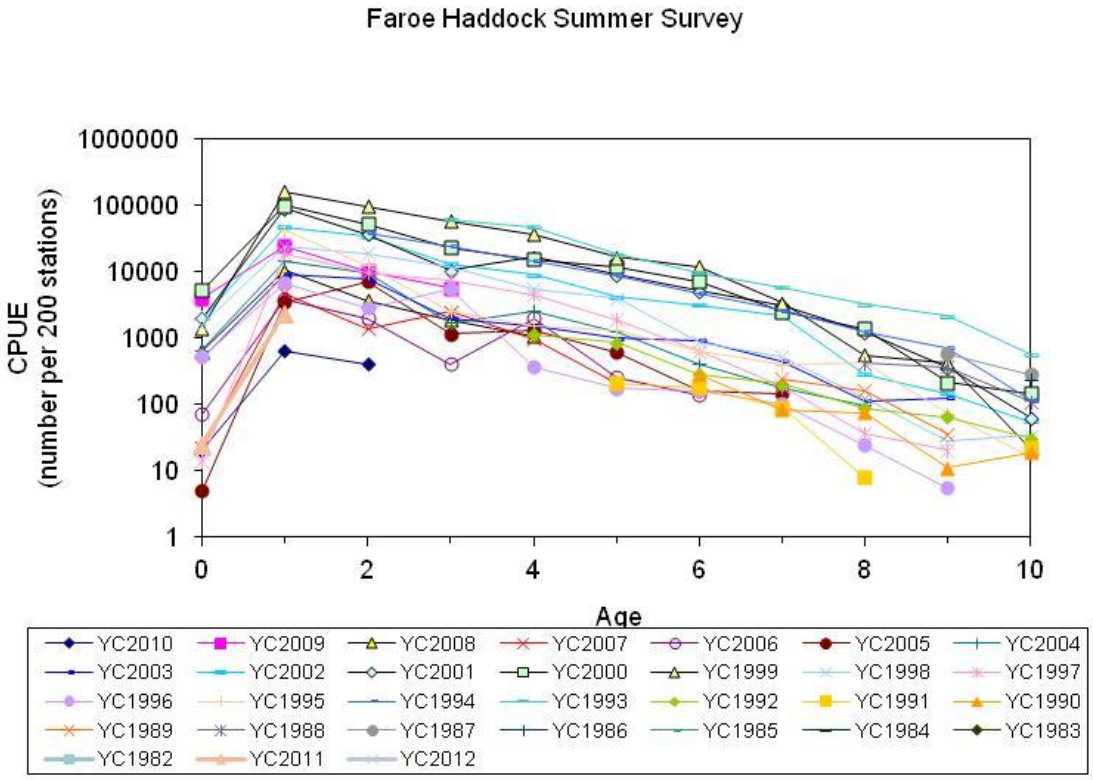


Figure 5.11. Faroe haddock. LN (c@age in numbers) in the summer survey.

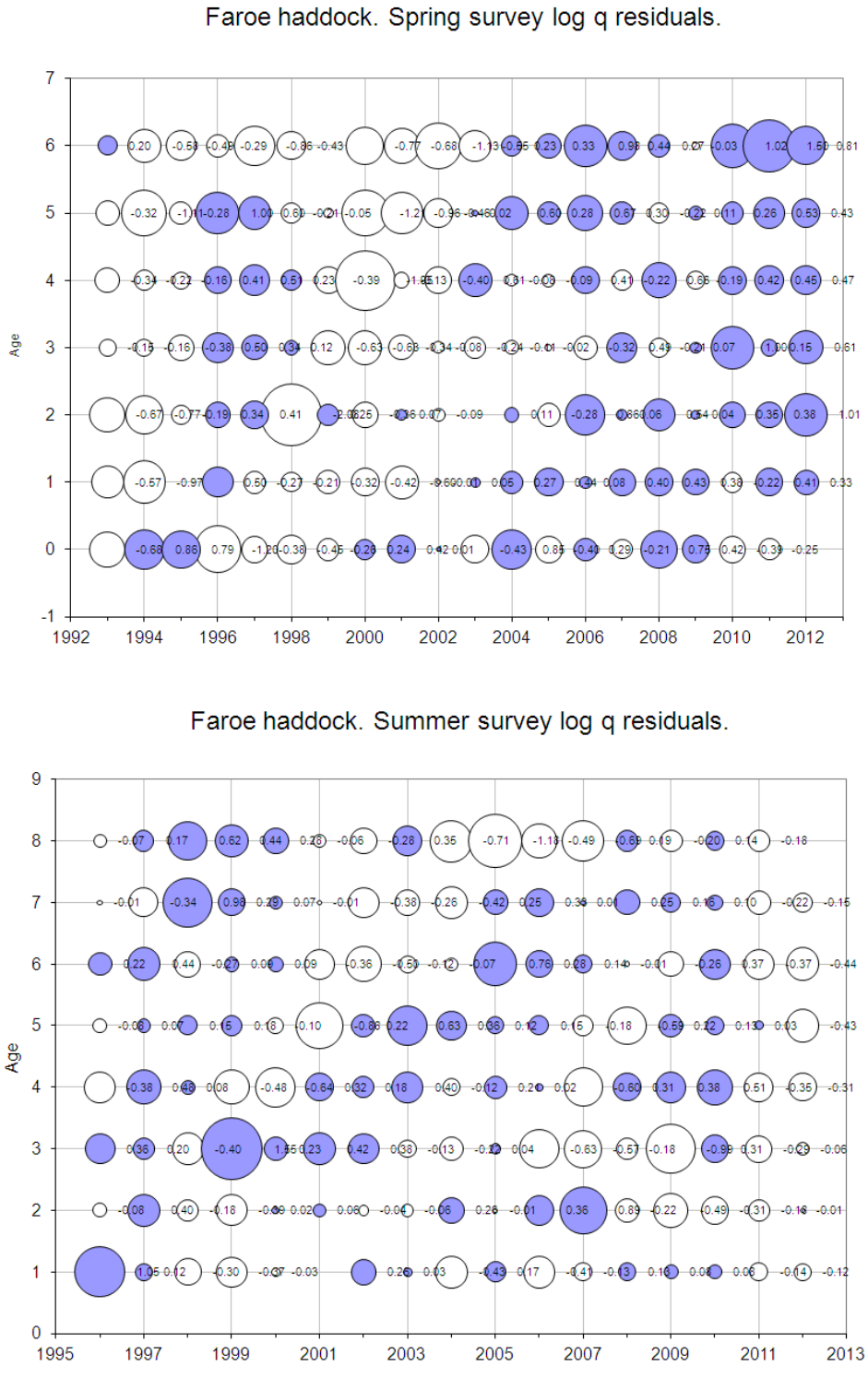


Figure 5.12. Faroe haddock survey log q residuals.

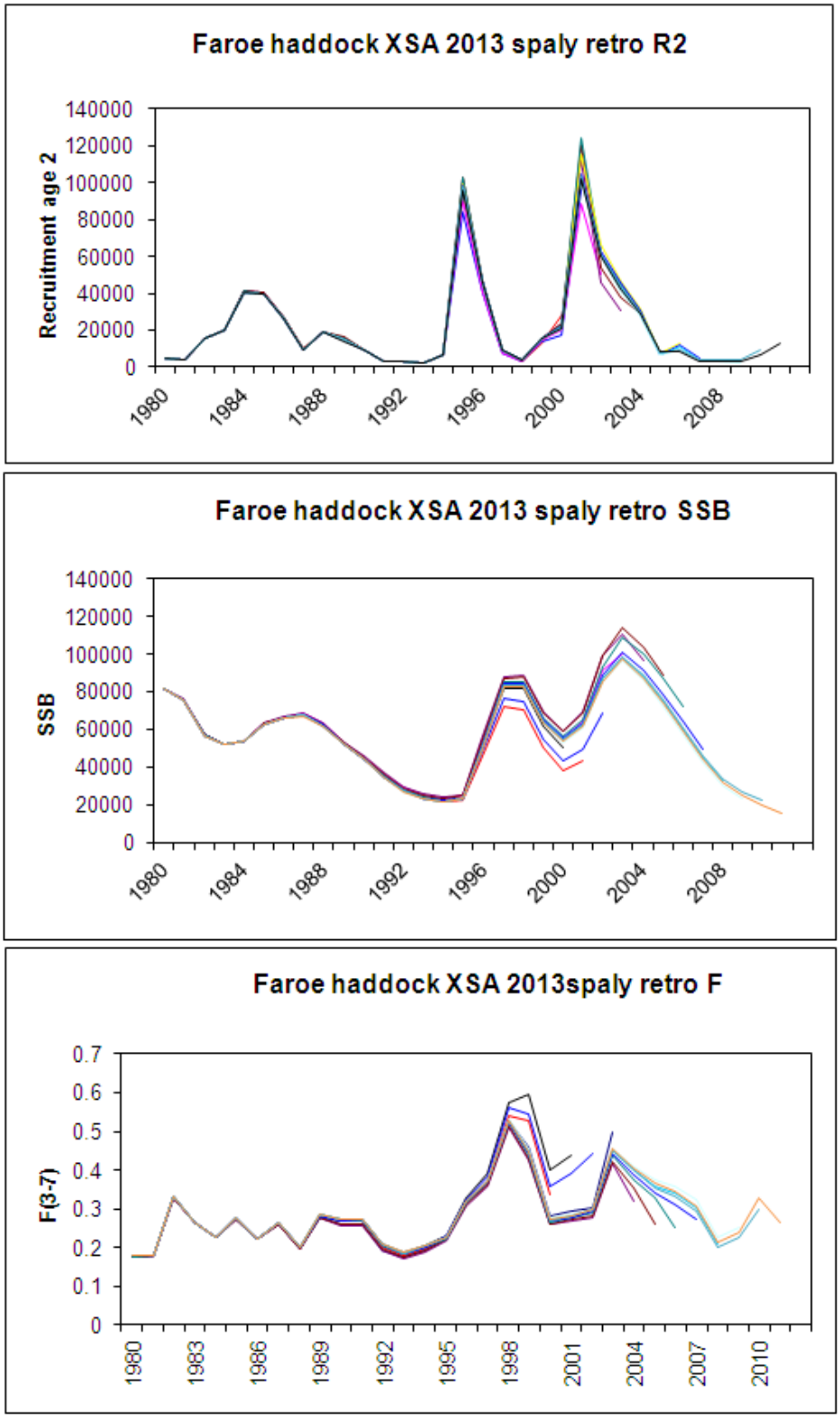


Figure 5.13. Faroe haddock. Retrospective analysis on the 2013 XSA.

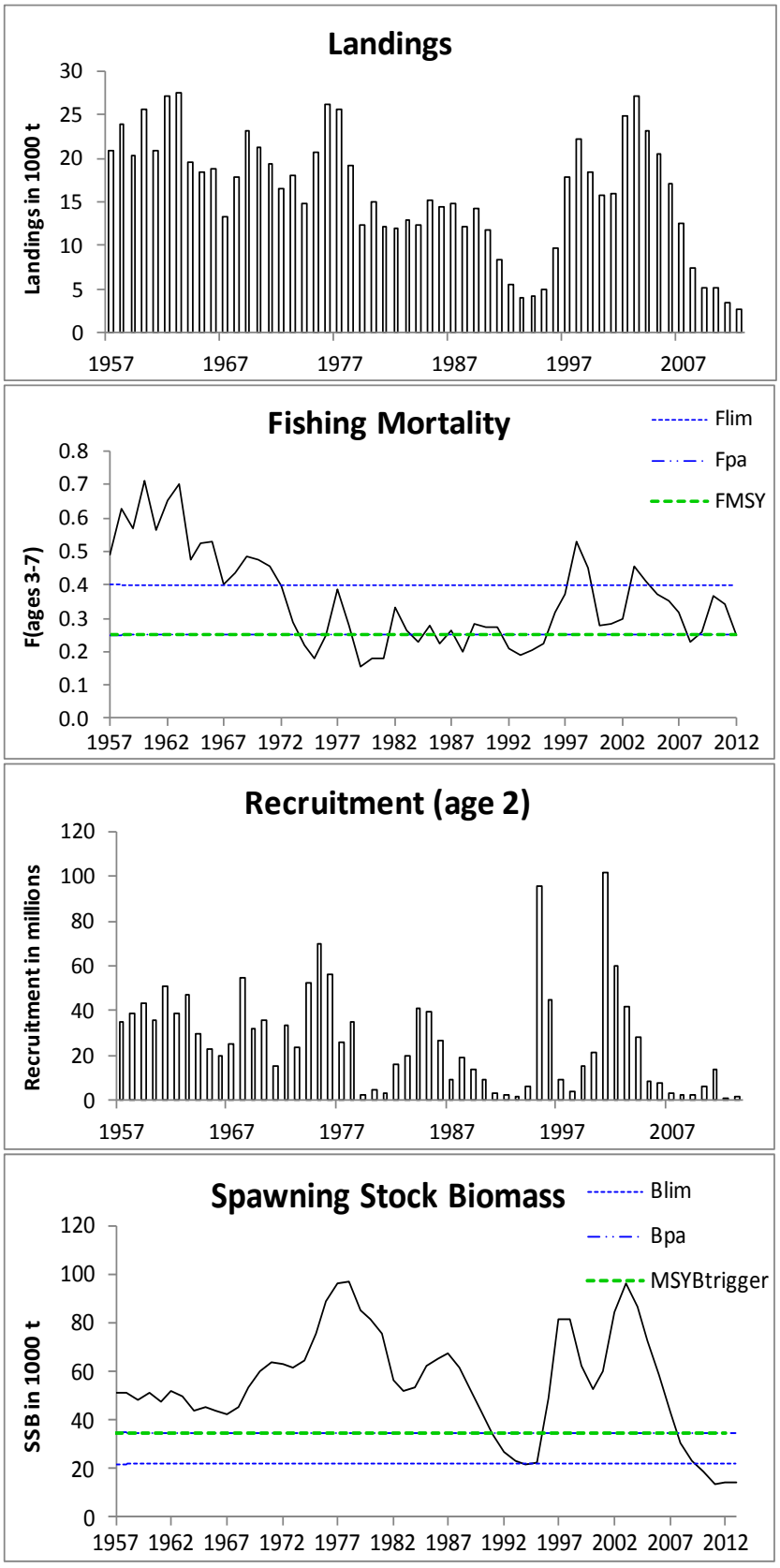


Figure 5.14. Faroe haddock (Division Vb) standard graphs from the 2013 assessment.

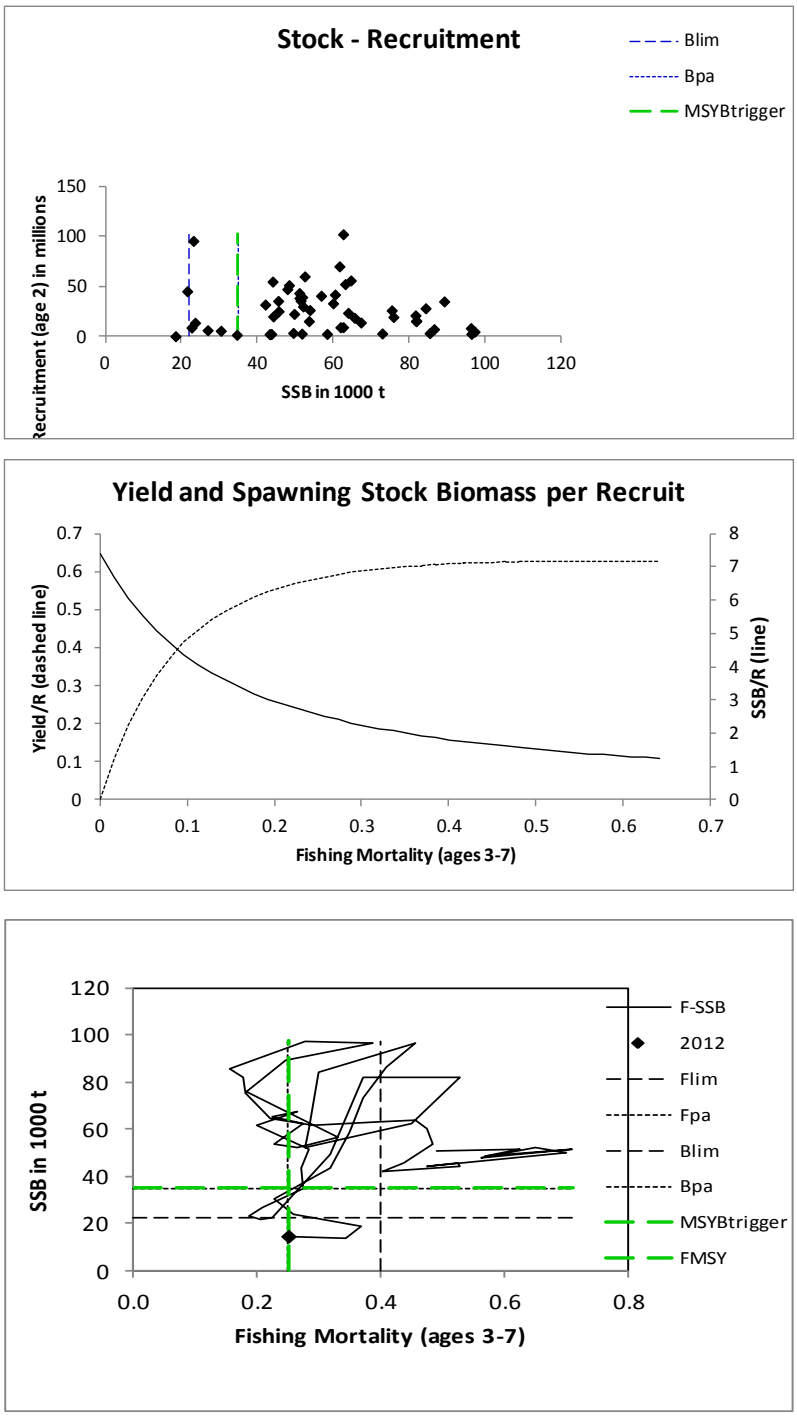


Figure 5.14 (cont.). Faroe haddock (Division Vb) standard graphs from the 2013 assessment.

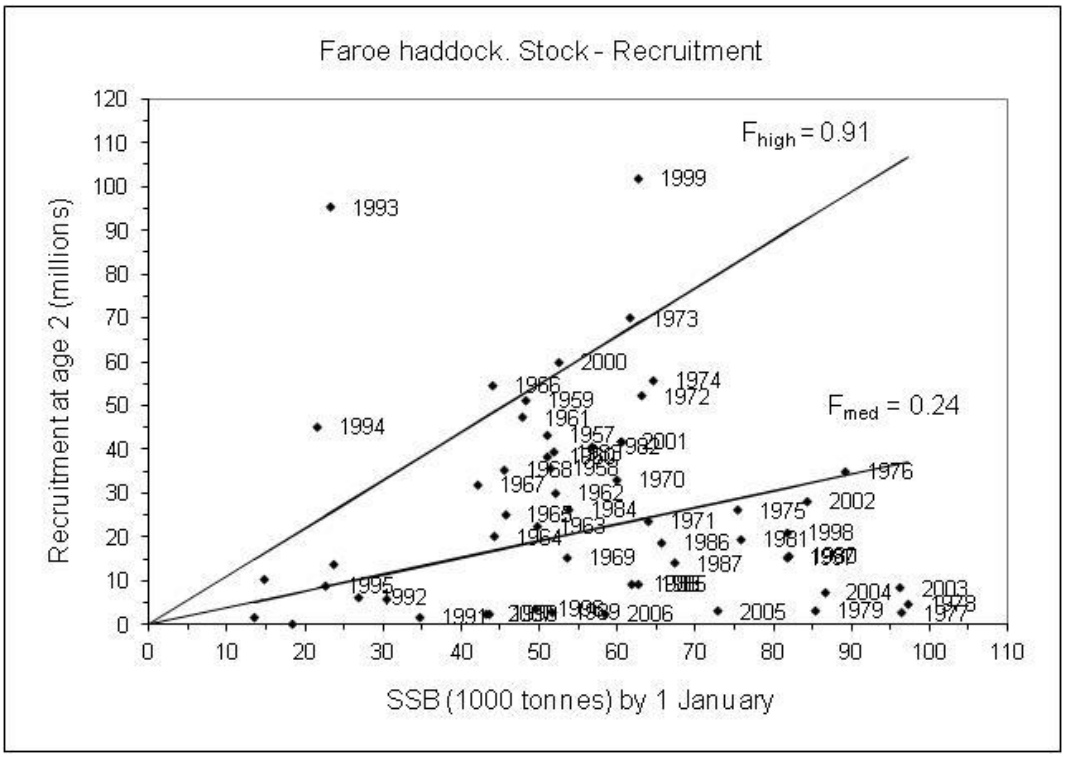
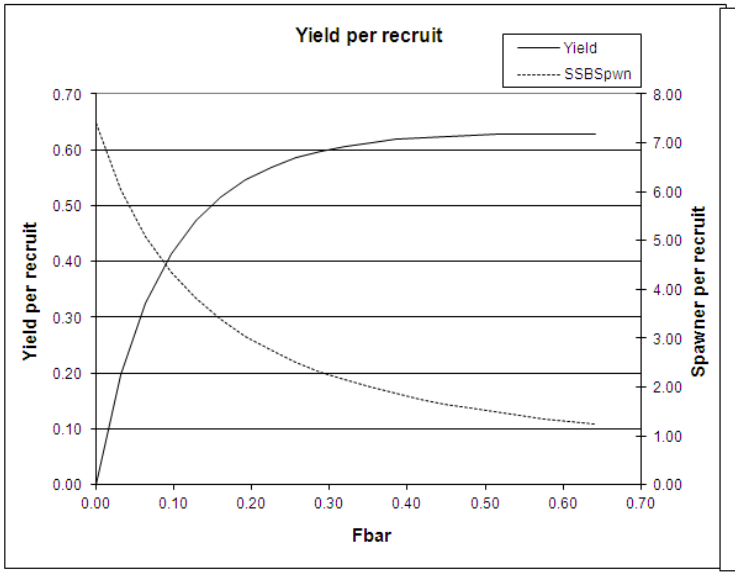
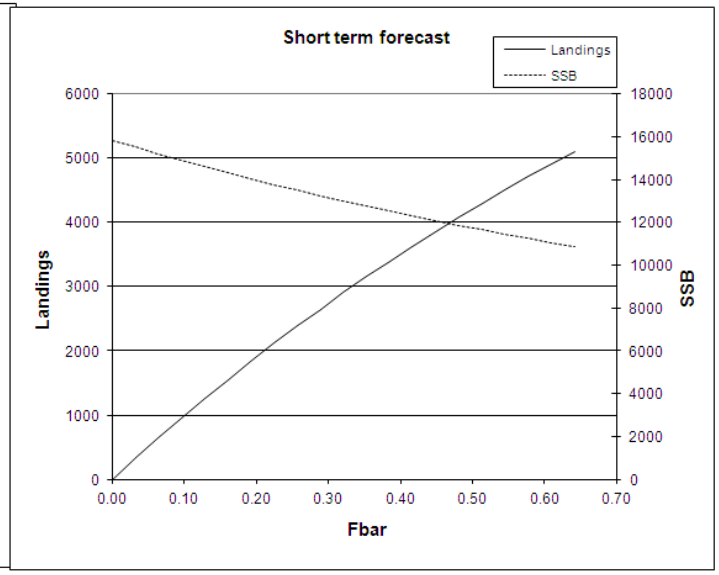


Figure 5.15. Faroe haddock. SSB-R plot.





MFYPR version 1
Run: jak2
Time and date: 13:45 25/04/2013

Reference point	F multiplier	Absolute F
Fbar(3-7)	1	0.2781
FMax	2.1989	0.6115
F0.1	0.7751	0.2156
F35%SPR	0.8729	0.2427
Fhigh	3.1488	0.8757
Fmed	0.8288	0.2305
Flow	-99	

Weights in kilograms

MFDP version 1
Run: jr1
Index file 23/04/2013
Time and date: 13:09 25/04/2013
Fbar age range: 3-7

Figure 5.16. Faroe haddock. Prediction output.

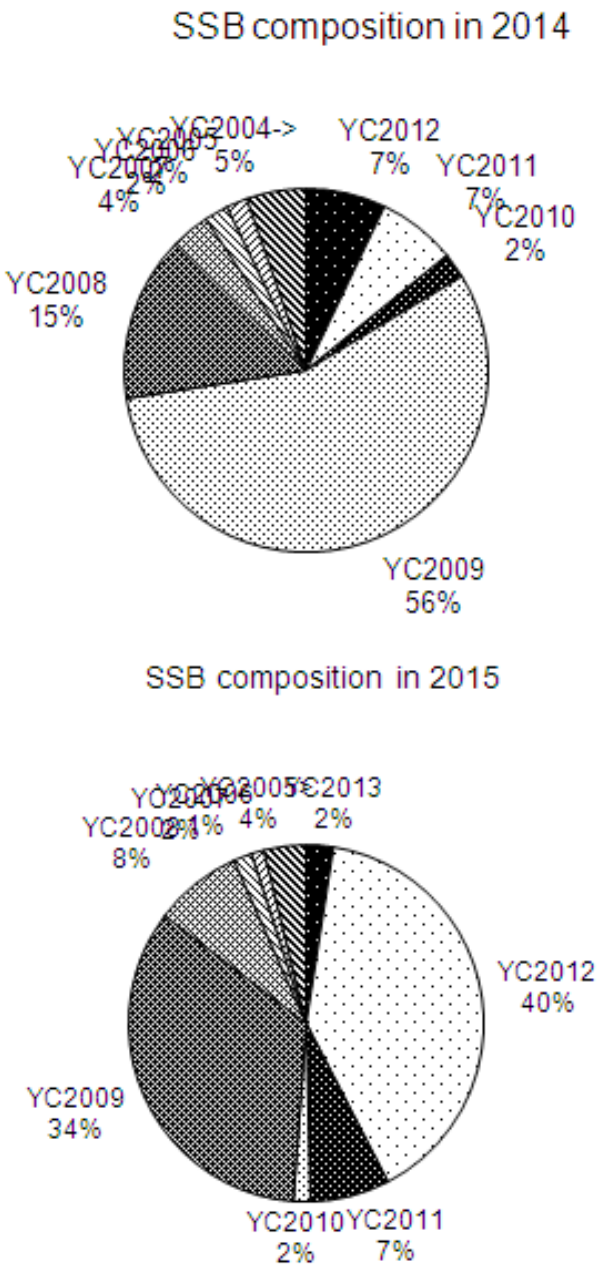


Figure 5.17. Faroe haddock. Projected composition of the number by year-classes in the SSB's in 2014 and 2015.