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 2011, showing a declining SSB mainly due to poor recruitment but also due to higher than recommended fishing mortalities in most years. SSB is now estimated well below B_{lim} and is predicted to stay below B_{lim} in 2012-2014 with status quo fishing mortality. Fishing mortality in 2011 is estimated at 0.26 and the average fishing mortality 2009-2011 at 0.28 (F_{MSY} and F_{pa} = 0.25). Landings in 2011 were only 3 500 t, the lowest in the assessment series back to 1957. This years assessment indicates that the 2011 assessment overestimated the 2010 recruitment by around 30% (9 mio. versus 7 mio.), underestimated the fishing mortality in 2010 by 8%and overestimated the 2010 total- and spawning stock biomasses by 15% and 12%, respectively.

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 Farose waters is given in the stock annex. Figures 5.8-5.9 show the age-aggregated distribution by year as seen in the two regular groundfish surveys in the area; the same 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 2011 to only about 3 500 t. Most of the landings are taken from the Faroe Plateau; the 2011 landings from the Faroe Bank (Sub-Division Vb2), where the area shallower than 200 m depths has been closed to all fishing since the fiscal year 2008-2009, amounted to only about 190 t (Tables 5.1 and 5.2). The cumulative landings by month (Figure 5.2) suggest that landings in 2012 may be at the same low level as in 2011.

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 the fishery by those parties in Vb are only minor in 2011. 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 2011, where the share by longliners was 82% and that by trawlers 18%; the longliners smaller than 110 GRT catched almost 50% 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) and the Faroe Bank (Vb2). The sampling intensity in 2011 is shown in Table 5.4 and it was somewhat lower than last year but more equally distributed throughout the year and among fleets. 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 hase been established in Tórshavn close to the Marine Research Institute and now people from the Institute are sampling these landings regularily; 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 from some minor fleets had to be treated by using 2 seasons only (Jan-Jun, Jul-Dec., and all otterboard trawlers and all pairtrawlers, respectively, had to be treated as one fleet. 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 other nations fishing in Faroese waters. Therefore, catches by trawlers from France and Greenland were assumed to have the same age composition as the Faroese otter board trawlers larger than 1 000 HP. 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 period with a quite substantial plus group (10+). These problems have been addressed in former reports of this WG and will not be further dealt with here (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 the 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 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 1982–2012. 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 2012 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 2011 assessment, with exactly the same settings of the XSA. The only changes are minor revisions of recent landings according to revised data and corresponding revisions of the c@age input file and small revisions of the 2011 summer survey indices. All other input files (VPA) are the same except for the addition of the 2011 data.

5.4.1 Tuning and estimates of fishing mortality

Commercial cpue series. Several commercial catch per unit effort series are updated every year, but as discussed in previous reports of this WG they are not used directly for tuning of the VPA 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).

Fisheries independent cpue series. Two annual groundfish surveys are available, one carried out in February-March since 1982 (100 stations per year down to 500 m depth), and the other in August-September since 1996 (200 stations per year down to 500 m depth). The distribution of haddock catches in the surveys are shown in Figure 5.9 (spring surveys 1994-2012) and Figure 5.10 (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 5.11-5.12 and show consistent pat-

terns. Further analyses of the performances of the two series are shown in figures 5.13 – 5.15. In general there is a good relationship between the indices for one year class in two successive years (Figures 5.13-5.14). The same applies when comparing the corresponding indices at age from the two surveys (Figure 5.15).

A SPALY (same procedure as last year) run, with the same settings of the XSA as in 2011 and tuned with the two surveys combined (Table 5.8), with 2011 data included and some minor revisions of recent catch figures, gave similar 2010 estimates as the 2011 assessment (Table 5.9), although this years assessment indicates that the 2010 assessment overestimated the 2010 recruitment by around 30% (9 mio. versus 7 mio.), underestimated the fishing mortality in 2010 by 8%and overestimated the 2010 total- and spawning stock biomasses by 15% and 12%, respectively.

The log q residuals for the two surveys are shown in Figure 5.16.

The retrospective analysis of fishing mortality, recruitment and spawning stock biomass of this XSA is shown in Figure 5.17. 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 5.18. According to this the fishing mortality showed an overall decline since the early 1960s and has been estimated to be below or at the natural mortality of 0.2 in several years from the late 1970s. It increased again in the years 1993-1998 to reach more than 0.5 in 1998. After that there was a drop to below 0.3 in 2000-2002 followed by an increase in 2003 to about 0.45. Since then the fishing mortality decreased to below the F_{pa} in 2008 and 2009 but in this years assessment the 2010 point value is estimated at 0.33 and in 2011 at 0.26, above the F_{pa} of 0.25 and the proposed F_{MSY} of 0.25.

5.5 Reference points

The yield- and spawning stock biomass per recruit (age 2) based on the long-term data are shown in Table 5.17 and Figure 5.20. From Figure 5.19, showing the recruit/spawning stock relationship, and from Table 5.17, $\mathbf{F}_{med}$, and $\mathbf{F}_{high}$ were calculated at 0.23 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 have investigated possible candidates for $F_{MSY.}$

The medium term forecast presented here is to a large degree based on an similar methodology as used in the stochastic forecast for Icelandic cod (see section 9). The weight at age, maturity at age and selection at age are the same used in the long term (yield per recruit) deterministic analysis (Table 5.16)

Starting condition (2011):

- Na,2011 are based on point values from the final stock esimates in the assessment (Table 5.13). Error in the stock in numbers in the first year are ignored. The fishing mortality in the assment and advisory year set to 0.30 equivalent to the F_{sq} in the short term deterministic predictions (table 5.15).

Simulation:

- No stochasicity is modelled for catch weights, stock weights, maturity nor selection pattern.
- Recruitment: Year classes 2010 and later. Deviations series from the mean recruitment from 1961-2010 year classes (17.5 millions) is applied to a hockey stick model with $SSB_{break}=B_{loss}$=22 kt and $R_{break}=R_{mean}$=17.5 millions. No error is assumed in the breakpoints. The time series of the recruitment deviation sinces 1961 is kept, with randomly drawn starting year in each iteration, looped continuously by repeating the time series. Effectively this means that when SSB is above 22 kt the historical time series of recruitment in absoluted values is repeated, while SSB being below 22 kt results in proportional reduction in the absolute recruitment values while the historical deviation is maintained. This formulation is largely set up so as to test the robustness of fishing mortality applied againts a series of years with very poor recruitment.
- Assessment error: Assessment error is modeled on the fishing mortality in the advisory year upon which the annual removal is taken: cv=0.20, rho=0.15. When setting up the starting value in the simulation (2011), the first 100 values in the error series are ignored in order to apply a potential assessment bias (as manifested in the rho) already in the starting year.
- Other parameters, such as natural mortality are kept the same as in the assessment with no stochastic errors applied in the simulations.

The analysis indicate that F_{msy} is in the range of 0.2-0.4 with a maximum close to 0.3 (Figure 5.21). A target fishing mortality of F=0.3 would result in a low probability of the stock going below B_{lim} but around 30% probability in going below B_{pa} (Figure 5.22). At target fishing mortality of F=0.25 there is only a slight loss in yield (Figure 5.21) but the probability of going below B_{pa} is only around 10% (Figure 5.22). The stock development when applying a target of F=0.25 (Figure 5.23) indicate that variability in catch and spawnings stock is within the range of historical observations. The realized fishing mortality when applying a target of F=0.25 is in the range of 0.17-0.32.

The evaluation are done without taking default action when SSB is below B_{pa}, a default canditate for $B_{trigger}$. Such action would result in lower probability of the SSB going below B_{lim}. The default ICES MSY rule dictates that action dictating a lower fishing mortality than F_{msy} is when the SSB in the assessment year is below $B_{trigger}$. However, given the nature of the recruitment in haddock, where very low recruitment can be observed for a number of years a the trigger action could

potentially be applied to estimates of spawning stock biomass 1-3 years into the future, based on available recruitment estimates from survey measurements. I.e. instead of:

$$F_{\text{target},y+1} = f(F_{MSY}, SSB_y, SSB_{TRIGGER})$$

where y refers to the assessment year the action would be based on:

$$F_{\text{target},y+1} = f(F_{MSY}, SSB_{y+3}, SSB_{TRIGGER})$$

Here the SSB in year y+3 (or y+2) would be largely a function of the recruitments already estimated from available survey indices. In cases where the indices were low, action in term of lower target would thus be taken "ahead of time". If the recruitment indices are however averages or above average size no action in the form of reducing F in the advisory years is requied.

Further evaluation of a suitable F_{msy} harvest rate mechanims is pending and will be presented in the next NWWG report. The WG proposes, based on the preliminary analysis presented here that the F_{msy} target be set provisionally at 0.25 and that this value be used as the basis for deriving an MSY advice for upcoming fishing year.

The third approach uses the very preliminary ecological model described in chapters 2 and 3, where F_{MSY} is estimated for the cod, haddock and saithe simultaneously. When optimizing the cod and haddock catches and at the same time allowing for about average catches of saithe, the F_{MSY} for haddock is indicated to be in the range of 0.20-0.25, consistent with the suggested F_{MSY} of 0.25.

Last year the NWWG stated that simulation studies taking into account the productivity (cyclic) of the ecosystem are necessary to come up with reliable candidates for F_{MSY}. This still is needed before a more final F_{MSY} can be set, so the present F_{MSY} suggestion should be regarded as very preliminary. The ecological model includes productivity of the ecosystem, but also this need to be further developed.

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

The stock size in numbers is given in Table 5.11 and a summary of the VPA with the biomass estimates is given in Table 5.12 and in Figure 5.18. According to this assessment, the 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 fishery 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 as 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 2008 YC which is estimated as one fourth 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

5.7.1 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 2010 are taken directly from the 2012 final XSA, the 2013 year class at age 2 is estimated from the 2012 XSA age 1 applying a natural mortality of 0.2 in a forward calculation of the numbers using basic VPA equations. The YC 2012 at age 2 in 2014 is estimated as the geometric mean of the 2-year-olds since 2005. This procedure was introduces last year . 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 2014 has little effect on the short term prediction. The exploitation pattern used in the prediction was derived from averaging the 20089–2011 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 2012-2014 was set equal to the average weights for 2009-2011 since the recent weights fluctuate without a trend .The maturity ogive for 2012 is estimated as the average of the observed maturities in the Faroese Groundfish Spring Survey 2010-2011, and the ogives in 2012-2013 are estimated as the average of the 2010-2012 values.

5.7.2 Results

Although the allocated number of fishing days for the fishing year 2011-2012was reduced for some fleets as compared to the year before (see section 2), it should not be unrealistic to assume fishing mortalities in 2012 as the average of some recent years, here the average of F(2009-2011), 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 2012 are then predicted to be about 4 000 t, and continuing with this fishing mortality will result in 2013 landings of about 3 300 t. The SSB will decrease to 18 000 t in 2012, to 15 000 t in 2013 and decrease further in 2014 to 11 400 t, i.e. far below the B_{lim} (22 000t) the next few years. The results of the short-term prediction are shown in Table 5.15 and in Figure 5.20. The contribution by year-classes to the age composition of the predicted 2013 and 2014 SSB's is shown in Figure 5.24.

5.8 Medium term forecasts and yield per recruit

Medium term projections are presented in section 5.5 of this years report.

The input data for the long-term yield and spawning stock biomass (yield-per-recruit calculations) are listed in Table 5.16. Mean weights-at-age (stock and catch) are averages for the 1977–2011 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 5.17, 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 2010 assessment overestimated the 2010 recruitment by around 30% (9 mio. versus 7 mio. as compared to the long term average of 27.5 mio.), underestimated the fishing mortality in 2010 by 8%and overestimated the 2010 total- and spawning stock biomasses by 15% and 12%, respectively.

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

The sampling of the catches in 2011 for length measurements, otolith readings and length-weight relationships improved as compared to 2007-2009, and and was considered to be adequate in 2010; however, the level of sampling decreased again in 2011 but was more equally distributed throughout the year and between fleets.

5.10 Comparison with previous assessment and forecast

As explained previously in the report, this assessment is an update of the 2011 assessment. The only changes are minor revisions of recent landings according to revised data and corresponding revisions of the c@age input file and small corrections of the 2011 summer survey indices. All other input files (VPA and tuning fleets) are the same except for the addition of the 2011 data.

Following differences in the 2010 estimates were observed as compared to last year:

Comparisons between 2011 and 2012 assessment of 2010 data
The year of comparison is 2010

	R at age 2 (thousands)	Total B (tonnes)	SSB (tonnes)	Landings (tonnes)	F (3-7)
2010 spaly	9117	29296	22262	5198	0.303
2011 spaly	6928	25412	19958	5202	0.3304
%-change	32	15	12	0	-8

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 harvest control role for cod, haddock and saithe, but the proposal has not yet been politically 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 longlinings 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 Ilands 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 2000-2011 and Working Group estimates in Vb.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 [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	3,299
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	+ [6]
Iceland			4									
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	3,302
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	3,489

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, 2000-2011.

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 [2]
Faroe Islands	1,565 [5]	1,948	3,698	4,934	3,594	2,444	1,375	810	556	192	178	187
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	187

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 1985-2011 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
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
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
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
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
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
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
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
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
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
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

Table 5.4

Catch at age 2011

Age	Vb Open Boats	Vb LLiners < 100GRT	Vb LLiners > 100GRT	Vb OB. trawl.	Vb Pair trawl.	Vb All Faroese fleets	Vb Foreign Trawlers	Vb Total All fleets
1	0	0	0	0	0	0	0	0
2	37	95	14	6	17	168	0	168
3	81	430	159	39	53	762	1	762
4	26	134	94	24	41	318	0	319
5	9	49	74	22	41	194	0	195
6	6	43	89	17	28	183	0	183
7	24	131	88	15	18	275	0	276
8	24	136	125	21	42	348	0	348
9	22	140	131	27	41	361	0	362
10	8	53	56	12	18	146	0	147
11	2	11	10	2	3	28	0	28
12	1	6	1	0	1	9	0	9
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
Total no.	240	1226	840	184	302	2792	3	2795
Catch, t.	228	1274	1083	201	354	3140	3	3143

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 tı Pair Trawl. = Pair trawlers

Comm. Sampling 2011	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	8	29	23	8	24	92	0	2	2	94
No. lengths	1676	5517	4755	1788	4841	18577	0	265	265	18842
No. weights	1676	5417	4550	1788	4639	18070	0	265	265	18335
No. ages	240	539	599	179	598	2155	0	60	60	2215

Table 5.5 Faroe haddock. Catch number-at-age

Run title : FAROE HADDOCK (ICES DIVISION Vb) HAD_IND

At 17/04/2012 15:32

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

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

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

YEAR,	1962,	1963,	1964,	1965,	1966,	1967,	1968,	1969,	1970,	1971,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	784,	356,	46,	39,	90,	70,	49,	95,	57,	55,
2,	9631,	13552,	2284,	1368,	1081,	1425,	5881,	2384,	1728,	717,
3,	13977,	8907,	7457,	4286,	3304,	2405,	4097,	7539,	4855,	4393,
4,	5233,	7403,	3899,	5133,	4804,	2599,	2812,	4567,	6581,	4727,
5,	2361,	2242,	2360,	1443,	2710,	1785,	1524,	1565,	1624,	3267,
6,	1407,	1539,	1120,	1209,	1112,	1426,	1526,	1485,	1383,	1292,
7,	868,	860,	728,	673,	740,	631,	923,	1224,	1099,	864,
8,	270,	257,	198,	1345,	180,	197,	230,	378,	326,	222,
9,	72,	75,	49,	43,	54,	52,	68,	114,	68,	147,
+gp,	22,	23,	7,	8,	9,	13,	12,	20,	10,	102,
TOTALNUM,	34625,	35214,	18148,	15547,	14084,	10603,	17122,	19371,	17731,	15786,
TONSLAND,	27151,	27571,	19490,	18479,	18766,	13381,	17852,	23272,	21361,	19393,
SOPCOF %,	89,	89,	101,	94,	109,	101,	102,	108,	102,	97,

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

YEAR,	1972,	1973,	1974,	1975,	1976,	1977,	1978,	1979,	1980,	1981,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	43,	665,	253,	94,	40,	0,	0,	1,	0,	0,
2,	750,	3311,	5633,	7337,	4396,	255,	32,	1,	143,	74,
3,	3744,	8416,	2899,	7952,	7858,	4039,	1022,	1162,	58,	455,
4,	4179,	1240,	3970,	2097,	6798,	5168,	4248,	1755,	3724,	202,
5,	2706,	2795,	451,	1371,	1251,	4918,	4054,	3343,	2583,	2586,
6,	1171,	919,	976,	247,	1189,	2128,	1841,	1851,	2496,	1354,
7,	696,	1054,	466,	352,	298,	946,	717,	772,	1568,	1559,
8,	180,	150,	535,	237,	720,	443,	635,	212,	660,	608,
9,	113,	68,	68,	419,	258,	731,	243,	155,	99,	177,
+gp,	95,	11,	147,	187,	318,	855,	312,	74,	86,	36,
TOTALNUM,	13677,	18629,	15398,	20293,	23126,	19483,	13104,	9326,	11417,	7051,
TONSLAND,	16485,	18035,	14773,	20715,	26211,	25555,	19200,	12424,	15016,	12233,
SOPCOF %,	96,	97,	97,	117,	107,	98,	99,	104,	100,	109,

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

Table 1	Catch numbers at age									Numbers*10**-3
YEAR,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	0,	0,	25,	0,	0,	0,	0,	0,	0,	0,
2,	539,	441,	1195,	985,	230,	283,	655,	63,	105,	77,
3,	934,	1969,	1561,	4553,	2549,	1718,	444,	1518,	1275,	1044,
4,	784,	383,	2462,	2196,	4452,	3565,	2463,	658,	1921,	1774,
5,	298,	422,	147,	1242,	1522,	2972,	3036,	2787,	768,	1248,
6,	2182,	93,	234,	169,	738,	1114,	2140,	2554,	1737,	651,
7,	973,	1444,	42,	91,	39,	529,	475,	1976,	1909,	1101,
8,	1166,	740,	861,	61,	130,	83,	151,	541,	885,	698,
9,	1283,	947,	388,	503,	71,	48,	18,	133,	270,	317,
+gp,	214,	795,	968,	973,	712,	334,	128,	81,	108,	32,
TOTALNUM,	8373,	7234,	7883,	10773,	10443,	10646,	9510,	10311,	8978,	6942,
TONSLAND,	11937,	12894,	12378,	15143,	14477,	14882,	12178,	14325,	11726,	8429,
SOPCOF %,	92,	106,	106,	106,	101,	102,	97,	100,	102,	106,

Table 1	Catch numbers at age									Numbers*10**-3
YEAR,	1992,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	0,	43,	1,	0,	1,	0,	0,	9,	73,	19,
2,	40,	113,	277,	804,	326,	77,	106,	174,	1461,	4380,
3,	154,	298,	191,	452,	5234,	2913,	1055,	1142,	3061,	3128,
4,	776,	274,	307,	235,	1019,	10517,	5269,	942,	210,	2423,
5,	1120,	554,	153,	226,	179,	710,	9856,	4677,	682,	173,
6,	959,	538,	423,	132,	163,	116,	446,	6619,	2685,	451,
7,	335,	474,	427,	295,	161,	123,	99,	226,	2846,	1151,
8,	373,	131,	383,	290,	270,	93,	87,	26,	79,	1375,
9,	401,	201,	125,	262,	234,	220,	95,	20,	1,	17,
+gp,	162,	185,	301,	295,	394,	516,	502,	192,	71,	18,
TOTALNUM,	4320,	2811,	2588,	2991,	7981,	15285,	17515,	14027,	11169,	13135,
TONSLAND,	5476,	4026,	4252,	4948,	9642,	17924,	22210,	18482,	15821,	15890,
SOPCOF %,	106,	103,	100,	103,	100,	103,	101,	100,	103,	100,

Table 1	Catch numbers at age									Numbers*10**-3
YEAR,	2002,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,
AGE										
0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
1,	0,	0,	3,	0,	0,	0,	6,	0,	0,	0,
2,	1515,	133,	243,	85,	247,	76,	66,	27,	389,	168,
3,	14039,	3436,	2007,	1671,	446,	982,	204,	329,	445,	762,
4,	2879,	13551,	4802,	3852,	2566,	547,	918,	402,	426,	319,
5,	1200,	2224,	10426,	6753,	3949,	2732,	424,	555,	279,	195,
6,	133,	949,	1163,	6127,	5423,	3309,	1471,	514,	484,	183,
7,	239,	163,	409,	542,	3278,	2758,	1706,	1133,	553,	276,
8,	843,	334,	89,	147,	136,	1117,	1254,	739,	718,	348,
9,	1095,	858,	166,	28,	63,	89,	320,	285,	444,	362,
+gp,	33,	924,	811,	154,	70,	9,	39,	48,	159,	184,
TOTALNUM,	21976,	22572,	20119,	19359,	16178,	11619,	6408,	4032,	3897,	2797,
TONSLAND,	24933,	27072,	23101,	20455,	17154,	12631,	7388,	5197,	5202,	3489,
SOPCOF %,	100,	100,	99,	100,	100,	100,	101,	100,	101,	101,

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

Run title : FAROE HADDOCK (ICES DIVISION Vb) HAD_IND

At 17/04/2012 15:32

Table 2 Catch weights at age (kg) YEAR,	1957,	1958,	1959,	1960,	1961,
AGE					
0,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.2500,	.2500,	.2500,	.2500,	.2500,
2,	.4700,	.4700,	.4700,	.4700,	.4700,
3,	.7300,	.7300,	.7300,	.7300,	.7300,
4,	1.1300,	1.1300,	1.1300,	1.1300,	1.1300,
5,	1.5500,	1.5500,	1.5500,	1.5500,	1.5500,
6,	1.9700,	1.9700,	1.9700,	1.9700,	1.9700,
7,	2.4100,	2.4100,	2.4100,	2.4100,	2.4100,
8,	2.7600,	2.7600,	2.7600,	2.7600,	2.7600,
9,	3.0700,	3.0700,	3.0700,	3.0700,	3.0700,
+gp,	3.5500,	3.5500,	3.5500,	3.5500,	3.5500,
SOPCOFAC,	.8937,	.8983,	.9034,	.8832,	.8832,

Table 2 Catch weights at age (kg) YEAR,	1962,	1963,	1964,	1965,	1966,	1967,	1968,	1969,	1970,	1971,
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,	.8929,	.8915,	1.0111,	.9383,	1.0885,	1.0117,	1.0246,	1.0787,	1.0249,	.9688,

Table 2 Catch weights at age (kg) YEAR,	1972,	1973,	1974,	1975,	1976,	1977,	1978,	1979,	1980,	1981,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.2500,	.2500,	.2500,	.2500,	.2500,	.0000,	.0000,	.3000,	.0000,	.0000,
2,	.4700,	.4700,	.4700,	.4700,	.4700,	.3110,	.3570,	.3570,	.6430,	.4520,
3,	.7300,	.7300,	.7300,	.7300,	.7300,	.6330,	.7900,	.6720,	.7130,	.7250,
4,	1.1300,	1.1300,	1.1300,	1.1300,	1.1300,	1.0440,	1.0350,	.8940,	.9410,	.9570,
5,	1.5500,	1.5500,	1.5500,	1.5500,	1.5500,	1.4260,	1.3980,	1.1560,	1.1570,	1.2370,
6,	1.9700,	1.9700,	1.9700,	1.9700,	1.9700,	1.8250,	1.8700,	1.5900,	1.4930,	1.6510,
7,	2.4100,	2.4100,	2.4100,	2.4100,	2.4100,	2.2410,	2.3500,	2.0700,	1.7390,	2.0530,
8,	2.7600,	2.7600,	2.7600,	2.7600,	2.7600,	2.2050,	2.5970,	2.5250,	2.0950,	2.4060,
9,	3.0700,	3.0700,	3.0700,	3.0700,	3.0700,	2.5700,	3.0140,	2.6960,	2.4650,	2.7250,
+gp,	3.5500,	3.5500,	3.5500,	3.5500,	3.5500,	2.5910,	2.9200,	3.5190,	3.3100,	3.2500,
SOPCOFAC,	.9597,	.9690,	.9678,	1.1696,	1.0741,	.9784,	.9947,	1.0380,	1.0017,	1.0870,

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

Table 2 Catch weights at age (kg) YEAR,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.3590,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.7000,	.4700,	.6810,	.5280,	.6080,	.6050,	.5010,	.5800,	.4380,	.5470,
3,	.8960,	.7400,	1.0110,	.8590,	.8870,	.8310,	.7810,	.7790,	.6990,	.6930,
4,	1.1500,	1.0100,	1.2550,	1.3910,	1.1750,	1.1260,	.9740,	.9230,	.9390,	.8840,
5,	1.4440,	1.3200,	1.8120,	1.7770,	1.6310,	1.4620,	1.3630,	1.2070,	1.2040,	1.0860,
6,	1.4980,	1.6600,	2.0610,	2.3260,	1.9840,	1.9410,	1.6800,	1.5640,	1.3840,	1.2760,
7,	1.8290,	2.0500,	2.0590,	2.4400,	2.5190,	2.1730,	1.9750,	1.7460,	1.5640,	1.4770,
8,	1.8870,	2.2600,	2.1370,	2.4010,	2.5830,	2.3470,	2.3440,	2.0860,	1.8180,	1.5740,
9,	1.9610,	2.5400,	2.3680,	2.5320,	2.5700,	3.1180,	2.2480,	2.4240,	2.1680,	1.9300,
+gp,	2.8560,	3.0400,	2.6860,	2.6860,	2.9220,	2.9330,	3.2950,	2.5140,	2.3350,	2.1530,
SOPCOFAC,	.9238,	1.0554,	1.0593,	1.0559,	1.0141,	1.0197,	.9695,	1.0025,	1.0195,	1.0635,

Table 2 Catch weights at age (kg) YEAR,	1992,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.3600,	.0000,	.0000,	.3600,	.0000,	.0000,	.2780,	.2800,	.2800,
2,	.5250,	.7550,	.7540,	.6660,	.5340,	.5190,	.6220,	.5040,	.6610,	.6080,
3,	.7240,	.9820,	1.1030,	1.0540,	.8580,	.7710,	.8460,	.6240,	.9360,	.9400,
4,	.8170,	1.0270,	1.2540,	1.4890,	1.4590,	1.0660,	1.0160,	.9740,	1.1660,	1.3740,
5,	1.0380,	1.1920,	1.4650,	1.7790,	1.9930,	1.7990,	1.2830,	1.2200,	1.4830,	1.7790,
6,	1.2490,	1.3780,	1.5930,	1.9400,	2.3300,	2.2700,	2.0800,	1.4900,	1.6160,	1.9710,
7,	1.4300,	1.6430,	1.8040,	2.1820,	2.3510,	2.3400,	2.5560,	2.4560,	1.8930,	2.1190,
8,	1.5640,	1.7960,	2.0490,	2.3570,	2.4690,	2.4750,	2.5720,	2.6580,	2.8210,	2.3730,
9,	1.6330,	1.9710,	2.2250,	2.4900,	2.7770,	2.5010,	2.4520,	2.5980,	3.7490,	2.7500,
+gp,	2.1260,	2.2400,	2.4230,	2.6780,	2.5820,	2.6760,	2.7530,	2.9530,	3.1960,	3.9660,
SOPCOFAC,	1.0554,	1.0320,	.9969,	1.0331,	1.0043,	1.0250,	1.0106,	.9973,	1.0349,	.9960,

Table 2 Catch weights at age (kg) YEAR,	2002,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.3670,	.0000,	.0000,	.0000,	.4910,	.0000,	.0000,	.0000,
2,	.5840,	.5710,	.5740,	.5380,	.4750,	.6280,	.6360,	.4820,	.6920,	.5530,
3,	.8570,	.7150,	.7700,	.6490,	.6010,	.6690,	.7540,	.7340,	.8700,	.8150,
4,	1.4050,	1.0080,	.8870,	.7970,	.7680,	.8590,	.8600,	.9850,	1.1490,	1.0860,
5,	1.7990,	1.5370,	1.1590,	1.0200,	.9110,	.9690,	.9910,	1.1300,	1.3080,	1.3030,
6,	1.9740,	1.9110,	1.6380,	1.2450,	1.1260,	1.0600,	1.0820,	1.2640,	1.3860,	1.3870,
7,	2.3010,	2.0910,	1.8700,	1.8430,	1.3740,	1.2450,	1.1510,	1.3570,	1.4290,	1.4690,
8,	2.3700,	2.3010,	2.4380,	2.0610,	2.1580,	1.4750,	1.3790,	1.5450,	1.5680,	1.5380,
9,	2.6260,	2.4060,	2.3570,	2.2630,	2.2110,	2.2660,	1.7270,	1.7920,	1.7400,	1.7020,
+gp,	3.1300,	2.5350,	2.4170,	2.5790,	2.5690,	2.2560,	2.4350,	2.1540,	1.8410,	1.8620,
SOPCOFAC,	1.0010,	1.0049,	.9929,	.9988,	.9987,	.9999,	1.0065,	.9955,	1.0076,	1.0062,

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

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

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

```
Table  5    Proportion mature at age
YEAR,       1962,    1963,    1964,    1965,    1966,    1967,    1968,    1969,
1970,    1971,

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,       1972,    1973,    1974,    1975,    1976,    1977,    1978,    1979,    1980,    1981,

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

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

Table 5 Proportion mature at age YEAR,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,
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,	.0800,	.0300,	.0300,	.0500,	.0500,	.0200,	.0800,	.1600,
3,	.6200,	.6200,	.7600,	.6200,	.4300,	.3200,	.2400,	.2200,	.3700,	.5800,
4,	.8900,	.8900,	.9800,	.9600,	.9500,	.9100,	.8900,	.8700,	.9000,	.9300,
5,	1.0000,	1.0000,	1.0000,	1.0000,	.9900,	.9800,	.9800,	.9900,	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,	1992,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.1800,	.1100,	.0500,	.0300,	.0300,	.0100,	.0100,	.0100,	.0200,	.0900,
3,	.6500,	.5000,	.4200,	.4700,	.4700,	.4700,	.3600,	.3500,	.3600,	.5400,
4,	.9100,	.8500,	.8600,	.9100,	.9300,	.9100,	.8700,	.8600,	.8700,	.9300,
5,	1.0000,	.9700,	.9600,	.9600,	.9800,	1.0000,	.9900,	.9900,	.9900,	1.0000,
6,	1.0000,	.9900,	.9900,	.9900,	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,	2002,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,
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,	.0700,	.0000,	.0100,	.0100,	.0200,	.0100,	.0100,	.0300,	.0900,
3,	.4900,	.4500,	.3500,	.3400,	.4200,	.5200,	.6400,	.6100,	.6500,	.7400,
4,	.9700,	.9700,	.9400,	.9100,	.9100,	.9100,	.9500,	.9300,	.9600,	.9700,
5,	1.0000,	.9900,	.9900,	.9900,	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. 2012 tuning file.

```
FAROE Haddock (ICES SUBDIVISION VB)       COMB-SURVEY-SPALY-12-jr.txt
102
SUMMER SURVEY
1996 2011
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
SPRING SURVEY SHIFTED
1993 2011
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   4871.40   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
```

Table 5.9 Faroe haddock 2012 xsa.

```
Lowestoft VPA Version 3.1

  17/04/2012  15:02

Extended Survivors Analysis

FAROE HADDOCK (ICES DIVISION Vb)                 HAD_IND

CPUE data from file D:\Vpa\vpa2012\input-files\comb-survey-spaly-12-jr.txt

Catch data for  55 years. 1957 to 2011. Ages  0 to  10.

     Fleet,            First, Last, First, Last, Alpha,  Beta
                   ,    year, year,  age ,  age
SUMMER SURVEY       ,   1996, 2011,   1,     8,   .600,   .700
SPRING SURVEY SHIFTE,   1993, 2011,   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   41 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,  2002,  2003,  2004,  2005,  2006,  2007,  2008,  2009,  2010,  2011

     0,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000
     1,  .000,  .000,  .000,  .000,  .000,  .000,  .002,  .000,  .000,  .000
     2,  .028,  .003,  .009,  .012,  .033,  .025,  .024,  .010,  .064,  .015
     3,  .216,  .082,  .066,  .082,  .078,  .180,  .088,  .163,  .231,  .172
     4,  .368,  .334,  .158,  .174,  .176,  .129,  .255,  .251,  .328,  .258
     5,  .412,  .545,  .467,  .348,  .272,  .287,  .140,  .241,  .277,  .245
     6,  .271,  .680,  .621,  .557,  .525,  .386,  .247,  .252,  .343,  .296
     7,  .224,  .628,  .718,  .674,  .668,  .561,  .352,  .306,  .472,  .336
     8,  .266,  .559,  .875,  .618,  .349,  .503,  .541,  .253,  .324,  .623
     9,  .263,  .477,  .606,  .770,  .594,  .406,  .260,  .222,  .237,  .269
```

Table 5.9 Faroe haddock 2012 xsa (cont.)

XSA population numbers (Thousands)

YEAR	AGE 0	1	2	3	4	5	6	7	8	9
2002	4.30E+04	5.20E+04	6.05E+04	7.99E+04	1.03E+04	3.92E+03	6.19E+02	1.32E+03	3.98E+03	5.23E+03
2003	1.21E+04	3.52E+04	4.26E+04	4.81E+04	5.27E+04	5.85E+03	2.13E+03	3.86E+02	8.62E+02	2.50E+03
2004	1.24E+04	9.93E+03	2.88E+04	3.47E+04	3.63E+04	3.09E+04	2.78E+03	8.82E+02	1.69E+02	4.04E+02
2005	4.99E+03	1.02E+04	8.13E+03	2.34E+04	2.66E+04	2.54E+04	1.59E+04	1.22E+03	3.52E+02	5.76E+01
2006	4.52E+03	4.08E+03	8.33E+03	6.58E+03	1.76E+04	1.83E+04	1.47E+04	7.43E+03	5.10E+02	1.55E+02
2007	4.40E+03	3.70E+03	3.34E+03	6.59E+03	4.98E+03	1.21E+04	1.14E+04	7.10E+03	3.12E+03	2.95E+02
2008	1.03E+04	3.60E+03	3.03E+03	2.67E+03	4.51E+03	3.58E+03	7.43E+03	6.36E+03	3.32E+03	1.54E+03
2009	1.84E+04	8.46E+03	2.94E+03	2.42E+03	2.00E+03	2.86E+03	2.55E+03	4.75E+03	3.66E+03	1.58E+03
2010	7.03E+02	1.51E+04	6.93E+03	2.38E+03	1.68E+03	1.27E+03	1.84E+03	1.62E+03	2.87E+03	2.33E+03
2011	1.93E+03	5.76E+02	1.23E+04	5.32E+03	1.55E+03	9.93E+02	7.90E+02	1.07E+03	8.29E+02	1.70E+03

Estimated population abundance at 1st Jan 2012

, 0.00E+00, 1.58E+03, 4.71E+02, 9.95E+03, 3.67E+03, 9.80E+02, 6.37E+02, 4.81E+02, 6.25E+02, 3.64E+02,

Taper weighted geometric mean of the VPA populations:

, 2.33E+04, 2.03E+04, 1.79E+04, 1.40E+04, 9.50E+03, 5.85E+03, 3.55E+03, 2.00E+03, 9.73E+02, 4.56E+02,

Standard error of the weighted Log(VPA populations) :

, 1.2016, 1.1580, 1.0521, 1.0283, 1.0200, .9827, .9478, .9592, 1.1185, 1.3936,

Log catchability residuals.

Fleet : SUMMER SURVEY

Age	1993	1994	1995	1996	1997	1998	1999	2000	2001
0	No data for this fleet at this age								
1	99.99	99.99	99.99	1.07	.14	-.27	-.34	-.01	.02
2	99.99	99.99	99.99	-.06	.43	-.15	-.36	.05	.09
3	99.99	99.99	99.99	.40	.23	-.36	1.59	.27	.46
4	99.99	99.99	99.99	-.36	.49	.09	-.46	-.62	.35
5	99.99	99.99	99.99	-.07	.08	.14	.17	-.10	-.87
6	99.99	99.99	99.99	.23	.44	-.26	.07	.07	-.37
7	99.99	99.99	99.99	-.01	-.34	.99	.29	.04	-.03
8	99.99	99.99	99.99	-.07	.17	.62	.44	.29	-.10

Age	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
0	No data for this fleet at this age									
1	.27	.03	-.36	.09	-.43	-.21	.00	-.06	.22	-.16
2	-.02	-.05	.28	.07	.28	.88	-.30	-.63	-.45	-.04
3	.41	-.10	-.19	.06	-.54	-.66	-.19	-1.07	.15	-.45
4	.20	.42	-.10	.22	.02	-.52	.17	.34	.36	-.59
5	.22	.64	.36	.12	.13	-.20	-.51	.02	.05	-.19
6	-.49	-.12	-.07	.75	.27	.11	-.04	-.17	.07	-.47
7	-.39	-.26	-.42	.25	.31	-.02	.20	.11	.22	-.68
8	-.31	.33	-.71	-1.20	-.51	-.74	.14	-.26	.07	.03

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

Age	1	2	3	4	5	6	7	8
Mean Log q	-4.9001	-5.2827	-5.7639	-5.7493	-5.8441	-5.8358	-5.8358	-5.8358
S.E(Log q)	.3529	.3620	.6054	.3885	.3452	.3296	.3917	.4999

Table 5.9 Faroe haddock 2012 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,	.00,	.619,	.00,	.00,	0,	.00,	.00,
2,	.00,	.338,	.00,	.00,	0,	.00,	.00,
3,	.00,	.825,	.00,	.00,	0,	.00,	.00,
4,	.00,	2.103,	.00,	.00,	0,	.00,	.00,
5,	.00,	2.031,	.00,	.00,	0,	.00,	.00,
6,	.00,	1.498,	.00,	.00,	0,	.00,	.00,
7,	.00,	-.157,	.00,	.00,	0,	.00,	.00,
8,	.00,	-.879,	.00,	.00,	0,	.00,	.00,

Fleet : SPRING SURVEY SHIFTE

Age ,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001
0 ,	-.67,	.87,	.80,	-1.18,	-.37,	-.44,	-.25,	.25,	.42
1 ,	-.52,	-.93,	.35,	.55,	-.21,	-.16,	-.26,	-.36,	-.55
2 ,	-.59,	-.69,	-.12,	.41,	.48,	-2.00,	.33,	-.28,	.14
3 ,	-.08,	-.09,	-.31,	.56,	.40,	.19,	-.55,	-.56,	-.27
4 ,	-.28,	-.15,	-.09,	.47,	.56,	.28,	-.33,	-1.88,	-.07
5 ,	-.26,	-1.05,	-.22,	1.06,	.65,	-.17,	-.01,	-1.16,	-.90
6 ,	.26,	-.51,	-.42,	-.22,	-.79,	-.35,	.05,	-.72,	-.62
7 ,	No data for this fleet at this age								
8 ,	No data for this fleet at this age								

Age ,	2002,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011
0 ,	.01,	-.37,	.76,	-.43,	.19,	-.36,	.61,	.55,	-.41,	.00
1 ,	.03,	.09,	.37,	.39,	.09,	.34,	.33,	.27,	-.26,	.42
2 ,	-.01,	.06,	.17,	-.15,	.83,	.10,	.51,	-.04,	.26,	.58
3 ,	-.02,	-.17,	-.06,	.03,	-.19,	.43,	-.19,	.01,	.86,	.01
4 ,	-.34,	.67,	-.03,	-.04,	.45,	-.10,	.55,	-.19,	.29,	.23
5 ,	-.40,	.08,	.65,	.32,	.70,	.33,	-.10,	-.06,	.23,	.33
6 ,	-1.05,	-.48,	.30,	.39,	1.03,	.47,	.31,	.13,	.76,	1.45
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,	-5.9358,	-5.2822,	-5.8871,	-6.0188,	-6.3005,	-6.4405,	-6.5598,
S.E(Log q),	.5669,	.4068,	.6166,	.3602,	.5596,	.5975,	.6599,

Table 5.9 Faroe haddock 2012 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,     .00,     .752,       .00,     .00,      0,     .00,     .00,
  1,     .00,   -2.775,       .00,     .00,      0,     .00,     .00,
  2,     .00,    1.035,       .00,     .00,      0,     .00,     .00,
  3,     .00,     .555,       .00,     .00,      0,     .00,     .00,
  4,     .00,    2.026,       .00,     .00,      0,     .00,     .00,
  5,     .00,     .859,       .00,     .00,      0,     .00,     .00,
  6,     .00,    1.532,       .00,     .00,      0,     .00,     .00,


 Terminal year survivor and F summaries :

 Age  0   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       ,        1.,   .000,       .000,    .00,   0,  .000,     .000
 SPRING SURVEY SHIFTE,     1581.,   .582,       .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,
      1581.,       .58,      .00,    1,    .000,   .000


 Age  1   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       ,       402.,   .364,       .000,    .00,   1,  .465,     .000
 SPRING SURVEY SHIFTE,       542.,   .339,       .397,   1.17,   2,  .535,     .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,
       471.,       .25,      .23,    3,    .929,   .000
```

Table 5.9 Faroe haddock 2012 xsa (cont.)

```
Age  2   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       ,     10949.,   .260,       .129,    .50,   2,  .491,     .014
SPRING SURVEY SHIFTE,     11480.,   .299,       .290,    .97,   3,  .373,     .013

  F shrinkage mean  ,      4742.,    .50,,,,                        .135,     .032

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     9950.,       .18,      .19,    6,   1.012,   .015


Age  3   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       ,      2771.,   .240,       .138,    .57,   3,  .421,     .222
SPRING SURVEY SHIFTE,      4544.,   .232,       .119,    .51,   4,  .457,     .141

  F shrinkage mean  ,      4305.,    .50,,,,                        .122,     .149

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     3666.,       .16,      .12,    8,    .726,   .172


Age  4   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       ,       691.,   .207,       .184,    .89,   4,  .465,     .349
SPRING SURVEY SHIFTE,      1394.,   .216,       .207,    .96,   5,  .413,     .188

  F shrinkage mean  ,      1122.,    .50,,,,                        .121,     .229

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
      980.,       .14,      .16,   10,   1.099,   .258
```

Table 5.9 Faroe haddock 2012 xsa (cont.)

```
Age  5   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       ,       538.,   .183,       .170,    .93,   5,  .519,     .284
SPRING SURVEY SHIFTE,       810.,   .207,       .071,    .35,   6,  .365,     .197

  F shrinkage mean  ,       636.,    .50,,,,                        .116,     .245

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
      637.,       .13,      .10,   12,    .727,   .245



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

Year class = 2005

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,       461.,   .164,       .209,   1.28,   6,  .564,     .307
SPRING SURVEY SHIFTE,       556.,   .200,       .226,   1.13,   7,  .325,     .261

  F shrinkage mean  ,       391.,    .50,,,,                        .110,     .353

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
      481.,       .13,      .13,   14,   1.074,   .296



Age  7   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       ,       559.,   .158,       .146,    .92,   7,  .607,     .369
SPRING SURVEY SHIFTE,      1009.,   .201,       .108,    .54,   7,  .260,     .221

  F shrinkage mean  ,       410.,    .50,,,,                        .133,     .475

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
      625.,       .13,      .12,   15,    .911,   .336
```

Table 5.9 Faroe haddock 2012 xsa (cont.)

```
Age  8   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       ,       307.,   .151,       .104,    .69,   8,  .577,     .706
 SPRING SURVEY SHIFTE,       351.,   .196,       .097,    .50,   7,  .238,     .640

   F shrinkage mean  ,       647.,    .50,,,,                        .185,     .397

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
       364.,       .14,      .10,   16,    .743,   .623


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

 Year class = 2002

 Fleet,                 Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
      ,                 Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,      1092.,   .152,       .047,    .31,   8,  .594,     .262
 SPRING SURVEY SHIFTE,      1261.,   .198,       .062,    .31,   7,  .232,     .231

   F shrinkage mean  ,       772.,    .50,,,,                        .174,     .354

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
      1063.,       .13,      .05,   16,    .406,   .269
```

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

Run title : FAROE HADDOCK (ICES DIVISION Vb) HAD_IND

At 17/04/2012 15:32

Terminal Fs derived using XSA (With F shrinkage)

Table 8 Fishing mortality (F) at age YEAR,	1957,	1958,	1959,	1960,	1961,
AGE					
0,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0010,	.0024,	.0132,	.0150,	.0219,
2,	.1394,	.1939,	.1066,	.2074,	.1875,
3,	.3707,	.4378,	.3860,	.4599,	.4162,
4,	.6163,	.5737,	.4782,	.6926,	.4209,
5,	.3909,	.5386,	.4195,	.5260,	.4387,
6,	.4380,	.6346,	.6458,	.6591,	.5879,
7,	.6340,	.9504,	.9184,	1.2130,	.9483,
8,	.5599,	.7839,	.8206,	.9667,	.8742,
9,	.5321,	.7028,	.6625,	.8198,	.6600,
+gp,	.5321,	.7028,	.6625,	.8198,	.6600,
FBAR 3- 7,	.4900,	.6270,	.5696,	.7101,	.5624,

Table 8 Fishing mortality (F) at age YEAR,	1962,	1963,	1964,	1965,	1966,	1967,	1968,	1969,	1970,	1971,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0149,	.0106,	.0018,	.0017,	.0032,	.0012,	.0014,	.0024,	.0033,	.0015,
2,	.3232,	.3801,	.0876,	.0691,	.0610,	.0641,	.1261,	.0860,	.0551,	.0526,
3,	.5866,	.5639,	.3723,	.2354,	.2370,	.1873,	.2647,	.2363,	.2528,	.1936,
4,	.5980,	.7261,	.5193,	.4767,	.4515,	.2971,	.3483,	.5320,	.3344,	.4186,
5,	.3480,	.5591,	.5369,	.3678,	.5006,	.2997,	.2847,	.3330,	.3639,	.2754,
6,	.6706,	.4026,	.6107,	.5882,	.5421,	.5406,	.4540,	.4975,	.5561,	.5560,
7,	1.0499,	1.2493,	.3375,	.9618,	.9128,	.6906,	.8367,	.8277,	.8740,	.8385,
8,	.9736,	1.1139,	1.2027,	2.3618,	.7509,	.6634,	.5851,	1.0631,	.5430,	.4224,
9,	.7351,	.8185,	.6472,	.9619,	.6373,	.5022,	.5057,	.6566,	.5386,	.5061,
+gp,	.7351,	.8185,	.6472,	.9619,	.6373,	.5022,	.5057,	.6566,	.5386,	.5061,
FBAR 3- 7,	.6506,	.7002,	.4753,	.5260,	.5288,	.4031,	.4377,	.4853,	.4762,	.4564,

Terminal Fs derived using XSA (With F shrinkage)

Table 8 Fishing mortality (F) at age YEAR,	1972,	1973,	1974,	1975,	1976,	1977,	1978,	1979,	1980,	1981,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0016,	.0114,	.0033,	.0015,	.0014,	.0000,	.0000,	.0002,	.0000,	.0000,
2,	.0253,	.1677,	.1266,	.1230,	.0908,	.0108,	.0010,	.0004,	.0325,	.0237,
3,	.4226,	.4320,	.2172,	.2650,	.1878,	.1128,	.0547,	.0458,	.0285,	.1373,
4,	.2853,	.2392,	.3730,	.2412,	.3810,	.1815,	.1665,	.1255,	.2025,	.1314,
5,	.4517,	.3143,	.1279,	.2116,	.2216,	.5273,	.2115,	.1913,	.2749,	.2111,
6,	.1495,	.2703,	.1714,	.0957,	.2871,	.7246,	.3820,	.1408,	.2135,	.2264,
7,	.6720,	.1951,	.2134,	.0859,	.1601,	.3904,	.5760,	.2721,	.1702,	.2004,
8,	.4066,	.2907,	.1433,	.1599,	.2538,	.3788,	.4968,	.3303,	.3954,	.0920,
9,	.3957,	.2633,	.2068,	.1595,	.2621,	.4437,	.3689,	.2130,	.2526,	.1730,
+gp,	.3957,	.2633,	.2068,	.1595,	.2621,	.4437,	.3689,	.2130,	.2526,	.1730,
0 FBAR 3- 7,	.3962,	.2902,	.2206,	.1799,	.2475,	.3873,	.2781,	.1551,	.1779,	.1813,

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

Table 8 Fishing mortality (F) at age YEAR,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0006,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0383,	.0252,	.0329,	.0280,	.0096,	.0337,	.0393,	.0049,	.0124,	.0289,
3,	.4617,	.1916,	.1167,	.1693,	.0940,	.0925,	.0679,	.1205,	.1305,	.1645,
4,	.3708,	.3480,	.3895,	.2391,	.2489,	.1843,	.1860,	.1360,	.2205,	.2703,
5,	.2917,	.3497,	.2170,	.3473,	.2596,	.2620,	.2364,	.3321,	.2327,	.2178,
6,	.2774,	.1382,	.3335,	.4161,	.3586,	.3078,	.3057,	.3202,	.3564,	.3165,
7,	.2523,	.2990,	.0853,	.2083,	.1572,	.4742,	.2079,	.5164,	.4225,	.4027,
8,	.2265,	.3101,	.2928,	.1719,	.5175,	.5841,	.2377,	.3879,	.4617,	.2676,
9,	.2853,	.2906,	.2650,	.2780,	.3102,	.3648,	.2359,	.3406,	.3408,	.2967,
+gp,	.2853,	.2906,	.2650,	.2780,	.3102,	.3648,	.2359,	.3406,	.3408,	.2967,
FBAR 3- 7,	.3308,	.2653,	.2284,	.2760,	.2237,	.2642,	.2008,	.2850,	.2725,	.2744,

Table 8 Fishing mortality (F) at age YEAR,	1992,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0060,	.0000,	.0000,	.0001,	.0000,	.0000,	.0004,	.0006,	.0003,
2,	.0167,	.0709,	.0488,	.0093,	.0079,	.0094,	.0319,	.0125,	.0790,	.0484,
3,	.0742,	.1658,	.1644,	.1050,	.0770,	.0907,	.1714,	.5563,	.3154,	.2422,
4,	.1771,	.1833,	.2574,	.3127,	.3638,	.2187,	.2355,	.2280,	.1829,	.4439,
5,	.2735,	.1850,	.1476,	.3065,	.4178,	.4675,	.3283,	.3396,	.2568,	.2255,
6,	.2593,	.2041,	.2102,	.1834,	.3797,	.5286,	.6112,	.3838,	.3334,	.2698,
7,	.2666,	.1969,	.2478,	.2222,	.3565,	.5547,	1.2947,	.7371,	.2820,	.2322,
8,	.2296,	.1577,	.2418,	.2655,	.3260,	.3598,	1.0229,	1.8975,	.6261,	.2135,
9,	.2424,	.1862,	.2220,	.2594,	.3563,	.4837,	.7772,	.6935,	.3097,	.2597,
+gp,	.2424,	.1862,	.2220,	.2594,	.3563,	.4837,	.7772,	.6935,	.3097,	.2597,
FBAR 3- 7,	.2101,	.1870,	.2055,	.2260,	.3190,	.3720,	.5282,	.4490,	.2741,	.2827,

Table 8 Fishing mortality (F) at age YEAR,	2002,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0003,	.0000,	.0000,	.0000,	.0018,	.0000,	.0000,	.0000,
2,	.0281,	.0035,	.0094,	.0116,	.0333,	.0254,	.0244,	.0102,	.0641,	.0152,
3,	.2160,	.0822,	.0660,	.0824,	.0779,	.1799,	.0883,	.1628,	.2311,	.1723,
4,	.3683,	.3343,	.1581,	.1742,	.1756,	.1293,	.2549,	.2512,	.3279,	.2583,
5,	.4125,	.5449,	.4670,	.3483,	.2722,	.2871,	.1401,	.2413,	.2772,	.2445,
6,	.2712,	.6796,	.6212,	.5572,	.5255,	.3860,	.2468,	.2519,	.3434,	.2956,
7,	.2238,	.6281,	.7180,	.6737,	.6680,	.5610,	.3519,	.3057,	.4722,	.3361,
8,	.2663,	.5587,	.8746,	.6181,	.3491,	.5035,	.5411,	.2525,	.3240,	.6234,
9,	.2633,	.4770,	.6057,	.7703,	.5938,	.4063,	.2601,	.2223,	.2367,	.2687,
+gp,	.2633,	.4770,	.6057,	.7703,	.5938,	.4063,	.2601,	.2223,	.2367,	.2687,
FBAR 3- 7,	.2983,	.4538,	.4060,	.3671,	.3438,	.3087,	.2164,	.2426,	.3304,	.2614,

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

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

  At 17/04/2012  15:32

                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,

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

Table 10 Stock number at age (start of year)	Numbers*10**-3									
YEAR,	1962,	1963,	1964,	1965,	1966,	1967,	1968,	1969,	1970,	1971,
AGE										
0,	45400,	33843,	30192,	37948,	81924,	47768,	53238,	23136,	49622,	35418,
1,	58715,	37170,	27709,	24719,	31069,	67073,	39109,	43587,	18942,	40627,
2,	38537,	47362,	30110,	22644,	20203,	25356,	54852,	31975,	35600,	15457,
3,	34806,	22837,	26515,	22585,	17302,	15563,	19470,	39587,	24022,	27583,
4,	12850,	15850,	10638,	14961,	14613,	11176,	10566,	12234,	25590,	15275,
5,	8877,	5786,	6278,	5182,	7604,	7617,	6798,	6106,	5884,	14996,
6,	3182,	5132,	2708,	3005,	2937,	3774,	4622,	4187,	3583,	3348,
7,	1476,	1332,	2809,	1204,	1366,	1398,	1800,	2403,	2084,	1682,
8,	480,	423,	313,	1641,	377,	449,	574,	638,	860,	712,
9,	153,	148,	114,	77,	127,	146,	189,	262,	180,	409,
+gp,	46,	45,	16,	14,	21,	36,	33,	45,	26,	281,
TOTAL,	204522,	169929,	137402,	133981,	177543,	180356,	191250,	164161,	166394,	155789,

)

Table 10 Stock number at age (start of year)	Numbers*10**-3									
YEAR,	1972,	1973,	1974,	1975,	1976,	1977,	1978,	1979,	1980,	1981,
AGE										
0,	78971,	104855,	83632,	39131,	52367,	4154,	7377,	5208,	23626,	29272,
1,	28998,	64656,	85848,	68472,	32038,	42874,	3401,	6040,	4264,	19344,
2,	33213,	23703,	52334,	70058,	55975,	26194,	35103,	2784,	4944,	3491,
3,	12006,	26514,	16410,	37751,	50720,	41851,	21215,	28711,	2279,	3919,
4,	18608,	6442,	14093,	10812,	23712,	34415,	30610,	16445,	22455,	1813,
5,	8229,	11454,	4152,	7946,	6955,	13263,	23501,	21218,	11876,	15015,
6,	9322,	4289,	6849,	2992,	5265,	4562,	6409,	15573,	14347,	7386,
7,	1572,	6573,	2680,	4724,	2226,	3235,	1810,	3581,	11075,	9488,
8,	595,	657,	4428,	1772,	3549,	1553,	1792,	833,	2234,	7649,
9,	382,	325,	402,	3141,	1237,	2254,	870,	893,	490,	1232,
+gp,	319,	52,	865,	1396,	1515,	2613,	1109,	424,	423,	249,
TOTAL,	192216,	249519,	271694,	248195,	235559,	176970,	133198,	101710,	98013,	98857,

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

Table 10 Stock number at age (start of year)						Numbers*10**-3				
YEAR,	1982,	1983,	1984,	1985,	1986,	1987,	1988,	1989,	1990,	1991,
AGE										
0,	60826,	58881,	39529,	14091,	28016,	21094,	14036,	4461,	3993,	2723,
1,	23966,	49800,	48207,	32364,	11537,	22938,	17270,	11492,	3652,	3269,
2,	15837,	19622,	40773,	39446,	26497,	9446,	18780,	14140,	9408,	2990,
3,	2791,	12479,	15666,	32301,	31405,	21486,	7477,	14783,	11520,	7608,
4,	2797,	1440,	8435,	11414,	22326,	23405,	16037,	5720,	10730,	8278,
5,	1302,	1580,	833,	4678,	7358,	14251,	15937,	10901,	4088,	7047,
6,	9953,	796,	912,	549,	2707,	4647,	8978,	10301,	6403,	2652,
7,	4822,	6175,	568,	535,	296,	1548,	2796,	5414,	6123,	3671,
8,	6357,	3068,	3749,	427,	356,	207,	789,	1860,	2645,	3286,
9,	5712,	4150,	1842,	2290,	294,	174,	95,	509,	1033,	1365,
+gp,	947,	3461,	4567,	4402,	2931,	1198,	669,	308,	410,	137,
TOTAL,	135310,	161451,	165081,	142497,	133722,	120393,	102865,	79889,	60006,	43026,

Table 10 Stock number at age (start of year)						Numbers*10**-3				
YEAR,	1992,	1993,	1994,	1995,	1996,	1997,	1998,	1999,	2000,	2001,
AGE										
0,	9643,	143540,	68161,	13616,	5565,	23076,	31705,	152873,	90226,	63513,
1,	2230,	7895,	117520,	55805,	11148,	4556,	18893,	25958,	125162,	73870,
2,	2677,	1826,	6425,	96217,	45689,	9126,	3730,	15468,	21245,	102408,
3,	2379,	2155,	1392,	5010,	78048,	37112,	7402,	2958,	12507,	16072,
4,	5284,	1808,	1495,	967,	3693,	59164,	27749,	5106,	1389,	7470,
5,	5172,	3624,	1232,	946,	579,	2101,	38924,	17952,	3328,	947,
6,	4640,	3221,	2466,	871,	570,	312,	1078,	22950,	10466,	2108,
7,	1582,	2931,	2150,	1636,	593,	319,	151,	479,	12801,	6139,
8,	2009,	992,	1971,	1374,	1073,	340,	150,	34,	188,	7905,
9,	2058,	1307,	694,	1267,	863,	634,	194,	44,	4,	82,
+gp,	827,	1198,	1662,	1418,	1442,	1473,	1012,	419,	293,	86,
TOTAL,	38501,	170498,	205169,	179127,	149263,	138214,	130989,	244240,	277606,	280600,

Table 10 Stock number at age (start of year)						Numbers*10**-3					
YEAR,	2002,	2003,	2004,	2005,	2006,	2007,	2008,	2009,	2010,	2011,	2012,
AGE											
0,	42962,	12132,	12420,	4987,	4520,	4396,	10336,	18408,	703,	1931,	0,
1,	52000,	35174,	9933,	10168,	4083,	3700,	3599,	8462,	15071,	576,	1581,
2,	60463,	42574,	28798,	8130,	8325,	3343,	3030,	2941,	6928,	12339,	471,
3,	79881,	48132,	34736,	23358,	6579,	6593,	2668,	2421,	2384,	5320,	9950,
4,	10328,	52698,	36298,	26624,	17612,	4983,	4509,	2000,	1684,	1549,	3666,
5,	3924,	5851,	30884,	25373,	18312,	12098,	3585,	2861,	1273,	993,	980,
6,	619,	2127,	2778,	15852,	14664,	11420,	7433,	2551,	1840,	790,	637,
7,	1317,	386,	882,	1222,	7435,	7099,	6355,	4754,	1624,	1069,	481,
8,	3985,	862,	169,	352,	510,	3121,	3316,	3660,	2867,	829,	625,
9,	5228,	2500,	404,	58,	155,	295,	1544,	1580,	2328,	1698,	364,
+gp,	157,	2666,	1950,	312,	171,	30,	187,	265,	829,	858,	1599,
TOTAL,	260863,	205102,	159252,	116436,	82365,	57075,	46562,	49903,	37532,	27952,	20356,

Table 5.12. Faroe haddock. Stock summary of the 2012 VPA.

```
At      17/04/2012   15:32                        HAD_IND
Table 16          Summary (without SOP  correction)
Terminal Fs  derived using  XSA  (With F shrinkage)

          RECRUITS RECRUITS TOTALBIO TOTSPBIO LANDINGS YIELD/SSB FBAR (3-7)
             Age 0   Age 2
    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     81924   20203   68774    44027     18766   0.4262   0.5288
    1967     47768   25356   77101    42086     13381   0.3179   0.4031
    1968     53238   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    63921     19393   0.3034   0.4564
    1972     78971   33213   91507    63134     16485   0.2611   0.3962
    1973    104855   23703   98977    61622     18035   0.2927   0.2902
    1974     83632   52334  116877    64631     14773   0.2286   0.2206
    1975     39131   70058  138905    75405     20715   0.2747   0.1799
    1976     52367   55975  143625    89221     26211   0.2938   0.2475
    1977      4154   26194  121045    96378     25555   0.2652   0.3873
    1978      7377   35103  120581    97235     19200   0.1975   0.2781
    1979      5208    2784   99506    85403     12424   0.1455   0.1551
    1980     23626    4944   87642    81907     15016   0.1833   0.1779
    1981     29272    3491   78969    75852     12233   0.1613   0.1813
    1982     60826   15837   68313    56810     11937   0.2101   0.3308
    1983     58881   19622   63972    51818     12894   0.2488   0.2653
    1984     39529   40773  100695    53831     12378   0.2299   0.2284
    1985     14091   39446   93994    62612     15143   0.2419   0.2760
    1986     28016   26497   98554    65617     14477   0.2206   0.2237
    1987     21094    9446   87684    67325     14882   0.2210   0.2642
    1988     14036   18780   77464    61935     12178   0.1966   0.2008
    1989      4461   14140   69607    51769     14325   0.2767   0.2850
    1990      3993    9408   53615    43743     11726   0.2681   0.2725
    1991      2723    2990   38784    34684      8429   0.2430   0.2744
    1992      9643    2677   29133    26989      5476   0.2029   0.2101
    1993    143540    1826   28811    23231      4026   0.1733   0.1870
    1994     68161    6425   27478    21611      4252   0.1968   0.2055
    1995     13616   96217   87935    22765      4948   0.2173   0.2260
    1996      5565   45689  113409    49837      9642   0.1935   0.3190
    1997     23076    9126  108023    82493     17924   0.2173   0.3720
    1998     31705    3730   92991    82521     22210   0.2691   0.5282
    1999    152873   15468   80545    63495     18482   0.2911   0.4490
    2000     90226   21245  109973    53414     15821   0.2962   0.2741
    2001     63513  102408  146493    61482     15890   0.2585   0.2827
    2002     42962   60463  153253    85419     24933   0.2919   0.2983
    2003     12132   42574  140466    97246     27072   0.2784   0.4538
    2004     12420   28798  127190    87339     23101   0.2645   0.4060
    2005      4987    8130   90283    73779     20455   0.2772   0.3671
    2006      4520    8325   66727    59301     17154   0.2893   0.3438
    2007      4396    3343   48792    44233     12631   0.2856   0.3087
    2008     10336    3030   36189    31596      7388   0.2338   0.2164
    2009     18408    2941   27131    24896      5197   0.2087   0.2426
    2010       703    6928   25412    19958      5202   0.2606   0.3304
    2011      1931   12339   22564    15177      3489   0.2299   0.2614

Arith.
Mean         39210   27514   85923    56693     16231   0.2906   0.3548
Units      (Thous.)(Thous.) (Tonnes) (Tonnes)   (Tonnes)
```

Table 5.13. Management options table - INPUT DATA descriptions.

Stock size

The stock in numbers 2012 is taken directly from the 2012 XSA. The year class 2011 at age 2 (in 2013) is estimated from the 2012 XSA age 1 applying a natural mortality of 0.2 in foreward calculation of the number using the standard VPA equation. The yearclass 2012 at age 2 (in 2014) is estimated as the geomean of the yearclasses since 2005.

Age	2012	2013	2014
2	471	1295	4110
3	9950		
4	3666		
5	980		
6	637		
7	481		
8	625		
9	364		
10+	1599		

Numbers in thousands (predicted values rounded).

Proportion mature at age

The proportion mature at age in 2012 is estimated as the average of the observed data in 2011 and 2012. For 2013 and 2014, the average of 2010 to 2012 is used.

Age	2012	2013	2014
2	0.13	0.08	0.08
3	0.82	0.74	0.74
4	0.98	0.97	0.97
5	1.00	1.00	1.00
6	1.00	1.00	1.00
7	1.00	1.00	1.00
8	1.00	1.00	1.00
9	1.00	1.00	1.00
10+	1.00	1.00	1.00

Catch&Stock weights at age

Catch and stock weights at age for all ages and for each of the years 2012-2014 are simply the average of the estimated point-values for 2009-2011 not re-scaled to 2011 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	2012	2013	2014
2	0.576	0.576	0.576
3	0.806	0.806	0.806
4	1.073	1.073	1.073
5	0.247	0.247	0.247
6	1.346	1.346	1.346
7	1.418	1.418	1.418
8	1.550	1.550	1.550
9	1.745	1.745	1.745
10+	1.952	1.952	1.952

Exploitation pattern

The exploitation pattern 2012 is estimated like last year as the average fishing mortality matrix in the 3 preceding years (2009-2011) from the final VPA in 2012, but without re-scaling to the terminal year (2011) 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	2012	2013	2014
2	0.0298	0.0298	0.0298
3	0.1887	0.1887	0.1887
4	0.2791	0.2791	0.2791
5	0.2543	0.2543	0.2543
6	0.2970	0.2970	0.2970
7	0.3713	0.3713	0.3713
8	0.4000	0.4000	0.4000
9	0.2426	0.2426	0.2426
10+	0.2426	0.2426	0.2426

Table 5.14 Faroe haddock. Management option table - Input data

MFDP version 1
Run: jr1
Time and date: 16:45 19/04/2012
Fbar age range: 3-7

2012

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	471	0.2	0.13	0	0	0.576	0.0298	0.576
3	9950	0.2	0.82	0	0	0.806	0.1887	0.806
4	3666	0.2	0.98	0	0	1.073	0.2791	1.073
5	980	0.2	1	0	0	1.247	0.2543	1.247
6	637	0.2	1	0	0	1.346	0.2970	1.346
7	481	0.2	1	0	0	1.418	0.3713	1.418
8	625	0.2	1	0	0	1.550	0.4000	1.550
9	364	0.2	1	0	0	1.745	0.2426	1.745
10	1599	0.2	1	0	0	1.952	0.2426	1.952

2013

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	1295	0.2	0.08	0	0	0.576	0.0298	0.576
3	.	0.2	0.74	0	0	0.806	0.1887	0.806
4	.	0.2	0.97	0	0	1.073	0.2791	1.073
5	.	0.2	1	0	0	1.247	0.2543	1.247
6	.	0.2	1	0	0	1.346	0.2970	1.346
7	.	0.2	1	0	0	1.418	0.3713	1.418
8	.	0.2	1	0	0	1.550	0.4000	1.550
9	.	0.2	1	0	0	1.745	0.2426	1.745
10	.	0.2	1	0	0	1.952	0.2426	1.952

2014

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	4110	0.2	0.08	0	0	0.576	0.0298	0.576
3	.	0.2	0.74	0	0	0.806	0.1887	0.806
4	.	0.2	0.97	0	0	1.073	0.2791	1.073
5	.	0.2	1	0	0	1.247	0.2543	1.247
6	.	0.2	1	0	0	1.346	0.2970	1.346
7	.	0.2	1	0	0	1.418	0.3713	1.418
8	.	0.2	1	0	0	1.550	0.4000	1.550
9	.	0.2	1	0	0	1.745	0.2426	1.745
10	.	0.2	1	0	0	1.952	0.2426	1.952

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 19/04/2012
Time and date: 16:45 19/04/2012
Fbar age range: 3-7

2012				
Biomass	SSB	FMult	FBar	Landings
19716	17958	1	0.2781	3806

2013					2014	
Biomass	SSB	FMult	FBar	Landings	Biomass	SSB
15987	15005	0	0	0	17104	14695
.	15005	0.1	0.0278	374	16727	14319
.	15005	0.2	0.0556	738	16361	13954
.	15005	0.3	0.0834	1093	16004	13598
.	15005	0.4	0.1112	1439	15657	13252
.	15005	0.5	0.1391	1775	15320	12915
.	15005	0.6	0.1669	2103	14992	12588
.	15005	0.7	0.1947	2422	14672	12269
.	15005	0.8	0.2225	2732	14362	11959
.	15005	0.9	0.2503	3035	14059	11658
.	15005	1	0.2781	3329	13765	11364
.	15005	1.1	0.3059	3616	13479	11079
.	15005	1.2	0.3337	3896	13201	10801
.	15005	1.3	0.3615	4168	12930	10531
.	15005	1.4	0.3893	4433	12666	10269
.	15005	1.5	0.4172	4691	12410	10013
.	15005	1.6	0.445	4943	12160	9764
.	15005	1.7	0.4728	5188	11917	9522
.	15005	1.8	0.5006	5427	11681	9287
.	15005	1.9	0.5284	5659	11451	9057
.	15005	2	0.5562	5886	11227	8834

Input units are thousands and kg - output in tonnes

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

MFYPR version 1
Run: jr2
Index file 19/04/2012
Time and date: 17:23 19/04/2012
Fbar age range: 3-7

Age	M	Mat	PF	PM	SWt	Sel	CWt
2	0.2	0.05	0	0	0.562	0.0298	0.562
3	0.2	0.49	0	0	0.799	0.1887	0.799
4	0.2	0.92	0	0	1.061	0.2791	1.061
5	0.2	0.99	0	0	1.367	0.2543	1.367
6	0.2	1.00	0	0	1.651	0.2970	1.651
7	0.2	1.00	0	0	1.920	0.3713	1.920
8	0.2	1.00	0	0	2.149	0.4000	2.149
9	0.2	1.00	0	0	2.388	0.2426	2.388
10	0.2	1.00	0	0	2.697	0.2426	2.697

Weights in kilograms

Table 5.17 Faroe haddock. Long-term Prediction - Results

MFYPR version 1
Run: jr2
Time and date: 17:23 19/04/2012
Yield per results

FMult	Fbar	CatchNos	Yield	StockNos	Biomass	SpwnNosJan	SSBJan	SpwnNosSpwn	SSBSpwn
0	0.0000	0.0000	0.0000	5.5167	8.3655	4.0859	7.4298	4.0859	7.4298
0.1	0.0278	0.0983	0.1640	5.0269	7.2055	3.5989	6.2724	3.5989	6.2724
0.2	0.0556	0.1756	0.2815	4.6426	6.3175	3.2173	5.3870	3.2173	5.3870
0.3	0.0834	0.2376	0.3671	4.3340	5.6223	2.9113	4.6944	2.9113	4.6944
0.4	0.1112	0.2885	0.4304	4.0813	5.0678	2.6612	4.1423	2.6612	4.1423
0.5	0.1391	0.3310	0.4777	3.8709	4.6181	2.4534	3.6950	2.4534	3.6950
0.6	0.1669	0.3669	0.5135	3.6931	4.2480	2.2781	3.3274	2.2781	3.3274
0.7	0.1947	0.3977	0.5406	3.5409	3.9396	2.1283	3.0213	2.1283	3.0213
0.8	0.2225	0.4244	0.5615	3.4091	3.6795	1.9990	2.7636	1.9990	2.7636
0.9	0.2503	0.4477	0.5775	3.2939	3.4578	1.8861	2.5442	1.8861	2.5442
1	0.2781	0.4684	0.5898	3.1922	3.2671	1.7868	2.3558	1.7868	2.3558
1.1	0.3059	0.4868	0.5993	3.1017	3.1016	1.6987	2.1925	1.6987	2.1925
1.2	0.3337	0.5033	0.6067	3.0207	2.9568	1.6200	2.0498	1.6200	2.0498
1.3	0.3615	0.5182	0.6124	2.9476	2.8292	1.5491	1.9243	1.5491	1.9243
1.4	0.3893	0.5318	0.6167	2.8812	2.7159	1.4851	1.8131	1.4851	1.8131
1.5	0.4172	0.5442	0.6201	2.8208	2.6147	1.4268	1.7141	1.4268	1.7141
1.6	0.4450	0.5556	0.6226	2.7653	2.5239	1.3735	1.6253	1.3735	1.6253
1.7	0.4728	0.5660	0.6244	2.7143	2.4418	1.3247	1.5452	1.3247	1.5452
1.8	0.5006	0.5757	0.6257	2.6671	2.3674	1.2796	1.4728	1.2796	1.4728
1.9	0.5284	0.5848	0.6266	2.6234	2.2996	1.2380	1.4069	1.2380	1.4069
2	0.5562	0.5932	0.6272	2.5827	2.2375	1.1994	1.3468	1.1994	1.3468

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
Flow	-99	
Fmed	0.8288	0.2305
Fhigh	3.1488	0.8757

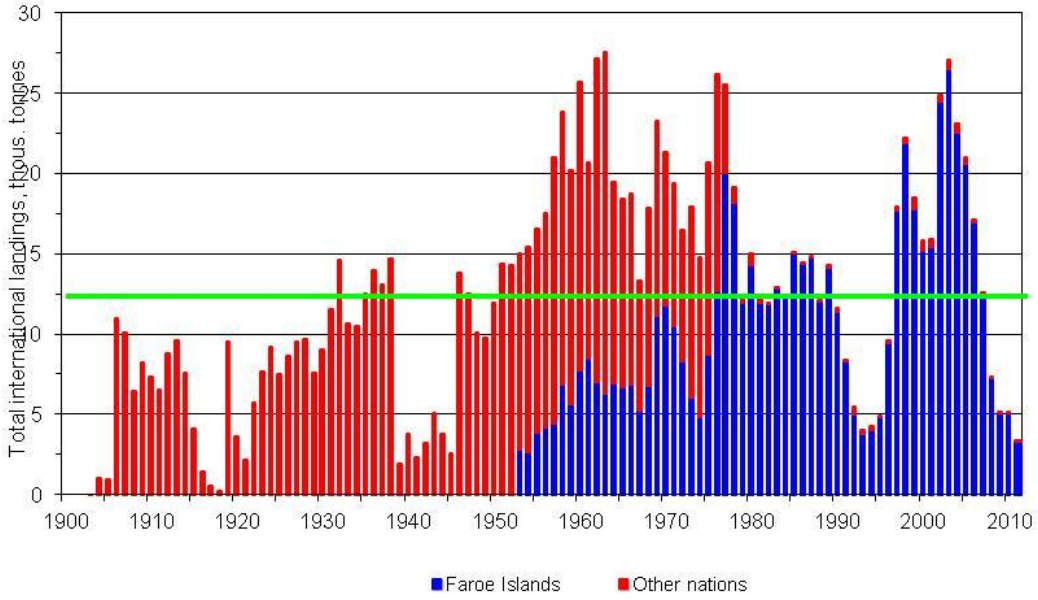


Figure 5.1. Haddock in ICES Division Vb. Landings by all nations 1904-2011. Horisontal line average for the whole period.

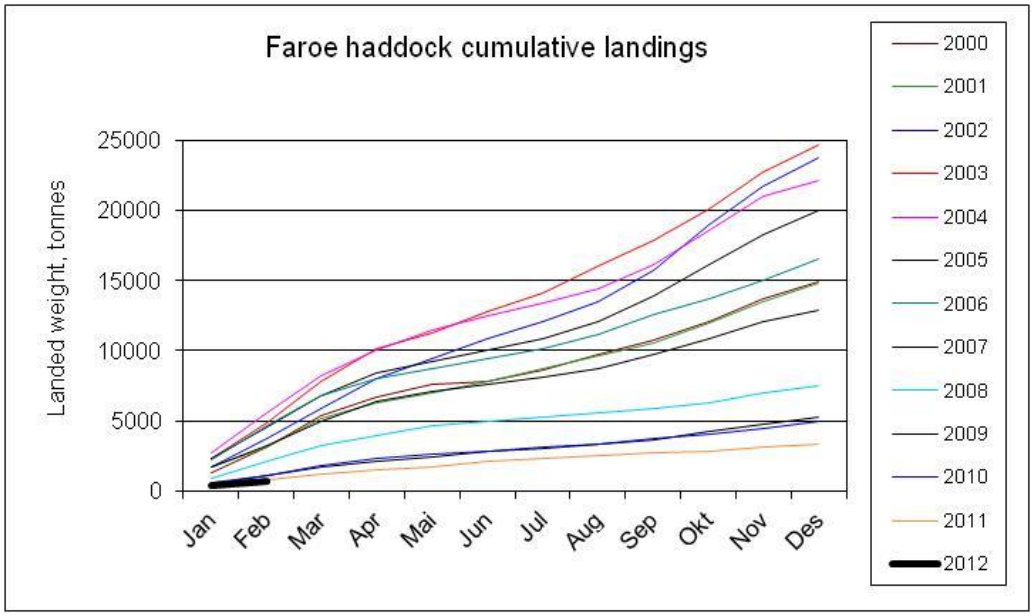


Figure 5.2. Faroe haddock. Cumulative Faroese landings from Vb.

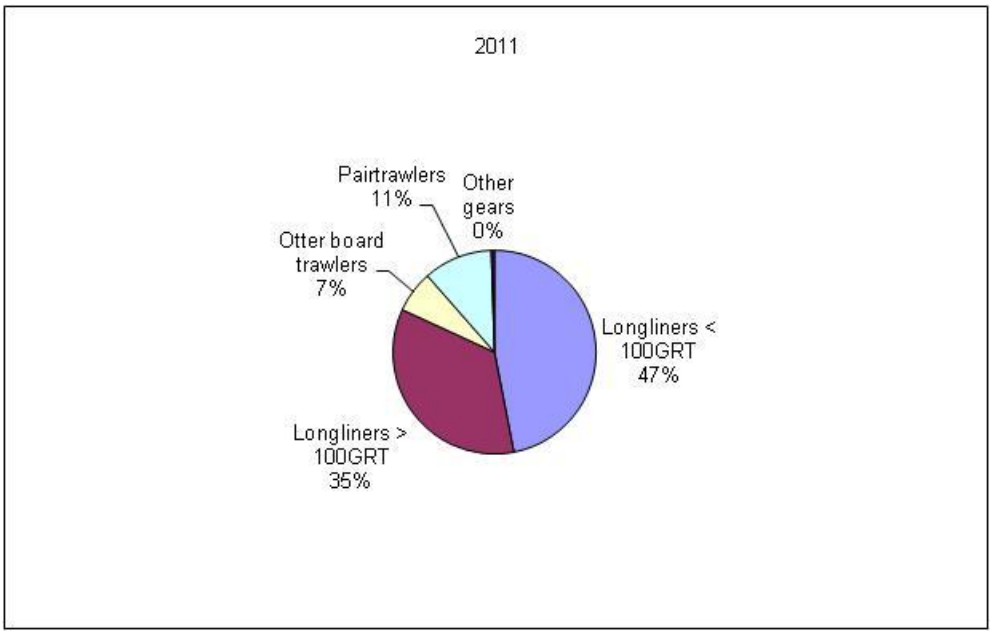


Figure 5.3. Faroe haddock. Contribution (%) by fleet to the total Faroese landings 2011.

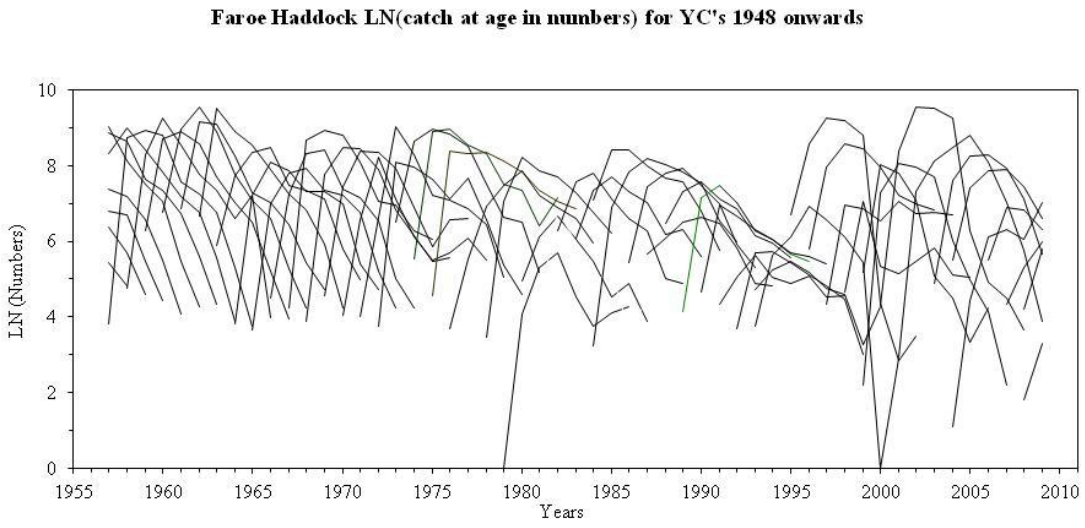


Figure 5.4.

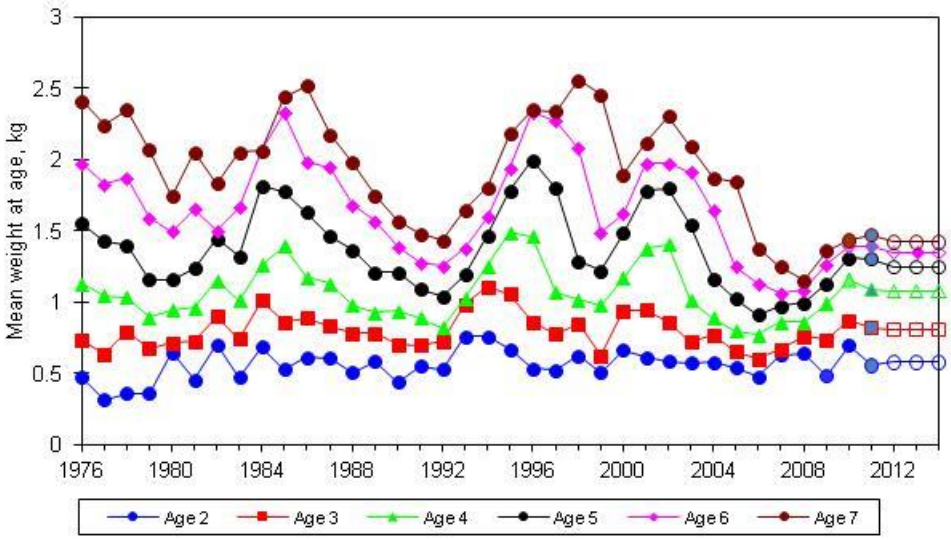


Figure 5.5. Faroe haddock. Mean weight at age (2-7). 2012-204 are predicted values used in the short term prediction (open symbols).

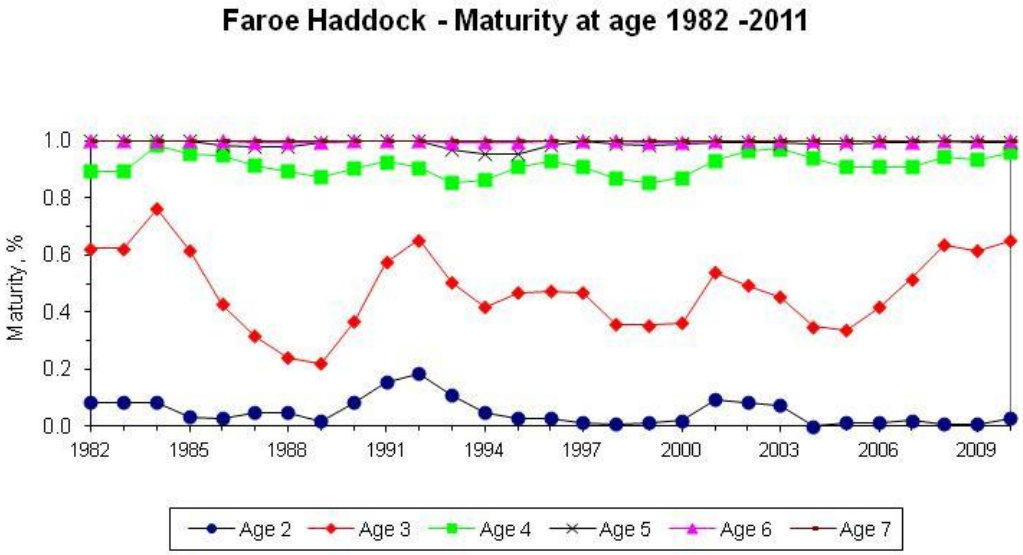


Figure 5.6. Faroe haddock. Maturity at age since 1982. Running 3-years average of survey observations.

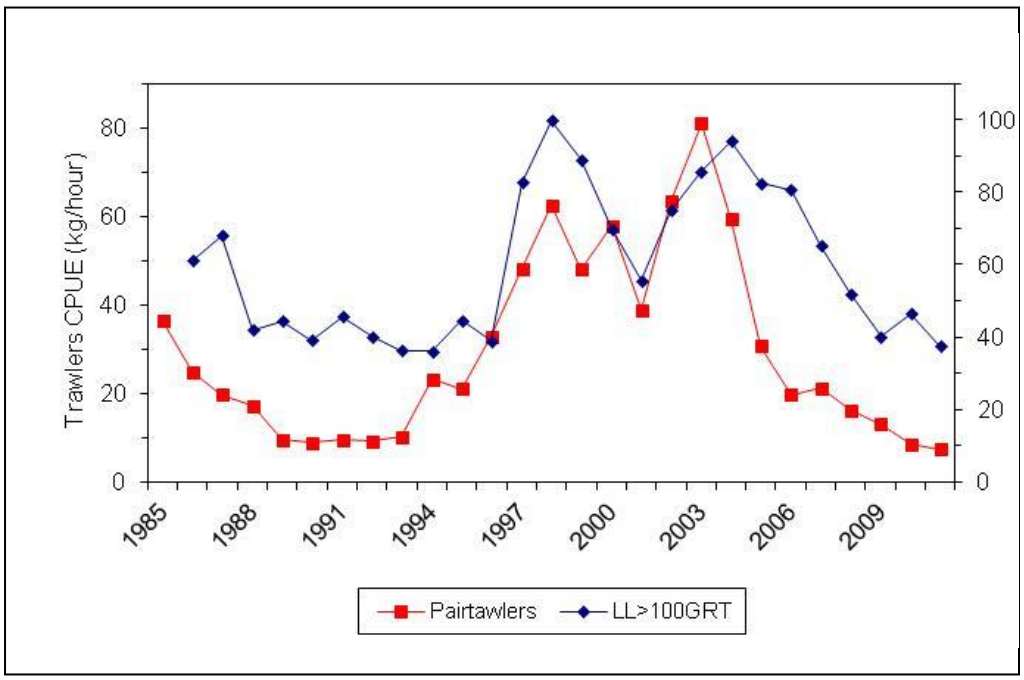


Figure 5.7. Commercial Cpue's for Pairtrawlers > 1000 HP and longliners > 100 HP.

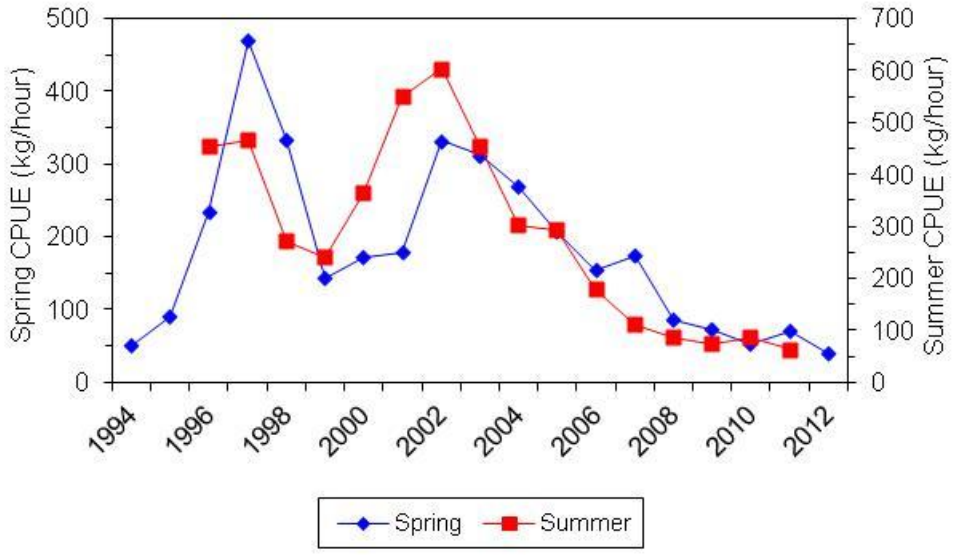


Figure 5.8. Faroe haddock. CPUE (kg/trawlhour) in the spring and summer surveys.

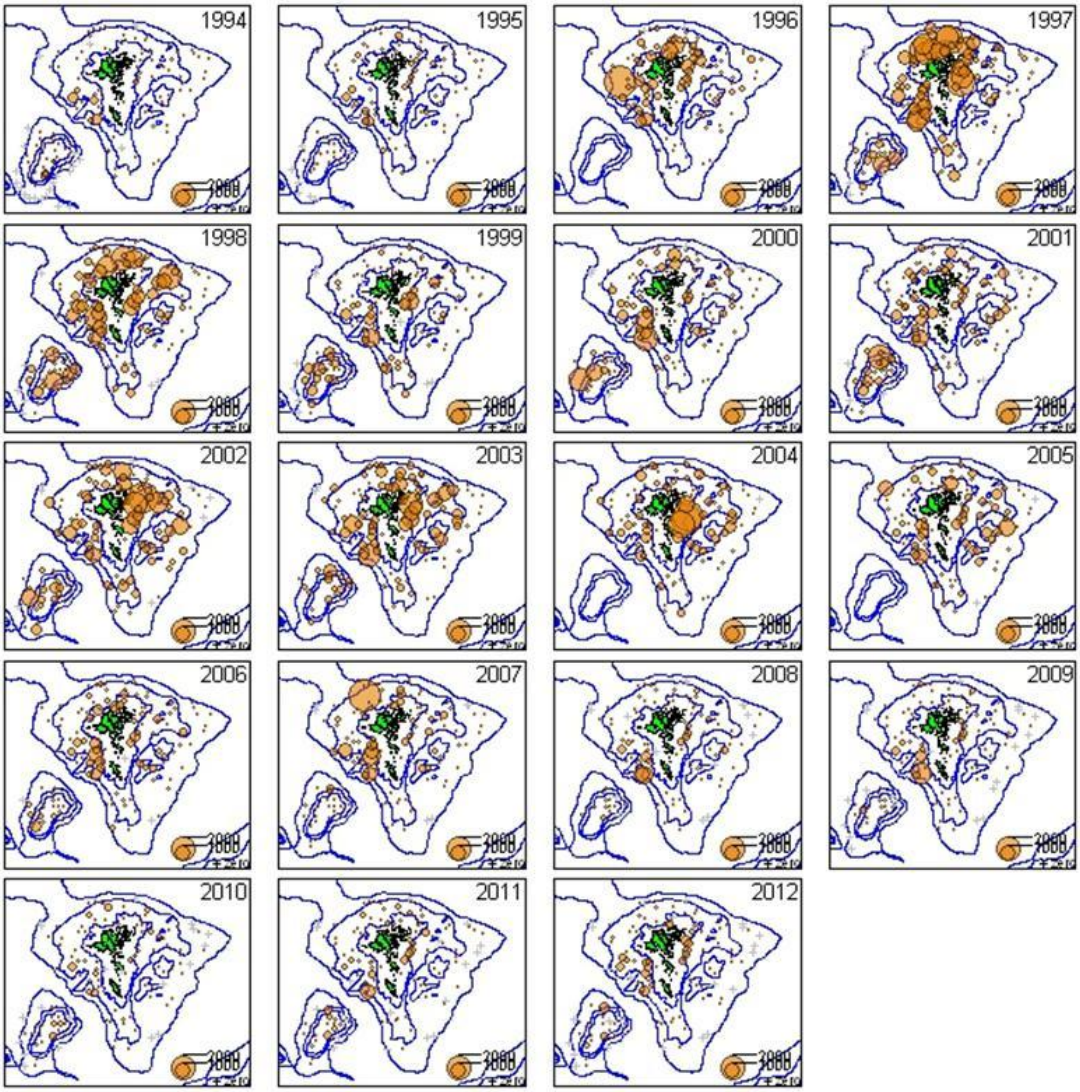


Figure 5.9. Distribution of Faroe haddock catches by year in the spring surveys 1994-2012.

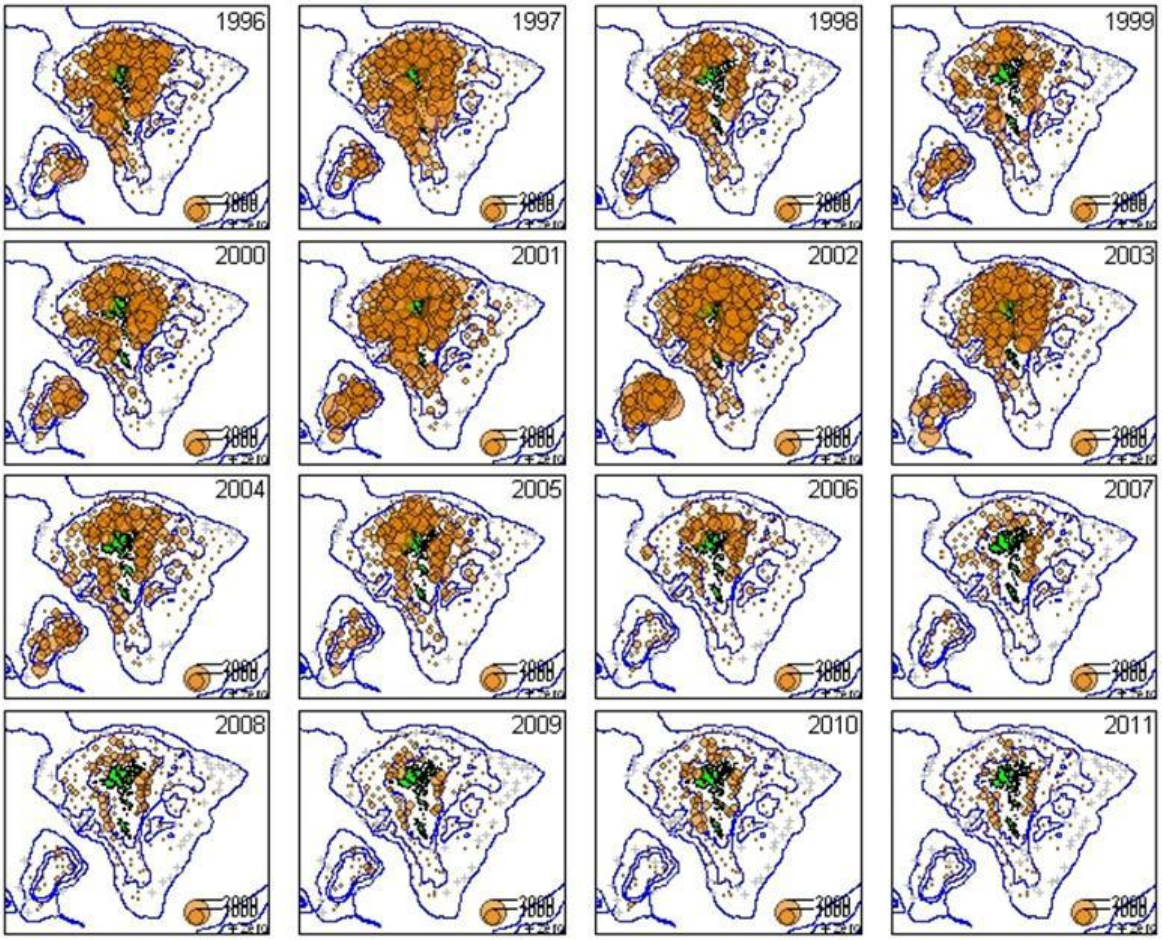


Figure 5.10. Distribution of Faroe haddock catches by year in the summer surveys 1996-2011.

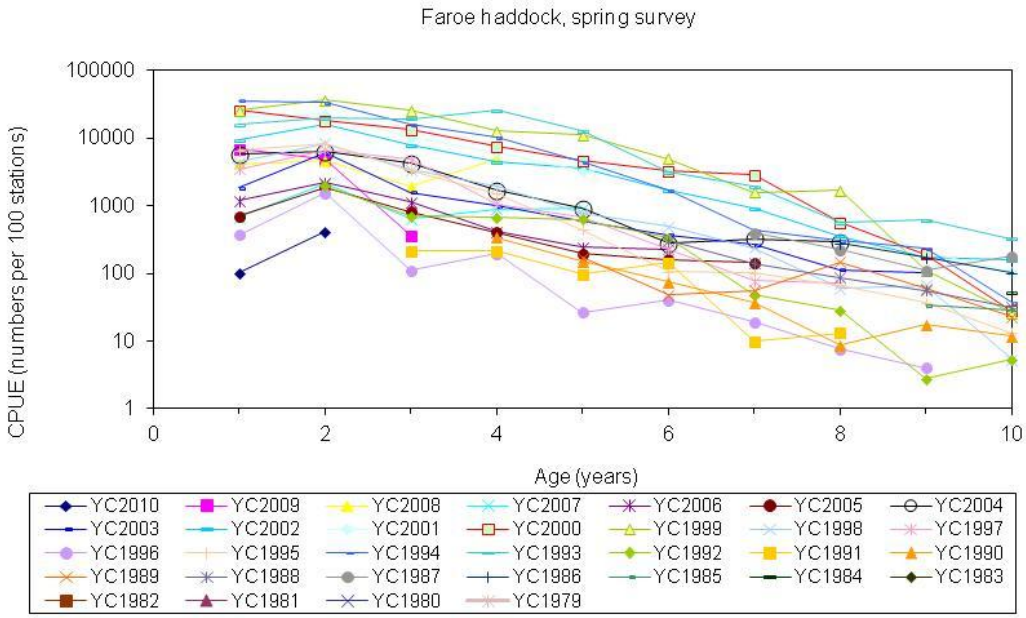


Figure 5.11. Faroe haddock. LN (c@age in numbers) in the spring survey.

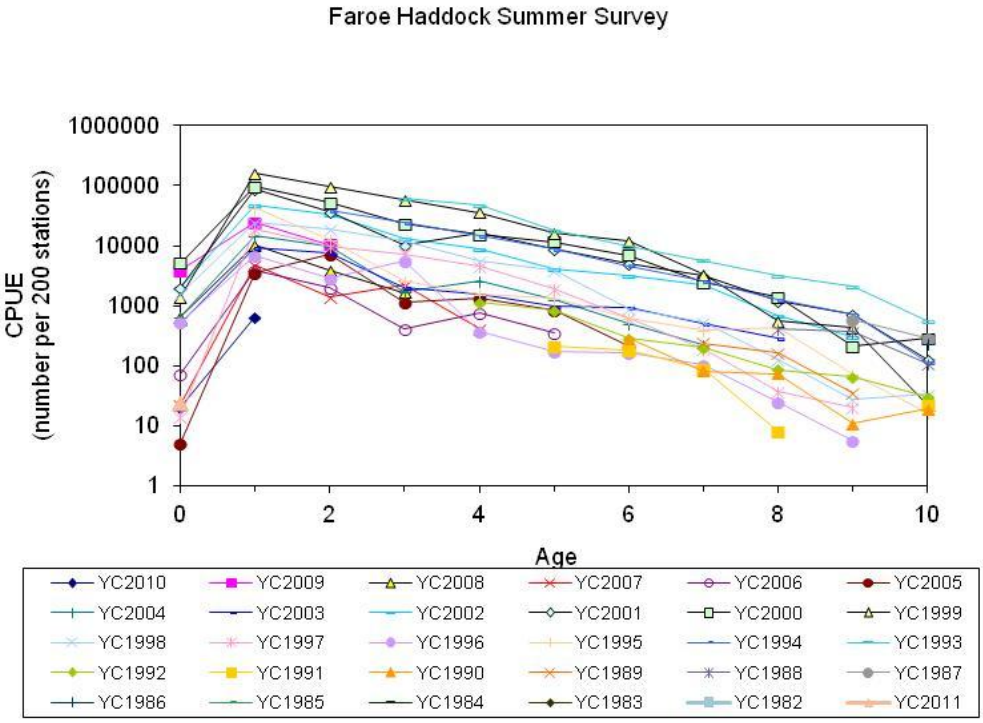


Figure 5.12. Faroe haddock. LN (c@age in numbers) in the summer survey.

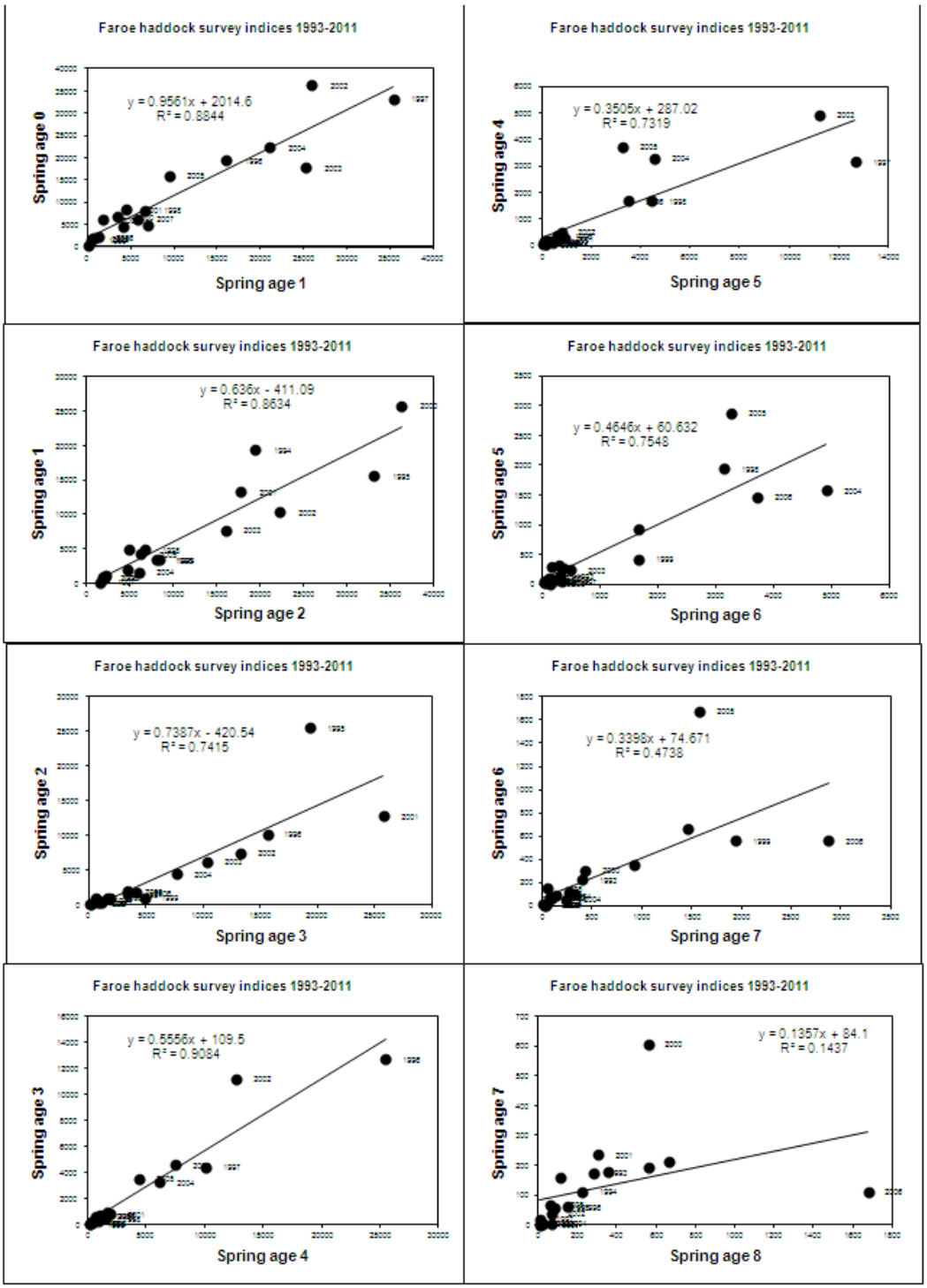


Figure 5.13. Faroe haddock. Comparison between spring survey indices (shifted) at age and the indices of the same YC one year later.

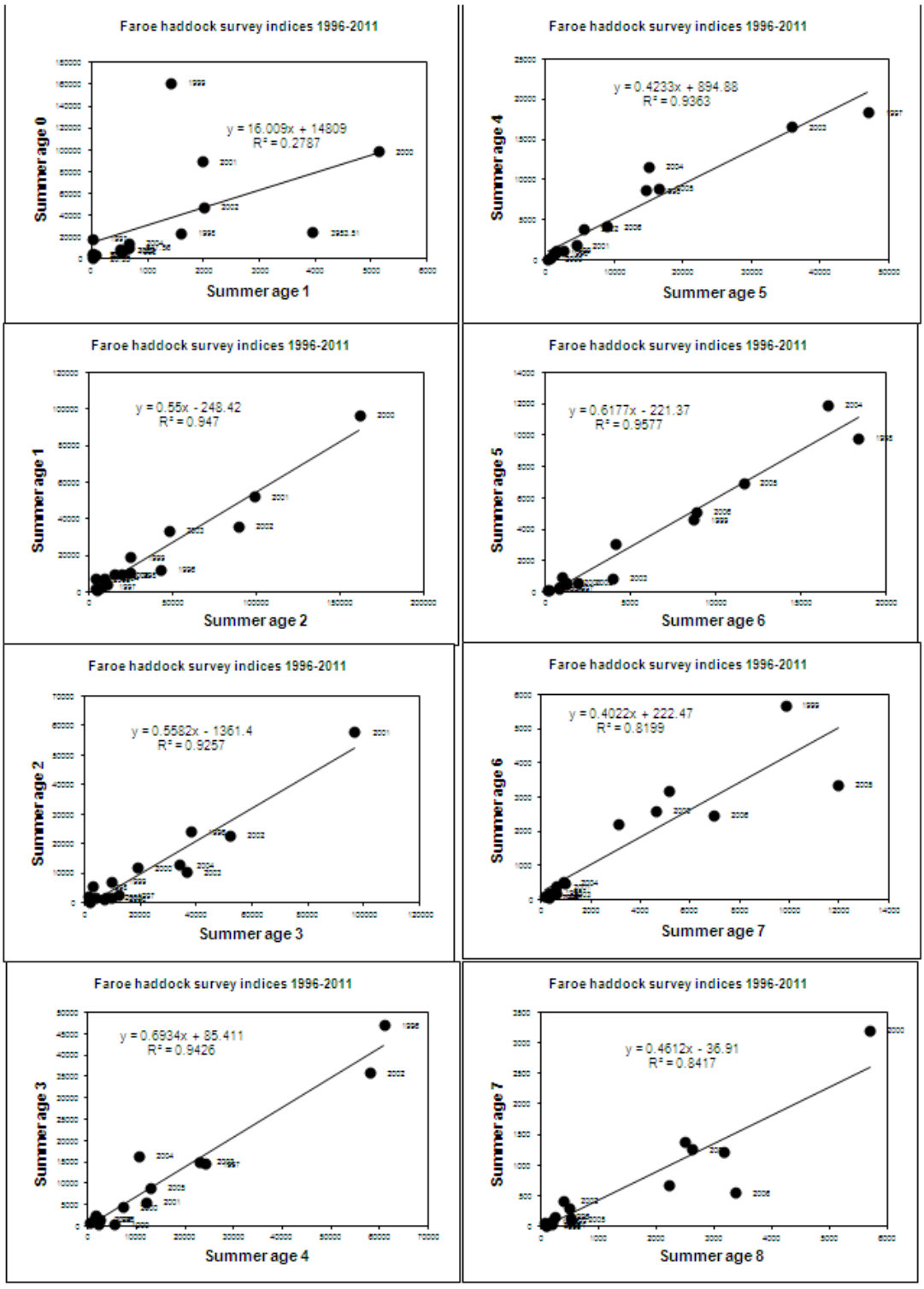


Figure 5.14. Faroe haddock. Comparison between summer survey indices at age and the indices of the same YC one year later.

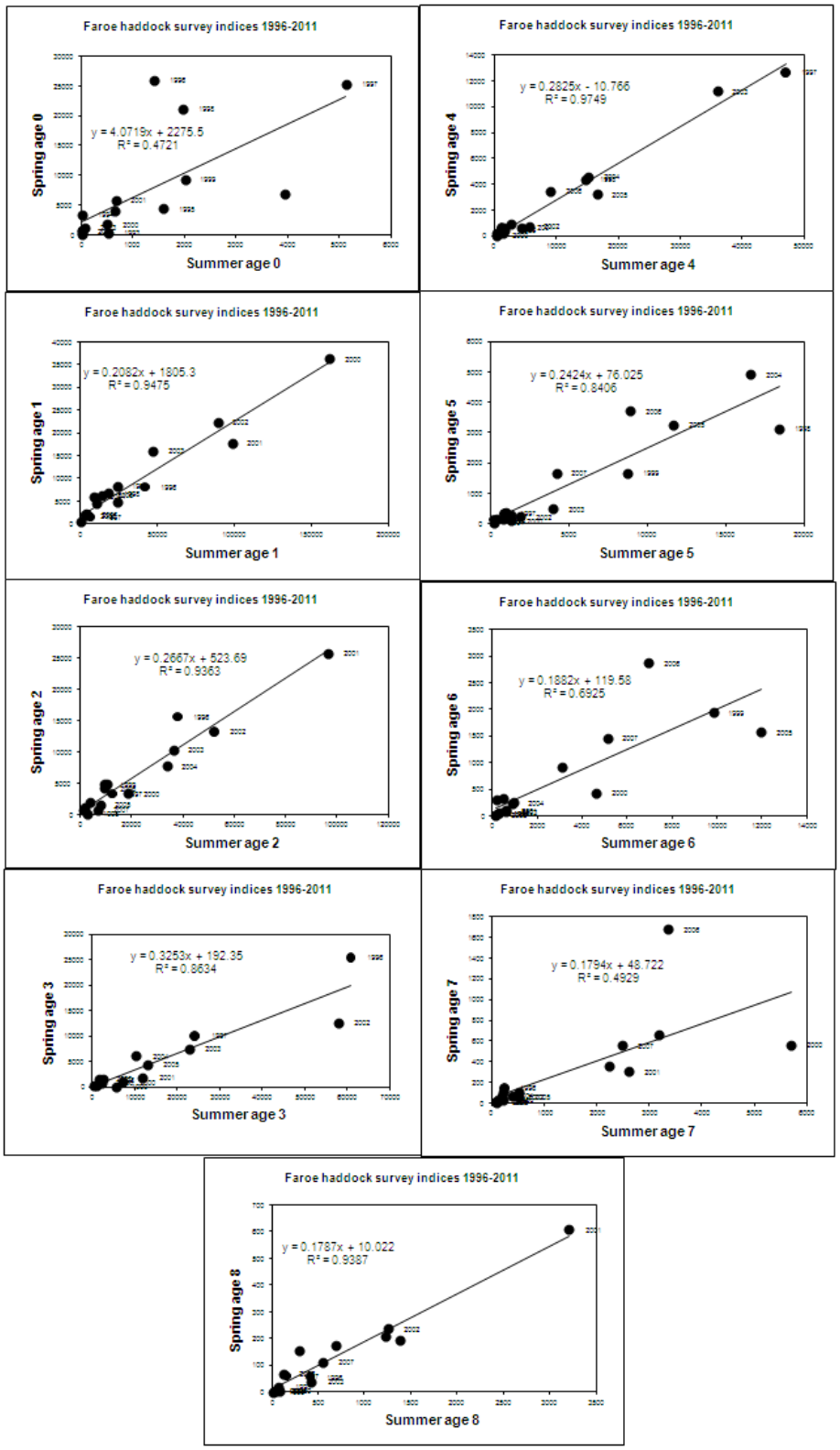


Figure 5.15. Faroe haddock. Comparison between indices at age from the spring survey (shifted) and the summer survey.

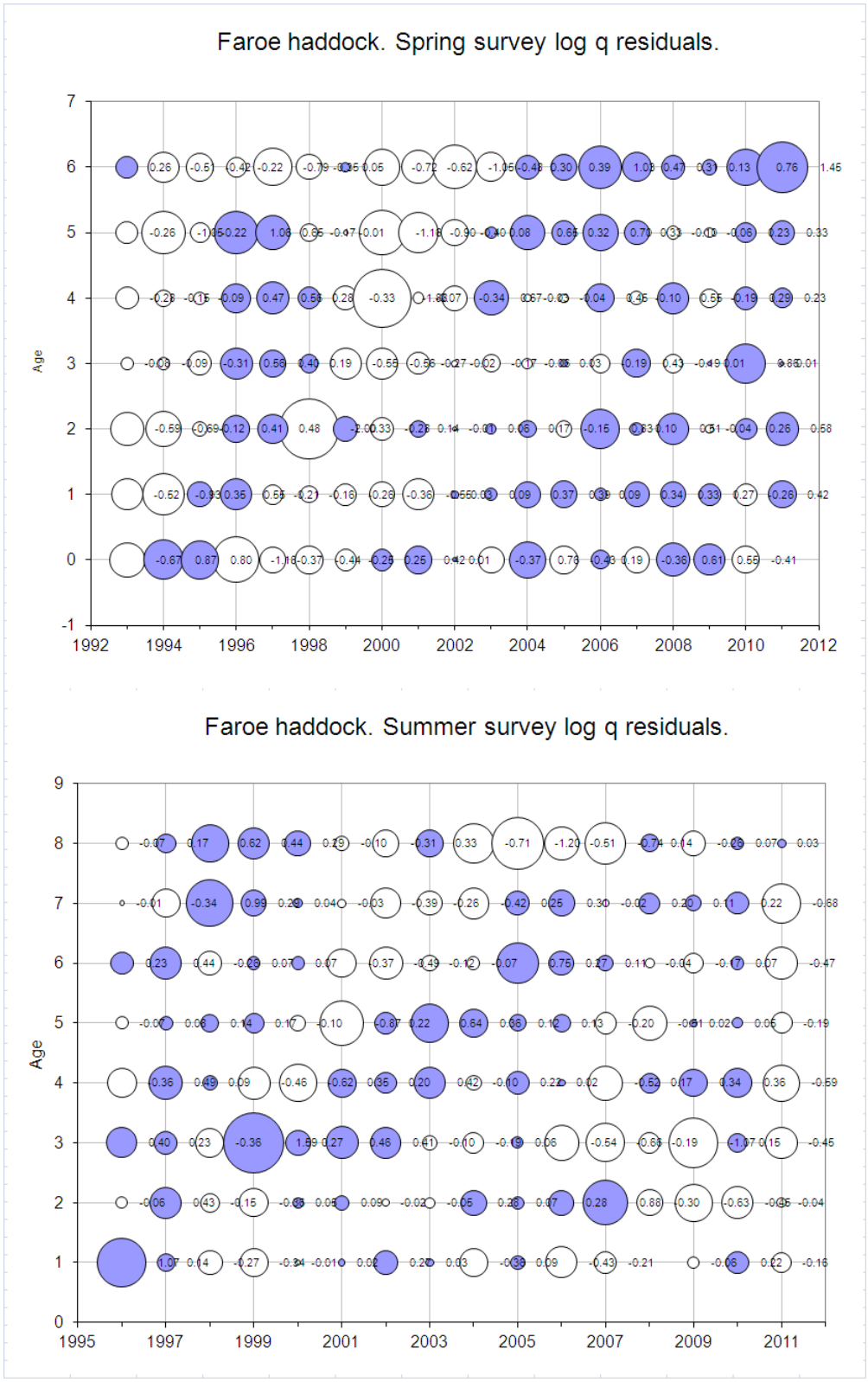
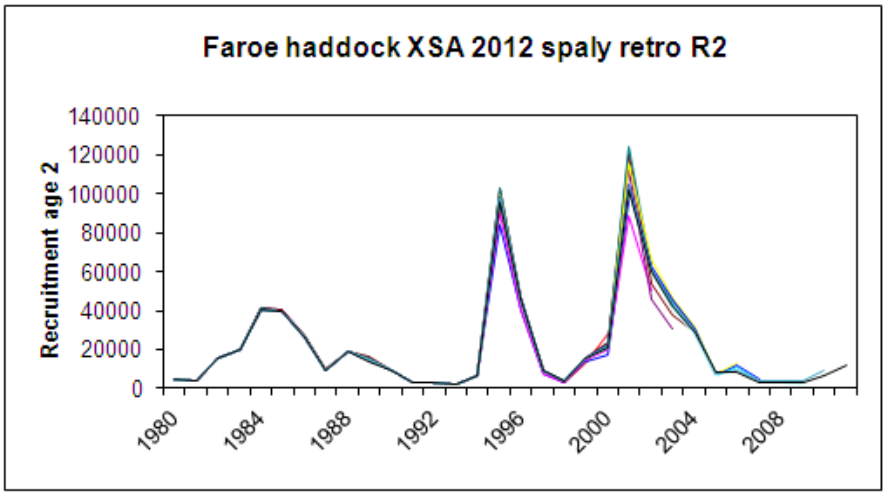
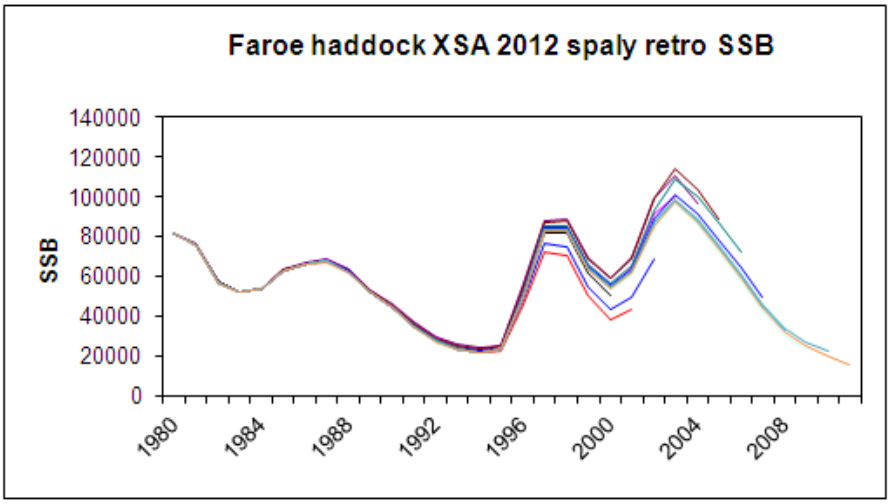


Figure 5.16. Faroe haddock survey log q residuals.





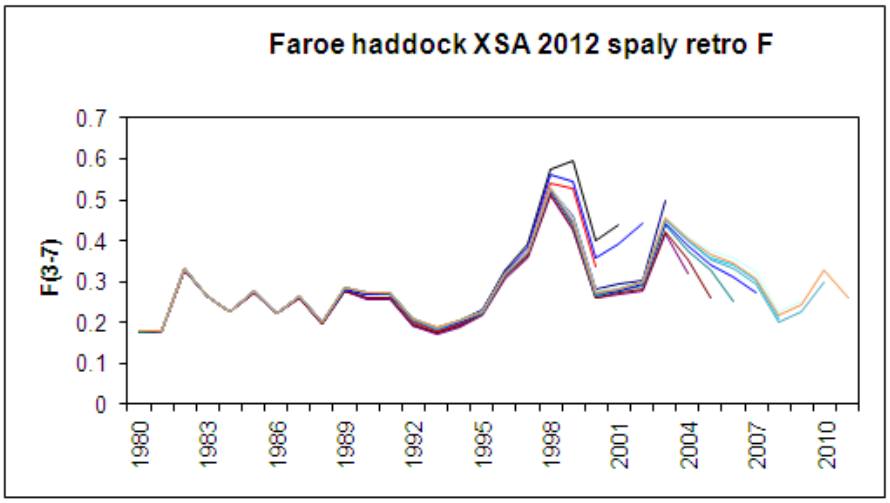


Figure 5.17. Faroe haddock. Retrospective analysis on the 2012 XSA.

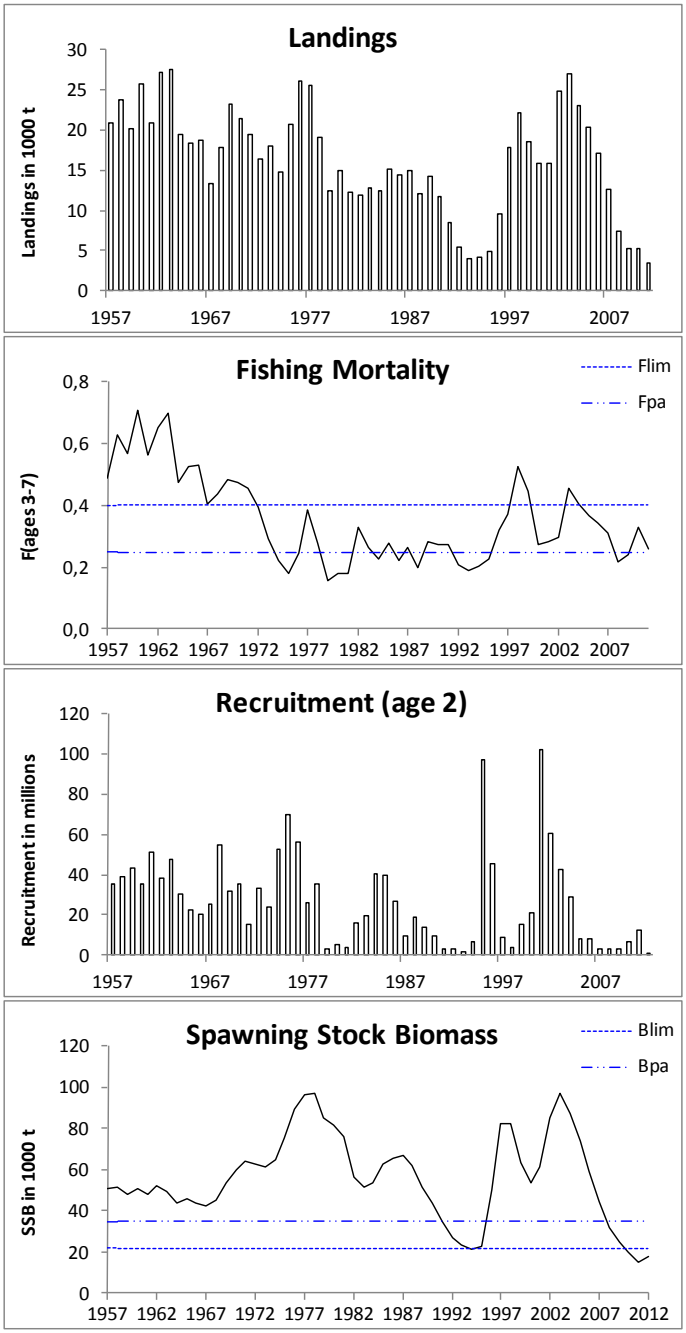


Figure 5.18. Faroe haddock (Division Vb) standard graphs from the 2012 assessment.

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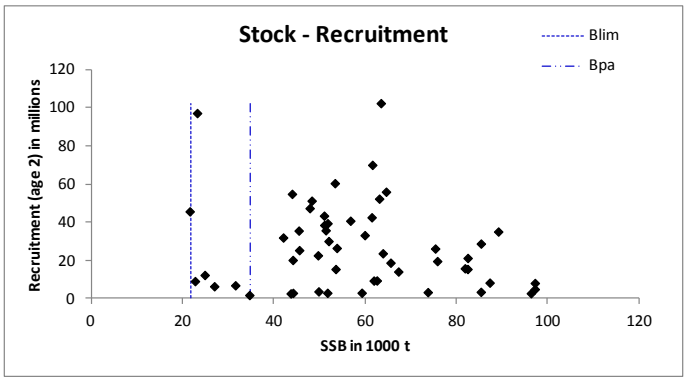
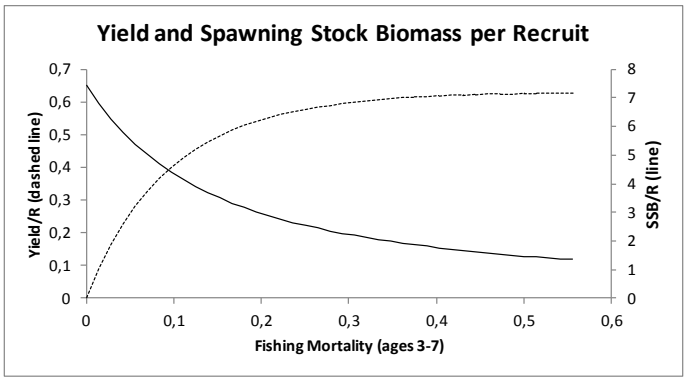




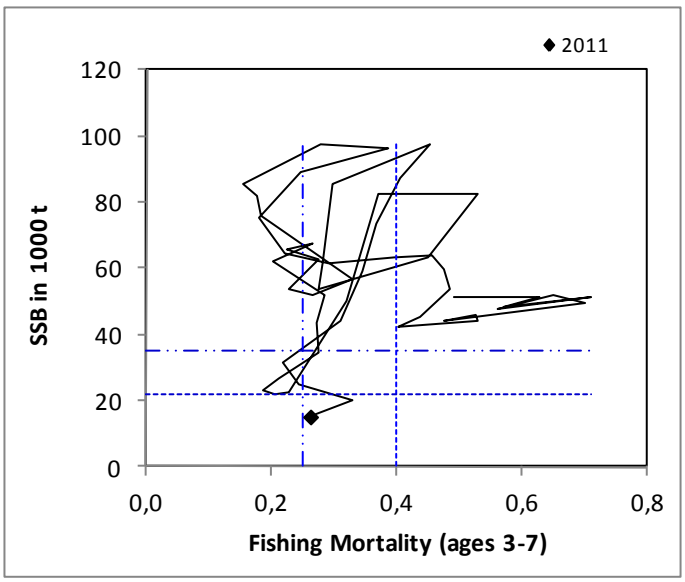


Figure 5.18 (cont.). Faroe haddock (Division Vb) standard graphs from the 2012 assessment

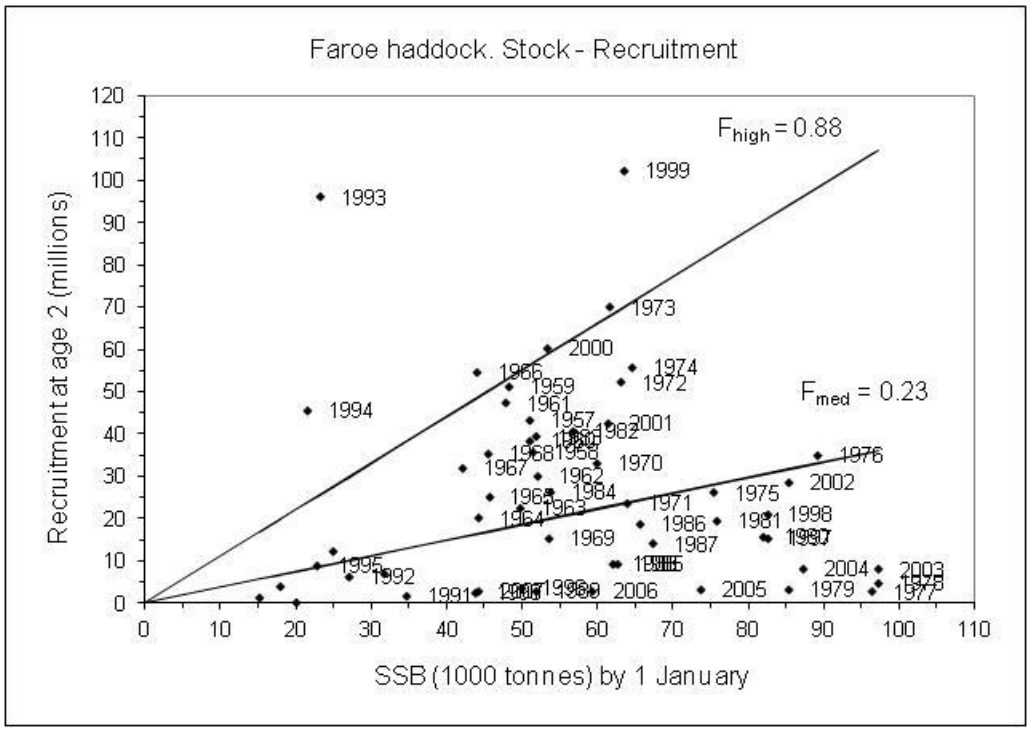
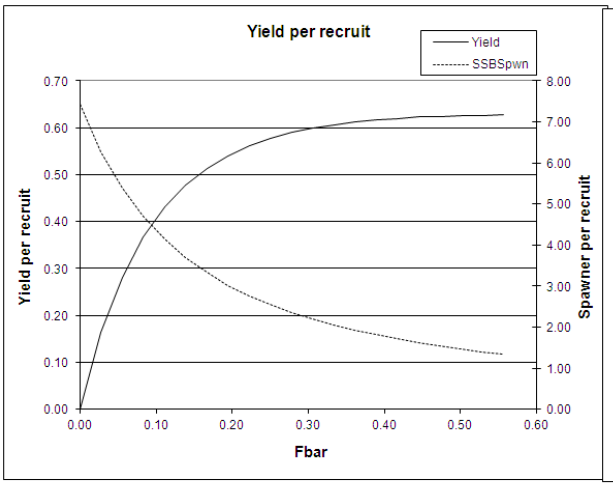


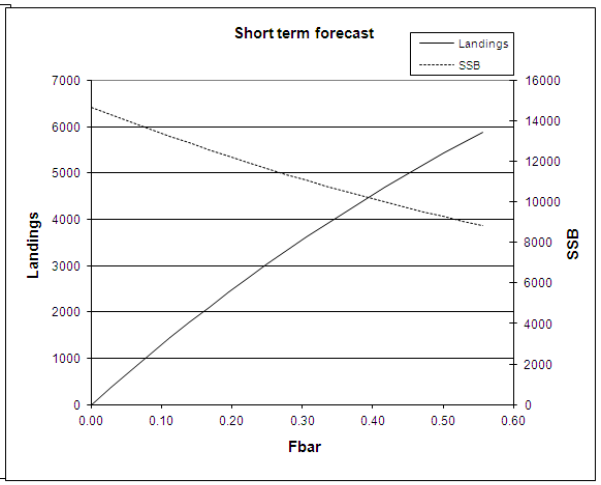
Figure 5.19. Faroe haddock. SSB-R plot.



MFYPR version 1
Run: jr2
Time and date: 17:23 19/04/2012

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 19/04/2012
Time and date: 16:45 19/04/2012
Fbar age range: 3-7

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Figure 5.20. Faroe haddock. Prediction output.

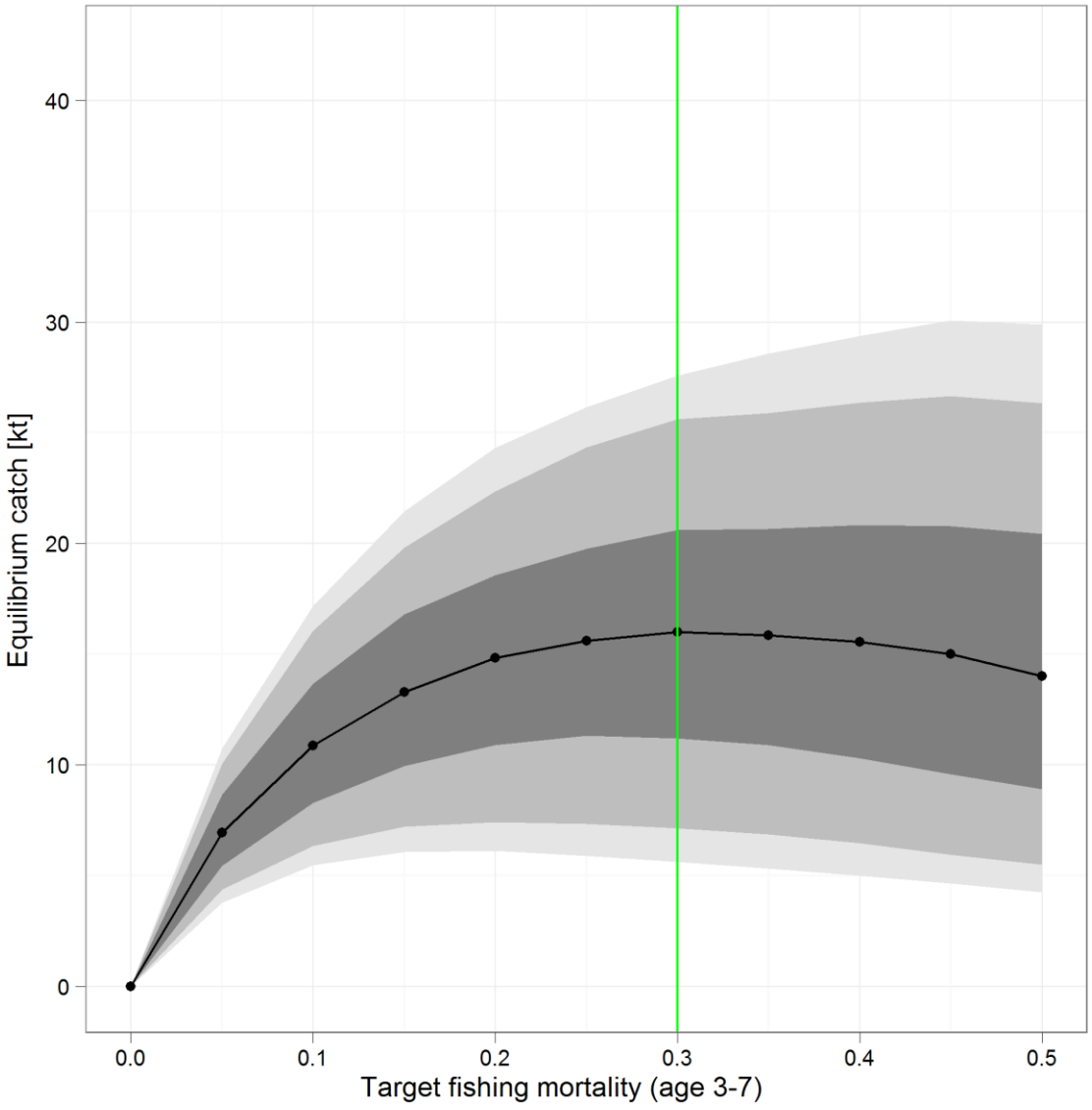

Figure 5.21. Equilibrium yield, vertical line showing F_{msy} = 0.3. The different shades of grey refer to 90%, 80% and 50% pseudo-confidence intervals.

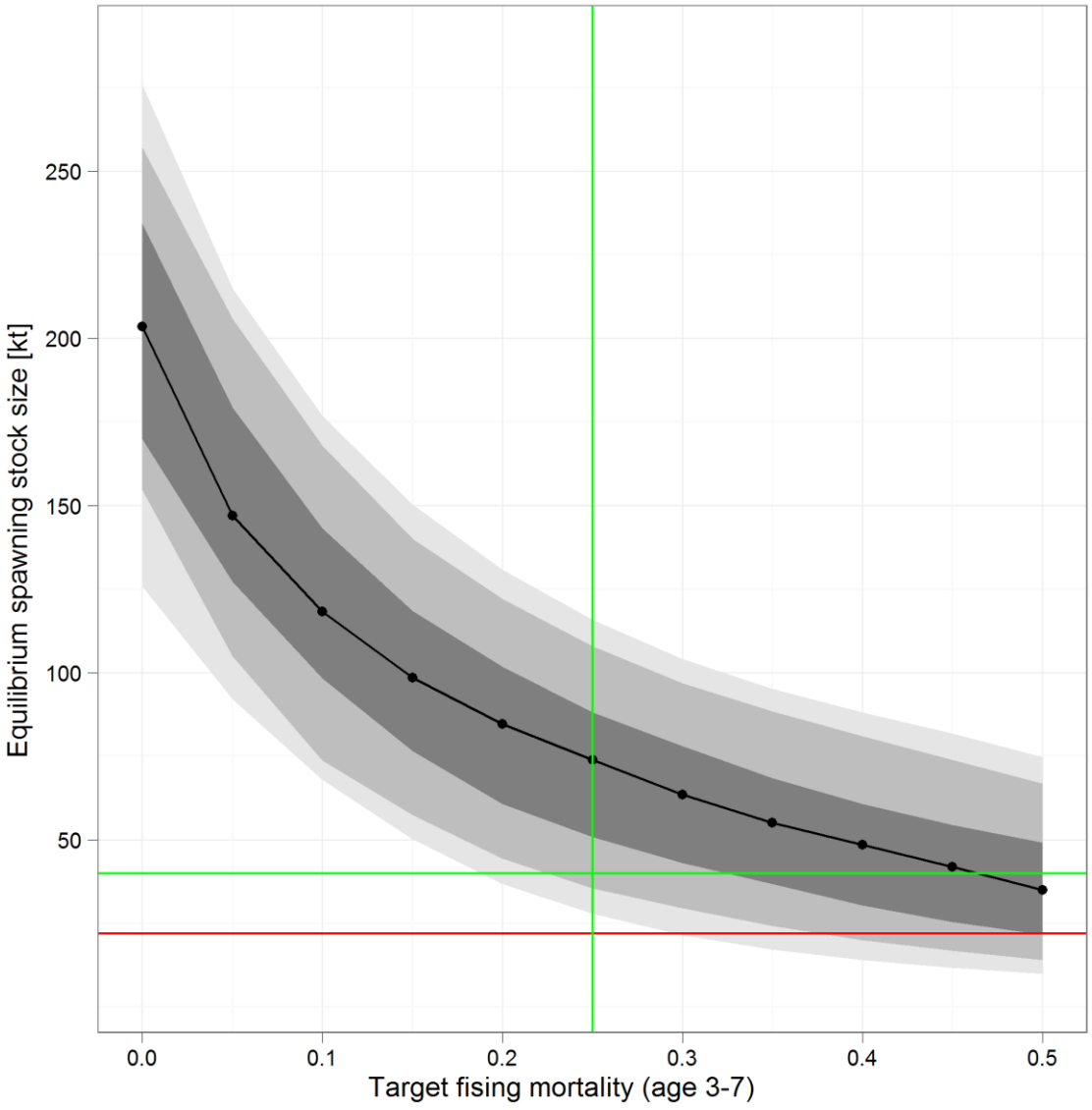

Figure 5.22. Spawning stock size as a function of target fishing mortality. B_{lim}: horizontal red line, B_{pa}: horizontal green line. Vertical line: Proposed preliminary F_{msy} of 0.25. The different shades of grey refer to 90%, 80% and 50% pseudo-confidence intervals.

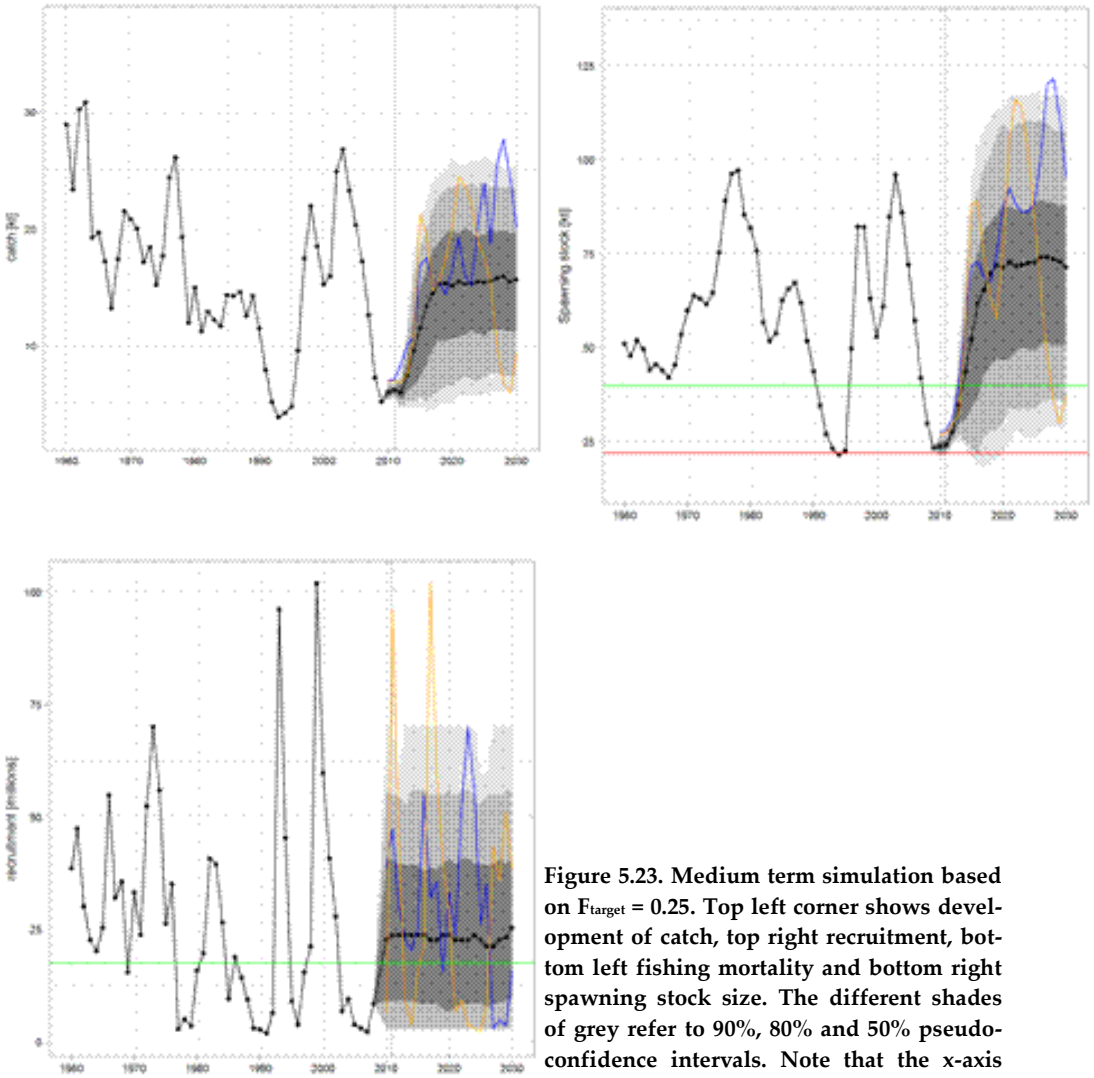

Figure 5.23. Medium term simulation based on F_{target} = 0.25. Top left corner shows development of catch, top right recruitment, bottom left fishing mortality and bottom right spawning stock size. The different shades of grey refer to 90%, 80% and 50% pseudo-confidence intervals. Note that the x-axis does not cross the y-axis at zero.

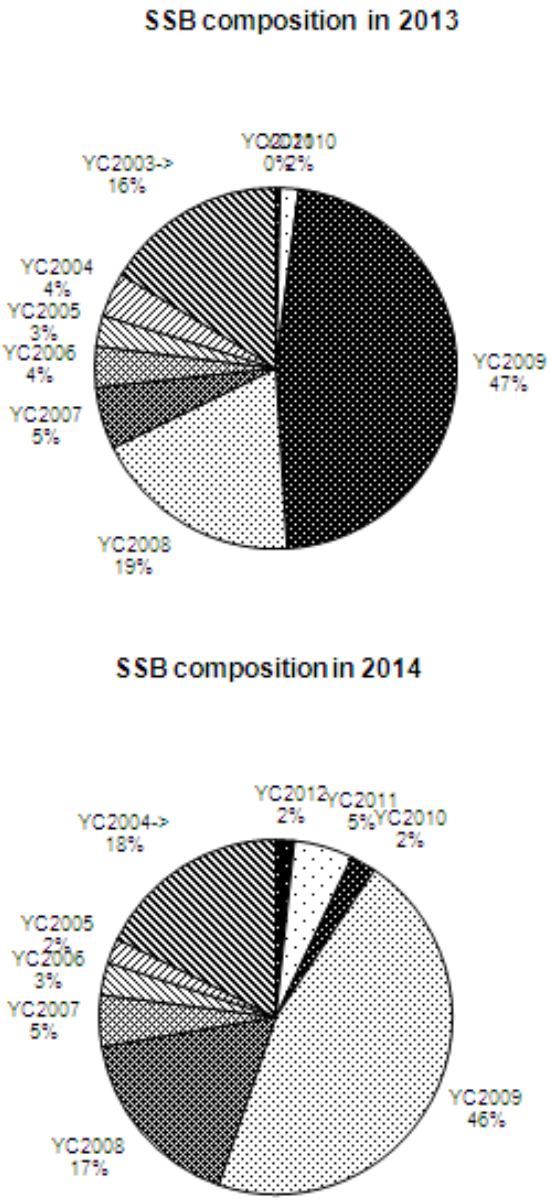

Figure 5.24. Faroe haddock. Projected composition of the number by year-classes in the SSB's in 2013 and 2014