

4 Faroe Plateau cod

Summary

The input data consisted of the catch-at-age matrix (ages 2-10+ years) for the period 1961-2008 and two age-disaggregated abundance indices obtained from the two Faroese groundfish surveys: the spring survey 1994-2009 (shifted back to the previous year) and the summer survey 1996-2008. The maturities were obtained from the spring survey 1983-2009.

The assessment settings were the same as in the 2008 assessment. An XSA was run and tuned with the two survey indices. The fishing mortality in 2008 (average of ages 3-7 years) was estimated at 0.76, which was considerably higher than the precautionary fishing mortality of 0.35 and also higher than the limit fishing mortality (when 'bad things' may happen) of 0.68. The total stock size (age 2+) in the beginning of 2008 was estimated at 25 000 tonnes and the spawning stock biomass at 19 000 tonnes, which was slightly below the limit biomass (which should be avoided) of 21 000 tonnes. The estimates of stock size were amongst the lowest during the 1906-2008 period.

The short term prediction until year 2011 showed a steady-state situation with a stock size of around 31 000 tonnes and a spawning stock biomass of around 19 000 tonnes.

Managers should realize the poor state of the stock. Very importantly, the recruitment seems to be positively correlated with the total stock size of cod. It is, therefore, urgent to reduce the fishing mortality so that the stock increases. It will therefore be necessary to extend area-closures, preferably for all fishing. Candidate areas are parts of Mýlingsgrunnur (north of the Faroes), Mykinesgrunnur (west of the Faroes) as well as areas east of Faroe Islands.

4.1 Stock description and management units

Both genetic and tagging data suggest that there are three cod stocks present in Faroese waters: on the Faroe Bank, on the Faroe Plateau and on the Faroe-Iceland Ridge. Cod on the Faroe-Iceland Ridge seem to belong to the cod stock at Iceland, and the WG in 2005 decided to exclude these catches from the catch-at-age calculations. The annex provides more information.

4.2 Scientific data

The landing figures were obtained from the Fisheries Ministry and Statistics Faroe Islands (Table 4.2.1) and the working group estimates are presented in Table 4.2.2. The catches on the Faroe-Iceland ridge, i.e. for the large single trawlers (Table 4.2.3) and the large longliners were not included in the catch-at-age calculations. In recent years the longliners have taken the majority of the cod catches (Table 4.2.4). The catch-at-age was updated to account for a change in the nominal landings for 2006 and 2007. Landings-at-age for 2008 are provided for the Faroese fishery in Table 4.2.5. Faroese landings from most of the fleet categories were sampled (see text table below). Catch-at-age from 1961 to 2008 are shown in Table 4.2.6. Catch curves are shown in Fig. 4.2.1. They show atypical patterns in 1996 and to some extent in 2001-2002 when there appears to be an increase over the previous year for ages where a decrease would normally have been expected. This could be due to catchability for longliners depending on fish growth, causing atypical catch curves for longliners.

Samples from commercial fleets in 2008.

Fleet	Size	Samples	Lengths	Otoliths	Weights
Open boats		15	193	339	1,457
Longliners	<100 GRT	24	395	780	3,624
Longliners	>100 GRT	22	0	589	4,297
Jiggers		2	0	0	446
Gillnetters		1	0	60	243
Sing. trawlers	<400 HP	0	0	0	0
Sing. trawlers	400-1000 HP	6	0	120	1,153
Sing. trawlers	>1000 HP	5	676	0	237
Pair trawlers	<1000 HP	3	135	120	344
Pair trawlers	>1000 HP	18	454	477	2,887
Total		81	1,660	2,146	13,231

Mean weight-at-age data for 1961-2008 are provided for the Faroese fishery in Table 4.2.7. These were calculated using the length/weight relationship based on individual length/weight measurements of samples from the landings. The sum-of-products-check for 2008 showed a discrepancy of 0 %.

Figure 4.2.2 shows the mean weight-at-age for 1961 to 2008. For 2009-2011 the values used in the short term predictions are shown on this graph in order to put them in perspective with previous observations. The weights increased from 1998 to 2000, but have decreased since, although they appear to have increased in 2008 and 2009.

The proportion of mature cod by age during the Faroese groundfish surveys carried out during the spawning period (March) are given in Table 4.2.8 (1961 - 2008) and shown in Figure 4.2.3 (1983 - 2008). The observed values in 2009 and the estimated values in 2010-2011 are also shown in order to put them in perspective with previous observations. Full maturity is generally reached at age 5 or 6, but considerable changes have been observed in the proportion mature for younger ages between years.

The spring groundfish surveys in Faroese waters with the research vessel *Magnus Heinason* is used as a tuning series. The catch curves showed a normal pattern (Figure 4.2.4). The stratified mean catch of cod per unit effort in 1994-2009 is given in Figure 4.2.5. The CPUE increased substantially in 1995 and remained high up to 1998. The CPUE decreased from 2002 to 2004 and was low in 2006-2008 and increased considerably in 2009. Normally the stratified mean catch per trawl hour increases for the first 3-4 years of life of a year class, and decreases afterwards (Figure 4.2.4). From 1994 to 1995, however, there was an increase for all year classes, possibly because of increased availability. A more normal pattern was observed from 1996-2009.

The other tuning series used is the Summer Groundfish Survey. The stratified mean catch of cod per unit effort (kg/trawl hour) 1996-2008 is shown in Figure 4.2.5, and catch curves in Figure 4.2.6. The catch curves show that the fish are fully recruited to the survey gear at an age of 4 or 5 years. Both tuning series are presented in Table 4.2.9.

Two commercial cpue series (longliners and Cuba trawlers) are also presented (Tables 4.2.10 and 4.2.11, as well as Figure 4.2.7), although they are not used as tuning series.

4.3 Information from the fishing industry

The sampling of the catches is included in the 'scientific data'. The fishing industry has during a ten year period gathered data on the size composition of the landings but this information has not been used in this assessment.

4.4 Methods

This an update assessment and the results of the assessment is mostly data-driven implying that there may be limited need to use other assessment methods.

4.5 Reference points

The reference points are dealt with in the general section of Faroese stocks. The reference points for Faroe Plateau cod are the following: $B_{pa} = 40\text{kt}$, $B_{lim} = 21\text{kt}$, $F_{pa} = 0.35$ and $F_{lim} = 0.68$.

4.6 State of the stock - historical and compared to what is now

Since the current assessment is an update assessment, the same procedure is followed as in the 2008 assessment: to use the two surveys for tuning and not the commercial series. The commercial series showed a similar overall tendency as the surveys (Figure 4.2.7). The XSA-run is presented in Table 4.6.1 and the results are shown in the Table 4.6.2 (fishing mortality at age), Table 4.6.3 (population numbers at age) and Table 4.6.4 (summary table).

The log catchability residuals from the adopted XSA run are shown in Figure 4.6.1.. There were year effects in both surveys since 2005. The stock estimates for 2008 seemed to be determined mostly by the summer survey.

The results from the retrospective analysis of the XSA (Figure 4.6.2) show that there has been a tendency to underestimate the recruitment and total stock/spawning stock biomass slightly, and to overestimate the fishing mortality.

The estimated fishing mortalities are shown in Tables 4.6.2 and 4.6.4 and Figures 4.6.3 and 4.6.4. The average F for age groups 3 to 7 in 2008 (F_{3-7}) is estimated at 0.76, considerably higher than $F_{pa} = 0.35$ and also higher than $F_{lim} = 0.68$.

The F_{3-7} (Figure 4.6.4) seems to be a problematic measure of fishing mortality for two reasons. Firstly, the fishing mortalities for ages 6-7 are generally overestimated in the terminal year leading to an overestimation of F_{3-7} for the terminal year. Secondly, the proportion of 6-7 year old cod in the stock or catch is small (normally less than 20%) and therefore get a disproportionate influence on the F_{3-7} . The yield over exploitable biomass (3 years and older) was introduced in the 2004 assessment, but has the drawback not being proportional to fishing effort. Another approach is to weight the fishing mortalities and three weighting procedures are presented in Figure 4.6.5: weighting by stock numbers, stock biomasses or catch weights. All measures of fishing mortality show, however, that the fishing mortality has increased since the introduction of the effort management system in 1996 but that there have been oscillations around this increasing trend. The fishing mortality in 2008 was above F_{lim} .

The stock size in numbers is given in Table 4.6.3. A summary of the XSA, with recruitment, biomass and fishing mortality estimates is given in Table 4.6.4 and in Figure 4.6.3. The stock-recruitment relationship is presented in Figure 4.6.6. The stock trajectory with respect to existing reference points is illustrated in Figure 4.6.7.

Figure 4.6.8, which is taken from last year's report (ICES, 2008), shows the F and SSB's from a 1000 bootstraps of the ADAPT with the two surveys. The figure also shows the point estimate of F and SSB from the XSA assessment. The ratio between the 75% percentiles and 25% percentiles of F is 1.28, and 1.16 for SSB. This means that there is a greater uncertainty associated with the estimation of F than with SSB.

The assessment shows the poor recruitment for the 1984 to 1991 year classes, and the strong 1992 and 1993 year classes. Due to the continuous poor recruitment from 1984 to 1991 and the high fishing mortalities, the spawning stock biomass declined steadily from 1983 to 1992 when it was the lowest on record at 21 000 t. It increased sharply to above 80 000 t in 1996 and 1997 before declining to about 45 000 t in 1999. The spawning stock biomass increased to 59 000 t in 2001 but dropped to about 17 000 t in 2007 which is the lowest value observed during the assessment period from 1961-2008. The 2002 year class is likely the lowest observed and the 2003-2006 year classes are also weak according to the XSA run. The 2007 year class seems to be a bit stronger (11 millions), but relies solely on the spring survey estimate in 2009 (shifted to 2008 in the tuning) and is also low.

In order to put the stock estimates in 2008 into a wider perspective, we have estimated the stock biomass back to 1906. A cpue series (tonnes per million tonn-hours) for British trawlers 1924-1972 was available from the data presented in Jákupsstovu and Reinert (1994). The cpue series was also used, and explained, in Jones (1966). There was an overlap between the cpue series and the stock assessment for the years 1961-1972. Another cpue series (cwts per day of absence from port) was available for British steam trawlers 1906-1925. The overlap was two years (1924 and 1925) and the 1906-1925 series was scaled to the 1924-1972 series. The results are presented in Figure 4.6.9. There was a decreasing trend in biomass from around 100 thousand tonnes to around 80 tonnes prior to World War II, and since then a decreasing trend from around 100 thousand tonnes to around 50 thousand tonnes. The biomass in 2008 was the lowest during the entire period, although comparable values were observed in 1991-1992.

4.7 Short term forecast

The input data for the short term prediction are given in Table 4.7.1. The 2008-2009 year classes were estimated as the average of the 2003-2007 year classes. Estimates of stock size (ages 3+) were taken directly from the XSA stock numbers. The exploitation pattern was estimated as the average fishing mortality for 2006-2008. The weights at age in the catches in 2009 were estimated from the commercial catches in January-February or the spring survey (ages 2-5 years). The weights in the catches in 2010-2011 were set to the values in 2009, i.e., rather high values. The proportion mature in 2009 was set to the 2009 values from the spring groundfish survey, and for 2010-2011 to the average values for 2007-2009.

Table 4.7.2 shows that the landings in 2009 are expected to be 9 000 tonnes (the landings from the Faroe-Icelandic ridge should be added to this figure in order to get the total Faroese landings within the Vb1 area). The spawning stock biomass is expected to be 16 000 tonnes in 2009, 21 000 tonnes in 2010 and eventually 21 000 tonnes in 2011. The current short term prediction is therefore quite pessimistic. The contribution of the various year-classes to the SSB in 2010 and 2011 is shown in Figure 4.7.1. It shows that the incoming year-classes (YC 2005-YC 2008) dominate the SSB. Setting the recruitment in 2009-2011 to 5328 millions (average of the recruitment in 2005-2008), the landings in 2009 are expected to be 7 000 tonnes. The SSB in 2009 to 2011 is expected to be 15 000 tonnes. This figure is further reduced to 12 000 tonnes if the

weights in 2010-2011 are set to the average values observed in 2006-2008. This shows that the short-term projection depends much on the assumptions of recruitment and weights-at-age.

4.8 Long term forecast

The input to the long term forecast is presented in Table 4.8.1 and the result is presented in Table 4.8.2 and Figure 4.8.1.

4.9 Uncertainties in assessment and forecast

Misreporting is not believed to be a problem under the current effort management system. The total catch figures (in subdivisions Vb1+Vb2) are believed to be accurate although there may be some minor problems when allocating the catches between the two subdivisions.

The sampling of the catches for length measurements and length-weight relationships is considered to be adequate but the number of otoliths could be higher.

The quality of the tuning data is considered high. The same research vessel has been used all the time and the gear as well as sampling procedures of the catch have remained the same. The only exception may be the otolith sampling during 1994-1996 when larger otolith samples were collected from fewer hauls than during the other years (1997 to present).

The quality of the assessment is believed to be high – in the sense that there seems to be no doubt that the stock size is amongst the lowest observed during a century. There was a good agreement between the survey indices and when compared to the commercial tuning series.

A model incorporating cannibalism gave approximately the same recruitment for the most recent years as the values used in the short term prediction.

4.10 Comparison with previous assessment and forecast

New or changed things compared to last years report: the assessment settings were the same as last year.

4.11 Management plans and evaluations

The effort management system was introduced in 1996 and aims at a target F of 0.45. The management plan is discussed in the overview section for Faroese stocks.

4.12 Management considerations

The current assessment shows that the spawning stock biomass in 2008 was below Blim of 21 000 tonnes and that it is expected to stay around 21 000 tonnes during 2010-2011. The catch in 2009-2010 is predicted to be around 10 000 tonnes, which is slightly above the catch in 1991-1993. The decrease in the stock is due to a combination of poor recruitment since 2002 and high fishing mortality. The low recruitment is believed to be a result of poor primary production since 2002 and the poor state of the stock. The primary production was above average in 2008, and a similar value in 2009 could produce stronger recruitment than has been assumed in the short-term prediction, i.e., a larger cod stock. However, a low primary production in 2009, i.e., poorer recruitment and slower growth, could cause the SSB in 2011 to become as low as 12 000 tonnes.

Biomass estimates of Faroe Plateau cod reconstructed back in time (Figure 4.6.9) show that the biomass fluctuated around 100 000 tonnes during the period 1906-1957, around 80 000 tonnes during 1958-1987 and eventually around 60 000 tonnes since 1988. The catches fluctuated between 20 000 and 40 000 tonnes, except in 1990-1994 and 2004-2008. Similar catches from smaller biomasses imply that the exploitation rates have increased.

There has been a long held view on the Faroe Islands that the cod stock is very resilient to exploitation and that a collapse in the fishery is nearly impossible – people bear in mind the rapid recovery of the cod stock during 1994-1996. The collapse in the fisheries during 1991-1994 has been regarded as an exceptional event. Figure 4.6.9 indicates that, although more resilient than some other cod stocks in the North Atlantic, Faroe Plateau cod does show a decreasing trend since World War II. This trend is likely caused by a combination of environmental factors and fishing effort, but the contribution from each of these two factors is unknown. While there is no direct information about environmental condition for cod such as the primary production index to evaluate possible environmental changes prior to 1990, there are reasons to believe that the fishing effort has increased during the period.

The catchability hypothesis presented in the overview section for Faroese stocks states that the fishing mortality is high when the primary production is low and *vice versa*. The primary production was low, or average, during 2002-2007 and the high fishing mortalities in 2005-2007 were therefore expected. The primary production in 2008 was above average, and there are signs that it will be above average in 2009 also. Hence, the high fishing mortality in 2008 may be overestimated in the current stock assessment, i.e., the stock size might be underestimated. More data are required before any conclusions can be made, for example the summer survey in 2008 and the spring survey in 2009.

Although the extremely low cod stock biomass is a serious problem for the Faroese fisheries sector it may not cause as intense a crisis as occurred in the early 1990s because the biomass of saithe is higher than in the early 1990s.

Given the very poor state of the cod stock the WG considers that measures should be taken to reduce fishing mortality significantly in 2009. This would require a substantial reduction in the number of fishing days in 2009/2010. A small reduction in the number of days is unlikely to have a detectable effect because the price of cod is higher than for the other two groundfish species, although the difference has become smaller during the last year. Also, the use of snail-baits in the longline fishery close to land has probably increased fishing efficiency. Area closures may therefore be necessary in order to reduce fishing mortality on the cod stock. Figures 4.12.1 and 4.12.2 show the average abundance of cod in March (1998-2006) and August (1997-2005) and provides a basis which areas should be closed for the fishery.

The continued high fishing mortality on cod also questions some of the underlying assumptions in the effort management system. The system assumes that the fleets would concentrate on abundant species, but, as mentioned earlier, fishing effort directed on cod has remained high. Another assumption is that the fishing mortality could be regulated by the number of fishing days. While the average fishing mortality is undoubtedly related to fishing effort, as indicated in the overview section, short term fluctuations in fishing mortality may depend as much upon natural processes than on the number of fishing days. Given the current very low cod stock extra means are necessary to protect that stock.

As indicated above, a substantial reduction in the number of fishing days would be required to reduce the fishing mortality on cod. Other means, such as area closures would also be necessary and may actually be more effective.

A Dr. Philos thesis, submitted by P. Steingrund to the University of Bergen in March 2009, suggests that there is a positive relationship between recruitment of Faroe Plateau cod (age 2) and the stock size of cod (age 3+). This relationship is valid up to a stock size of around 100 000 tonnes, above which there is a decline in recruitment. A simulation model, which was primarily based on this relationship, suggests that the fishing mortality should be reduced by some 30-50%, relative to the 1997-2006 level, in order to get the highest long-term catch (around 23 000 tonnes per year) during the next 100 years. The simulations also showed that the current (1997-2006) fishing mortality will almost certainly lead to a virtual extinction of the cod stock within the next 50 years. Thus, the simulations show that it should be in the interest of the Faroese fishing industry to reduce the fishing mortality on cod.

4.13 Ecosystem considerations

The issue is not dealt with in this assessment and there is little information available how the fisheries affect the ecosystem.

4.14 Regulations and their effects

As mentioned earlier, there seems to be a poor relationship between the number of fishing days and the fishing mortality because of large fluctuations in catchability. Area restrictions may be the only alternative that may reduce fishing mortality.

4.15 Changes in fishing technology and fishing patterns

Fishing effort per fishing day may have increased gradually since the effort management system was introduced in 1996, although little direct quantitative information exists. There also seems to have been substantial increases in fishing power when new vessels are replacing old vessels.

The fishing pattern in 2006-2008 has changed in comparison to previous years. The large longliners seem to have exploited the deep areas (> 200 m) to a larger extent (ling and tusk) because the catches in shallower waters of cod and haddock have been so poor – which was also observed in the beginning of the 1990s. This could reduce the fishing mortality on cod and haddock, but the small longliners still exploit the shallow areas.

4.16 Changes in the environment

The primary production has been low for a number of years, except in 2008, but it is not believed that this has any relationship with a change in the environment.

4.17 References

ICES, 2008. Report of the North-Western Working Group. ICES CM 2008/ACOM:03.

Jákupsstovu, S. H. and Reinert, J. 1994. Fluctuations in the Faroe Plateau cod stock. ICES Marine Science Symposia, 198:194-211.

Jones, B. W. 1966. The cod and the cod fishery at the Faroe. Fishery Investigations, London, 24.

Table 4.2.1. Faroe Plateau (Subdivision Vb1) COD. Nominal catches (tonnes) by countries, 1986-2008, as officially reported to ICES.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	8	30	10	-	-	-	-	-	-	-	-	-	-
Faroe Islands	34,492	21,303	22,272	20,535	12,232	8,203	5,938	5,744	8,724	19,079	39,406	33,556	23,308
France	4	17	17	-	-	- ¹	3 ²	1 ²	-	2 ²	1 ²	-	-
Germany	8	12	5	7	24	16	12	+	2 ²	2	+	+	-
Norway	83	21	163	285	124	89	39	57	36	38	507	410	405
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (E/W/Nl)	-	8	-	-	-	1	74	186	56	43	126	61 ²	27 ²
UK (Scotland)	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	34,595	21,391	22,467	20,827	12,380	8,309	6,066	5,988	8,818	19,164	40,040	34,027	23,740

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008 [*]
Denmark	-	-	-	-	-	-	-	-	-	-
Faroe Islands	19,156	-	29,762	40,602	30,259	17,540	13,556	11,629	9,905	9,293
France	-	1	9 ²	20	14	2	-	7	1 ²	-
Germany	39	2	9	6	7	3 ²	-	1 ²	-	-
Iceland	-	-	-	5	-	-	-	-	-	-
Norway	450	374	531 [*]	573	447	414	201	49	71	43
Greenland	-	-	-	-	-	-	-	5	-	-
Portugal	-	-	-	-	-	1	-	-	-	-
UK (E/W/Nl) ²	51	18	50	42	15	15	24	1	3	-
UK (Scotland) ¹	-	-	-	-	-	-	-	-	358	-
United Kingdom	-	-	-	-	-	-	-	-	-	439
Total	19,696	395	30,361	41,248	30,742	17,975	13,781	11,692	10,338	9,775

* Preliminary

¹⁾ Included in Vb2.

²⁾ Reported as Vb.

Table 4.2.2. Nominal catch (tonnes) of COD in subdivision Vb1 (Faroe Plateau) 1986-2008, as used in the assessment.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Officially reported	34,595	21,391	22,467	20,827	12,380	8,309	6,066	5,988	8,818	19,164	40,040	34,027	23,740
Faroese catches in IIA within Faroe area jurisdiction			715	1,229	1,090	351	154						
Expected misreporting/discard										3330			
French catches as reported to Faroese authorities				12	17								
Catches reported as Vb2:													
UK (E/W/Ni)					-	-	+	1	1	-	-	-	-
UK (Scotland)					205	90	176	118	227	551	382	277	265
Used in the assessment	34,595	21,391	23,182	22,068	13,487	8,750	6,396	6,107	9,046	23,045	40,422	34,304	24,005

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008 ¹
Officially reported	19,696	395	30,361	41,248	30,742	17,975	13,781	11,692	10,338	9,775
Faroese catches in Vb1		21,793 ²								
Correction of Faroese catches in Vb1 ¹			-1,766	-2,409	-1,795	-1,041	-804	-690	-588	-749
Correction of Faroese catches in Vb1 ²										3,325
Faroese catch on the Faroe-Iceland ridge	-1,600	-1,400	-700	-600	-4,700	-4,000	-4,200	-800	-1,800	-1,828
Greenland ³									6	
France ³										
Catches reported as Vb2:										
UK (E/W/Ni)	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	210	245	288	218	254	244	1,129	278	53	
United Kingdom										
Used in the assessment	18,306	21,033	28,183	38,457	24,501	13,178	9,906	10,480	8,009	10,523

¹) Preliminary²) In order to be consistent with procedures used previous years.²) Data from the Coastal Guard (CG) regarded more reliable than the preliminary Statlant: 12608 - 9293 = 3325.

CG catch Vb1+Vb2 = 12756 t. CG catch Vb2 = 148 t, i.e. CG catch Vb1 = 12756-148 = 12608 t.

³) Reported to Faroese Coastal Guard.

Table 4.2.3. Faroe Plateau (subdivision Vb1) COD. Estimate of the landings from the Faroe-Icelandic ridge. The landings were estimated from total landings by the single trawlers larger than 1000 HP (ST>1000 HP) and the proportion of the catch taken on the Faroe-Icelandic ridge (obtained from logbooks). Not updated from last year.

Year	ST>1000HP		Ratio Icelandic ridge	Tonnes Icelandic ridge (rounded)
	Landings	Round weight		
1991	329	365	0.23	100
1992	196	218	0.51	100
1993	179	199	0.38	100
1994	449	498	0.02	0
1995	862	957	0.05	0
1996	667	740	0.06	0
1997	985	1093	0.15	200
1998	1359	1508	0.13	200
1999	2074	2302	0.7	1600
2000	2515	2792	0.49	1400
2001	1649	1831	0.37	700
2002	2267	2516	0.26	600
2003	4492	4986	0.94	4700
2004	3826	4247	0.94	4000
2005	3933	4365	0.95	4200
2006	1097	1217	0.63	800
2007	1335	1482	0.25	400

Table 4.2.4. Faroe Plateau (subdivision Vb1) COD. The landings of Faroese fleets (in percents) of total catch. Note that the catches on the Faroe-Iceland ridge (mainly belonging to single trawlers > 1000 HP) are included in this table, but excluded in the XSA-run.

Year	Open boats	Longliners <100 GRT	Singletrawl <400 HP	Gill net	Jiggers	Singletrawl 400-1000 HP	Singletrawl >1000 HP	Pairtrawl <1000 HP	Pairtrawl >1000 HP	Longliners >100 GRT	Industrial trawlers	Others	Faroe catch Round.weight
1986	9.5	15.1	5.1	1.3	2.9	6.2	8.5	29.6	14.9	5.1	0.4	1.3	34,492
1987	9.9	14.8	6.2	0.5	2.9	6.7	8.0	26.0	14.5	9.9	0.5	0.1	21,303
1988	2.6	13.8	4.9	2.6	7.5	7.4	6.8	25.3	15.6	12.7	0.6	0.2	22,272
1989	4.4	29.0	5.7	3.2	9.3	5.7	5.5	10.5	8.3	17.7	0.7	0.0	20,535
1990	3.9	35.5	4.8	1.4	8.2	3.7	4.3	7.1	10.5	19.6	0.6	0.2	12,232
1991	4.3	31.6	7.1	2.0	8.0	3.4	4.7	8.3	12.9	17.2	0.6	0.1	8,203
1992	2.6	26.0	6.9	0.0	7.0	2.2	3.6	12.0	20.8	13.4	5.0	0.4	5,938
1993	2.2	16.0	15.4	0.0	9.0	4.1	3.6	14.2	21.7	12.6	0.8	0.4	5,744
1994	3.1	13.4	9.6	0.5	19.2	2.7	5.3	8.3	23.7	13.7	0.5	0.1	8,724
1995	4.2	17.9	6.5	0.3	24.9	4.1	4.7	6.4	12.3	18.5	0.1	0.0	19,079
1996	4.0	19.0	4.0	0.0	20.0	3.0	2.0	8.0	19.0	21.0	0.0	0.0	39,406
1997	3.1	28.4	4.4	0.5	9.8	5.1	2.9	4.8	11.3	29.7	0.0	0.1	33,556
1998	2.4	31.2	6.0	1.3	6.5	6.3	5.5	3.1	8.6	29.1	0.1	0.0	23,308
1999	2.7	24.0	5.4	2.3	5.4	5.2	11.8	6.4	14.5	21.9	0.4	0.1	19,156
2000	2.3	19.3	9.1	0.9	10.5	9.6	12.7	5.7	13.9	15.7	0.1	0.1	21,793
2001	3.7	28.3	7.4	0.2	15.6	6.4	6.4	5.2	9.2	17.8	0.0	0.0	28,838
2002	3.8	32.9	5.8	0.3	9.9	6.7	6.6	2.5	7.2	24.4	0.0	0.0	38,347
2003	4.9	28.7	4.0	1.5	7.4	3.0	14.4	2.2	7.4	26.5	0.0	0.0	29,382
2004	4.4	31.1	2.1	0.5	6.6	1.6	12.9	2.2	11.7	26.8	0.0	0.0	16,772
2005	3.7	27.5	5.1	0.8	5.4	2.4	28.1	1.7	6.4	18.8	0.0	0.0	15,472
2006	6.2	35.0	3.2	0.2	7.1	1.6	12.9	2.5	6.6	24.7	0.0	0.0	8,636
2007	5.1	28.2	2.6	0.3	6.1	1.7	17.5	1.7	4.8	32.0	0.0	0.0	8,866
2008	5.1	32.7	4.7	0.7	6.4	3.2	14.6	1.0	3.1	28.6	0.0	0.0	7,666
Average	4.3	25.2	5.9	0.9	9.4	4.4	8.8	8.5	12.1	19.9	0.5	0.1	

Table 4.2.5. Faroe Plateau COD. Catch in numbers at age per fleet in 2008. Numbers are in thousands and the catch is in tonnes, round weight.

Age\Fleet	Open boat: < 100 GRT	Longliners	Jiggers	Single trwl 0-399HP	Single trwl 400-1000H	Single trwl > 1000 HP	Pair trwl 700-999 HI	Pair trwl > 1000 HP	Longliners > 100 GRT	Gillnetters	Others (scaling)	Catch-at-age
2	40	168	50		65	6	1	4	65	0	14	413
3	94	559	114		105	28	5	18	129	4	38	1094
4	76	462	83		120	66	15	44	207	12	41	1126
5	47	212	50		51	43	9	28	140	16	22	618
6	10	77	14		21	30	6	19	70	13	9	269
7	6	46	8		18	22	5	14	93	6	8	226
8	7	58	13		13	21	4	14	85	2	8	225
9	2	14	3		6	7	1	4	41	0	4	82
10+	0	4	0		2	1	0	1	19	0	1	28
Sum	282	1600	335		401	224	46	146	849	53	145	4081
G.weight	445	2867	569		851	866	181	569	2627	173	332	9480

Others include industrial bottom trawlers, longlining for halibut, foreign fleets, and scaling to correct catch.

Gutted total catch is calculated as round weight divided by 1.11.

Table 4.2.6. Faroe Plateau COD. Catch in numbers at age 1961-2008.

year	age									
	1	2	3	4	5	6	7	8	9	10
1961	0	3093	2686	1331	1066	232	372	78	29	0
1962	0	4424	2500	1255	855	481	93	94	22	0
1963	0	4110	3958	1280	662	284	204	48	30	0
1964	0	2033	3021	2300	630	350	158	79	41	0
1965	0	852	3230	2564	1416	363	155	48	63	0
1966	0	1337	970	2080	1339	606	197	104	33	0
1967	0	1609	2690	860	1706	847	309	64	27	0
1968	0	1529	3322	2663	945	1226	452	105	11	0
1969	0	878	3106	3300	1538	477	713	203	92	0
1970	0	402	1163	2172	1685	752	244	300	44	0
1971	0	328	757	821	1287	1451	510	114	179	0
1972	0	875	1176	810	596	1021	596	154	25	0
1973	0	723	3124	1590	707	384	312	227	120	97
1974	0	2161	1266	1811	934	563	452	149	141	91
1975	0	2584	5689	2157	2211	813	295	190	118	150
1976	0	1497	4158	3799	1380	1427	617	273	120	186
1977	0	425	3282	6844	3718	788	1160	239	134	9
1978	0	555	1219	2643	3216	1041	268	201	66	56
1979	0	575	1732	1673	1601	1906	493	134	87	38
1980	0	1129	2263	1461	895	807	832	339	42	18
1981	0	646	4137	1981	947	582	487	527	123	55
1982	0	1139	1965	3073	1286	471	314	169	254	122
1983	0	2149	5771	2760	2746	1204	510	157	104	102
1984	0	4396	5234	3487	1461	912	314	82	34	66
1985	0	998	9484	3795	1669	770	872	309	65	80
1986	0	210	3586	8462	2373	907	236	147	47	38
1987	0	257	1362	2611	3083	812	224	68	69	26
1988	0	509	2122	1945	1484	2178	492	168	33	25
1989	0	2237	2151	2187	1121	1026	997	220	61	9
1990	0	243	2849	1481	852	404	294	291	50	26
1991	0	192	451	2152	622	303	142	93	53	24
1992	0	205	455	466	911	293	132	53	30	34
1993	0	120	802	603	222	329	96	33	22	25
1994	0	573	788	1062	532	125	176	39	23	16
1995	0	2615	2716	2008	1012	465	118	175	44	49
1996	0	351	5164	4608	1542	1526	596	147	347	47
1997	0	200	1278	6710	3731	657	639	170	51	120
1998	0	455	745	1558	5140	1529	159	118	28	25
1999	0	1185	993	799	1107	2225	439	59	17	7
2000	0	2091	2637	782	426	674	809	104	7	1
2001	0	3912	3759	2101	367	367	718	437	36	6
2002	0	2079	7283	3372	1671	470	533	413	290	7
2003	0	678	2128	4572	1927	640	177	91	115	20
2004	0	100	691	1263	2105	736	240	65	42	37
2005	0	494	592	877	1122	823	204	41	19	30
2006	0	1182	1168	499	706	852	355	81	11	3
2007	0	540	1307	771	336	308	272	91	21	3
2008	0	413	1094	1126	618	269	226	225	82	28

Table 4.2.7. Faroe Plateau COD. Catch weight at age 1961-2008.

year	age									
	1	2	3	4	5	6	7	8	9	10
1961	0	1.080	2.220	3.450	4.690	5.520	7.090	9.910	8.030	0.000
1962	0	1.000	2.270	3.350	4.580	4.930	9.080	6.590	6.660	0.000
1963	0	1.040	1.940	3.510	4.600	5.500	6.780	8.710	11.720	0.000
1964	0	0.970	1.830	3.150	4.330	6.080	7.000	6.250	6.190	0.000
1965	0	0.920	1.450	2.570	3.780	5.690	7.310	7.930	8.090	0.000
1966	0	0.980	1.770	2.750	3.510	4.800	6.320	7.510	10.340	0.000
1967	0	0.960	1.930	3.130	4.040	4.780	6.250	7.000	11.010	0.000
1968	0	0.880	1.720	3.070	4.120	4.650	5.500	7.670	10.950	0.000
1969	0	1.090	1.800	2.850	3.670	4.890	5.050	7.410	8.660	0.000
1970	0	0.960	2.230	2.690	3.940	5.140	6.460	10.310	7.390	0.000
1971	0	0.810	1.800	2.980	3.580	3.940	4.870	6.480	6.370	0.000
1972	0	0.660	1.610	2.580	3.260	4.290	4.950	6.480	6.900	0.000
1973	0	1.110	2.000	3.410	3.890	5.100	5.100	6.120	8.660	7.570
1974	0	1.080	2.220	3.440	4.800	5.180	5.880	6.140	8.630	7.620
1975	0	0.790	1.790	2.980	4.260	5.460	6.250	7.510	7.390	8.170
1976	0	0.940	1.720	2.840	3.700	5.260	6.430	6.390	8.550	13.620
1977	0	0.870	1.790	2.530	3.680	4.650	5.340	6.230	8.380	10.720
1978	0	1.112	1.385	2.140	3.125	4.363	5.927	6.348	8.715	12.229
1979	0	0.897	1.682	2.211	3.052	3.642	4.719	7.272	8.368	13.042
1980	0	0.927	1.432	2.220	3.105	3.539	4.392	6.100	7.603	9.668
1981	0	1.080	1.470	2.180	3.210	3.700	4.240	4.430	6.690	10.000
1982	0	1.230	1.413	2.138	3.107	4.012	5.442	5.563	5.216	6.707
1983	0	1.338	1.950	2.403	3.107	4.110	5.020	5.601	8.013	8.031
1984	0	1.195	1.888	2.980	3.679	4.470	5.488	6.466	6.628	10.981
1985	0	0.905	1.658	2.626	3.400	3.752	4.220	4.739	6.511	10.981
1986	0	1.099	1.459	2.046	2.936	3.786	4.699	5.893	9.700	8.815
1987	0	1.093	1.517	2.160	2.766	3.908	5.461	6.341	8.509	9.811
1988	0	1.061	1.749	2.300	2.914	3.109	3.976	4.896	7.087	8.287
1989	0	1.010	1.597	2.200	2.934	3.468	3.750	4.682	6.140	9.156
1990	0	0.945	1.300	1.959	2.531	3.273	4.652	4.758	6.704	8.689
1991	0	0.779	1.271	1.570	2.524	3.185	4.086	5.656	5.973	8.147
1992	0	0.989	1.364	1.779	2.312	3.477	4.545	6.275	7.619	9.725
1993	0	1.155	1.704	2.421	3.132	3.723	4.971	6.159	7.614	9.587
1994	0	1.194	1.843	2.613	3.654	4.584	4.976	7.146	8.564	8.796
1995	0	1.218	1.986	2.622	3.925	5.180	6.079	6.241	7.782	8.627
1996	0	1.016	1.737	2.745	3.800	4.455	4.978	5.270	5.593	7.482
1997	0	0.901	1.341	1.958	3.012	4.158	4.491	5.312	6.172	7.056
1998	0	1.004	1.417	1.802	2.280	3.478	5.433	5.851	7.970	8.802
1999	0	1.050	1.586	2.350	2.774	3.214	5.496	8.276	9.129	10.652
2000	0	1.416	2.170	3.187	3.795	4.048	4.577	8.182	11.895	13.009
2001	0	1.164	2.076	3.053	3.976	4.394	4.871	5.563	7.277	12.394
2002	0	1.017	1.768	2.805	3.529	4.095	4.475	4.650	6.244	7.457
2003	0	0.820	1.362	2.127	3.329	4.092	4.670	6.000	6.727	6.810
2004	0	1.037	1.154	1.693	2.363	3.830	5.191	6.326	7.656	9.573
2005	0	0.986	1.373	1.760	2.293	3.138	5.287	8.285	8.703	9.517
2006	0	0.839	1.304	1.988	2.386	3.330	4.691	7.635	9.524	11.990
2007	0	0.937	1.324	1.970	3.076	3.529	4.710	6.464	9.461	9.509
2008	0	1.209	1.478	2.104	2.714	3.804	4.669	5.915	7.233	9.559

Table 4.2.8. Faroe Plateau (subdivision Vb1) COD. Proportion mature at age 1983-2008. From 1961-1982 the average from 1983-1996 is used.

year	age									
	1	2	3	4	5	6	7	8	9	10
1961	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1962	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1963	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1964	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1965	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1966	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1967	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1968	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1969	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1970	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1971	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1972	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1973	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1974	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1975	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1976	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1977	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1978	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1979	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1980	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1981	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1982	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1	1
1983	0	0.03	0.71	0.93	0.94	1.00	1.00	1.00	1	1
1984	0	0.07	0.96	0.98	0.97	1.00	1.00	1.00	1	1
1985	0	0.00	0.50	0.96	0.96	1.00	1.00	1.00	1	1
1986	0	0.00	0.38	0.93	1.00	1.00	0.96	0.94	1	1
1987	0	0.00	0.67	0.91	1.00	1.00	1.00	1.00	1	1
1988	0	0.06	0.72	0.90	0.97	1.00	1.00	1.00	1	1
1989	0	0.05	0.54	0.98	1.00	1.00	1.00	1.00	1	1
1990	0	0.00	0.68	0.90	0.99	0.96	0.98	1.00	1	1
1991	0	0.00	0.72	0.86	1.00	1.00	1.00	1.00	1	1
1992	0	0.06	0.50	0.82	0.98	1.00	1.00	1.00	1	1
1993	0	0.03	0.73	0.78	0.91	0.99	1.00	1.00	1	1
1994	0	0.05	0.33	0.88	0.96	1.00	0.96	1.00	1	1
1995	0	0.09	0.35	0.33	0.66	0.97	1.00	1.00	1	1
1996	0	0.04	0.43	0.74	0.85	0.94	1.00	1.00	1	1
1997	0	0.00	0.64	0.91	0.97	1.00	1.00	1.00	1	1
1998	0	0.00	0.62	0.90	0.99	0.99	1.00	1.00	1	1
1999	0	0.02	0.43	0.88	0.98	1.00	1.00	1.00	1	1
2000	0	0.02	0.39	0.69	0.92	0.99	1.00	1.00	1	1
2001	0	0.07	0.47	0.86	0.94	1.00	1.00	1.00	1	1
2002	0	0.04	0.37	0.76	0.97	0.93	0.97	1.00	1	1
2003	0	0.00	0.29	0.79	0.88	0.98	1.00	1.00	1	1
2004	0	0.00	0.51	0.78	0.92	0.89	0.87	1.00	1	1
2005	0	0.05	0.66	0.90	0.93	0.98	0.92	1.00	1	1
2006	0	0.04	0.59	0.80	0.99	0.99	1.00	1.00	1	1
2007	0	0.00	0.47	0.78	0.91	0.99	0.97	1.00	1	1
2008	0	0.10	0.78	0.91	0.90	0.95	1.00	1.00	1	1

Table 4.2.9. Faroe Plateau (subdivision Vb1) COD. Summer survey tuning series (number of individuals per 200 stations) and spring survey tuning series (number of individuals per 100 stations).

FAROE PLATEAU COD (ICES SUBDIVISION VB1)									
Surveys.TXT									
102									
SUMMER SURVEY									
1996 2008									
1	1	0.6	0.7						
2 8									
200	707.3	6614.6	3763	1322.2	714	236.2	49		
200	513.1	1502.1	6771	1479.9	180.8	139.5	30.4		
200	527	509.1	989.1	3723.7	915.6	50.5	37.2		
200	373.4	1257.4	753.8	676.1	1424.8	239.1	40.5		
200	1364.1	1153.3	673.8	309.6	436.9	600.8	35.4		
200	3422.1	2458.7	1537.8	415.9	234.8	283	242		
200	2326	5562.9	1816.5	810.8	147.7	83.3	69.5		
200	354	1038.8	2209.2	565.9	123.4	17.6	11.9		
200	437	839.9	1080.2	1550.2	344.2	80.2	25.7		
200	616.5	735.1	872.1	1166.3	756	142.5	44.8		
200	978.4	684.2	349.3	312	256.6	123	28.2		
200	234.1	448.7	314.2	179.7	134.5	75.9	30.9		
200	68.8	370.1	328	401.2	160.1	52.4	27.5		
SPRING SURVEY (shifted back to december)									
1993 2008									
1	1	0.9	1.0						
1 8									
100	567.8	335.1	906.5	504.7	128.9	186.1	28.5	0.1	
100	706	785.9	1453.4	1480.1	1179	284	349	48.6	
100	393.6	3975	3606.1	1768.2	1314.2	403.6	79.6	161.3	
100	90.7	935.7	5474	2309.5	328.8	223.9	57.8	5.2	
100	76.2	424.4	1548.5	4857.6	1126.2	81.7	40.5	34.8	
100	530.1	644.9	972.5	1204.4	2047.4	250	25.1	13.3	
100	288.8	1402.2	735.7	436.6	502.1	829.6	63.4	3.1	
100	874.1	2282.9	1953.5	448.8	320.4	572.5	128	3.9	
100	345.9	4193.7	2789.9	1544.1	323.2	225.7	174.1	128.1	
100	79.1	720.2	4343.4	1350.6	548.9	63.3	48.2	36.9	
100	426.8	450.2	786.3	1198.8	297.7	65.8	21.9	11.8	
100	293.4	400.4	1100.5	1409.9	837.9	139.7	14	3.8	
100	129.7	144.5	166.1	340.7	281.1	92.1	15.2	3.9	
100	40.5	255.7	270.6	148.3	164.1	102.9	37.5	14.3	
100	147.2	411.3	764.3	445.6	144.4	80.9	38.5	13.3	
100	266.8	464	968.1	1151.1	425.1	73.4	31.4	24.8	

Table 4.2.10. Faroe Plateau (subdivision Vb1) COD. Pairtrawler abundance index (number of individuals per 1000 fishing hours). This series was not used in the tuning of the XSA.

Year	Standardized effort	1	2	3	4	5	6	7	8	9	10
1985	1000	0	332	8712	5134	2308	918	1108	400	142	93
1986	1000	0	211	3288	12317	4777	2043	544	333	98	88
1987	1000	0	77	1313	3584	5438	1944	515	112	90	21
1988	1000	0	73	1707	2067	1942	2962	713	265	47	42
1989	1000	0	137	991	2061	1616	1409	1343	339	97	26
1990	1000	0	31	2130	2282	1409	720	444	444	76	31
1991	1000	0	12	245	1562	956	525	291	199	92	34
1992	1000	0	25	366	694	1993	807	366	151	63	63
1993	1000	20	78	1551	2081	942	1258	472	136	99	78
1994	1000	0	497	1615	2182	2679	763	939	211	141	35
1995	1000	0	1142	3129	5199	3864	1930	434	517	162	83
1996	1000	0	407	13198	12929	4454	2764	667	17	269	43
1997	1000	0	38	1201	10428	8738	1569	795	165	0	104
1998	1000	0	27	1082	2611	5887	3666	554	306	57	0
1999	1000	0	350	2114	2336	2482	4412	1508	93	38	0
2000	1000	0	2717	3467	1896	949	1217	1317	185	0	0
2001	1000	0	3298	7725	3205	642	351	899	407	14	8
2002	1000	0	497	6856	5154	1362	272	203	132	211	9
2003	1000	0	61	1652	5102	2866	679	107	56	73	10
2004	1000	0	0	307	1622	3809	2321	745	149	39	80
2005	1000	0	57	489	797	2470	2113	510	124	45	12
2006	1000	0	124	588	986	1020	1579	707	208	43	7
2007	1000	0	138	1132	1614	1038	566	541	254	64	0
2008	1000	0	82	418	1014	651	447	332	312	98	12

Table 4.2.11. Faroe Plateau (subdivision Vb1) COD. Longliner abundance index (number of individuals per 100000 hooks). This series was not used in the tuning of the XSA. The age composition was obtained from all longliners > 100 GRT. The area was restricted to the area west of Faroe Islands at depths between 100 and 200 m.

Year	Stand. effort	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9
1986	100000	0	0	250	875	375	188	63	63	0
1987	100000	0	0	53	263	447	237	105	53	26
1988	100000	0	44	393	393	349	480	131	87	0
1989	100000	0	587	573	545	307	363	349	98	28
1990	100000	0	56	585	304	225	152	129	129	22
1991	100000	0	28	138	799	275	138	83	55	28
1992	100000	0	80	208	208	384	144	64	32	16
1993	100000	7	23	583	570	195	352	91	46	23
1994	100000	39	705	904	452	282	88	160	58	34
1995	100000	0	405	1039	596	410	242	75	158	42
1996	100000	0	49	1528	1492	598	822	360	110	248
1997	100000	0	26	302	2094	1336	300	293	87	38
1998	100000	16	101	159	270	1016	339	48	26	11
1999	100000	4	331	180	136	151	324	96	22	7
2000	100000	75	517	653	125	59	117	189	35	5
2001	100000	11	1030	746	393	62	80	200	157	22
2002	100000	0	544	2085	816	442	164	181	123	137
2003	100000	0	151	697	1653	729	271	76	44	76
2004	100000	0	11	57	210	335	132	43	18	14
2005	100000	0	10	39	102	220	234	83	24	10
2006	100000	5	136	233	112	102	277	165	49	10
2007	100000	5	60	410	295	137	137	144	74	14
2008	100000	20	80	154	248	168	87	114	101	47

Table 4.6.1. Faroe Plateau (subdivision Vb1) COD. The XSA-run.

Lowestoft VPA Version 3.1

21/04/2009 15:38

Extended Survivors Analysis

COD FAROE PLATEAU (ICES SUBDIVISION Vb1)

COD_ind_Surveys10.txt

CPUE data from file Surveys.TXT

Catch data for 48 years. 1961 to 2008. Ages 1 to 10.

Fleet,	First,	Last,	First,	Last,	Alpha,	Beta
,	year,	year,	age,	age	,	
SUMMER SURVEY	, 1996,	2008,	2,	8,	.600,	.700
SPRING SURVEY (shift,	1993,	2008,	1,	8,	.900,	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 = 2.000

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

Prior weighting not applied

Tuning converged after 34 iterations

1

Regression weights

, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000

Fishing mortalities

Age,	1999,	2000,	2001,	2002,	2003,	2004,	2005,	2006,	2007,	2008
1,	.000,	.000,	.000,	.000,	.000,	.000,	.000,	.000,	.000,	.000
2,	.096,	.124,	.157,	.189,	.127,	.031,	.098,	.209,	.137,	.127
3,	.283,	.318,	.344,	.488,	.300,	.185,	.255,	.351,	.376,	.451
4,	.290,	.379,	.453,	.598,	.658,	.293,	.379,	.354,	.414,	.654
5,	.318,	.247,	.306,	.814,	.846,	.742,	.461,	.604,	.431,	.696
6,	.644,	.326,	.350,	.822,	.888,	.969,	.746,	.783,	.582,	.747
7,	1.050,	.514,	.695,	1.361,	.883,	1.064,	.806,	.876,	.622,	1.233
8,	.716,	.771,	.585,	1.223,	.929,	1.011,	.504,	.919,	.578,	2.049
9,	.432,	.164,	.676,	1.034,	1.687,	1.988,	.979,	.242,	.649,	1.975

1
XSA population numbers (Thousands)

YEAR ,	AGE								
	1,	2,	3,	4,	5,	6,	7,	8,	
1999 ,	2.41E+04,	1.44E+04,	4.45E+03,	3.51E+03,	4.50E+03,	5.18E+03,	7.46E+02,	1.28E+02,	5.36E+01,
2000 ,	3.64E+04,	1.97E+04,	1.07E+04,	2.74E+03,	2.15E+03,	2.68E+03,	2.23E+03,	2.14E+02,	5.11E+01,
2001 ,	1.63E+04,	2.98E+04,	1.43E+04,	6.37E+03,	1.54E+03,	1.37E+03,	1.58E+03,	1.09E+03,	8.10E+01,
2002 ,	7.65E+03,	1.34E+04,	2.08E+04,	8.28E+03,	3.31E+03,	9.27E+02,	7.92E+02,	6.47E+02,	4.97E+02,
2003 ,	4.48E+03,	6.27E+03,	9.07E+03,	1.05E+04,	3.73E+03,	1.20E+03,	3.34E+02,	1.66E+02,	1.56E+02,
2004 ,	7.18E+03,	3.67E+03,	4.52E+03,	5.50E+03,	4.44E+03,	1.31E+03,	4.05E+02,	1.13E+02,	5.38E+01,
2005 ,	8.48E+03,	5.87E+03,	2.91E+03,	3.07E+03,	3.36E+03,	1.73E+03,	4.07E+02,	1.14E+02,	3.36E+01,
2006 ,	5.70E+03,	6.94E+03,	4.36E+03,	1.85E+03,	1.72E+03,	1.73E+03,	6.72E+02,	1.49E+02,	5.66E+01,
2007 ,	4.68E+03,	4.66E+03,	4.61E+03,	2.52E+03,	1.06E+03,	7.71E+02,	6.49E+02,	2.29E+02,	4.86E+01,
2008 ,	1.38E+04,	3.83E+03,	3.33E+03,	2.59E+03,	1.36E+03,	5.65E+02,	3.53E+02,	2.85E+02,	1.05E+02,

Estimated population abundance at 1st Jan 2009

, 0.00E+00, 1.13E+04, 2.77E+03, 1.74E+03, 1.10E+03, 5.56E+02, 2.19E+02, 8.42E+01, 3.01E+01,

Taper weighted geometric mean of the VPA populations:

, 1.59E+04, 1.31E+04, 9.94E+03, 6.27E+03, 3.44E+03, 1.69E+03, 7.69E+02, 3.10E+02, 1.26E+02,

Standard error of the weighted Log(VPA populations) :

, .6362, .6360, .6081, .5857, .5676, .5795, .6122, .6907, .8081,

1

Log catchability residuals.

Fleet : SUMMER SURVEY

Age ,	1993,	1994,	1995,	1996,	1997,	1998
1 ,	No data for this fleet at this age					
2 ,	99.99,	99.99,	99.99,	-.31,	.06,	.20
3 ,	99.99,	99.99,	99.99,	.18,	-.17,	-.54
4 ,	99.99,	99.99,	99.99,	.28,	.39,	-.50
5 ,	99.99,	99.99,	99.99,	.74,	.01,	.31
6 ,	99.99,	99.99,	99.99,	.28,	-.09,	.71
7 ,	99.99,	99.99,	99.99,	.39,	.05,	-.32
8 ,	99.99,	99.99,	99.99,	-.13,	-.23,	.12

Age ,	1999,	2000,	2001,	2002,	2003,	2004,	2005,	2006,	2007,	2008
1 ,	No data for this fleet at this age									
2 ,	-1.02,	-.02,	.51,	.94,	-.22,	.46,	.38,	.74,	-.34,	-1.37
3 ,	.57,	-.37,	.12,	.65,	-.32,	.09,	.44,	.03,	-.43,	-.25
4 ,	-.04,	.15,	.18,	.18,	.18,	-.13,	.29,	-.13,	-.51,	-.34
5 ,	-.62,	-.71,	-.04,	.18,	-.27,	.49,	.31,	-.25,	-.43,	.29
6 ,	.20,	-.53,	-.47,	-.23,	-.63,	.36,	.73,	-.33,	-.30,	.30
7 ,	.62,	.10,	-.20,	-.30,	-1.30,	.14,	.55,	-.06,	-.67,	-.03
8 ,	.39,	-.23,	-.05,	-.36,	-.96,	.25,	.46,	.01,	-.56,	.06

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

Age ,	2,	3,	4,	5,	6,	7,	8
Mean Log q,	-7.7358,	-6.8208,	-6.4743,	-6.2326,	-6.2405,	-6.2405,	-6.2405,
S.E(Log q),	.6631,	.3880,	.3020,	.4400,	.4583,	.5181,	.4014,

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
2,	.84,	.630,	7.94,	.59,	13,	.57,	-7.74,
3,	.92,	.586,	6.99,	.82,	13,	.37,	-6.82,
4,	.83,	2.012,	6.83,	.93,	13,	.22,	-6.47,
5,	.85,	.968,	6.50,	.79,	13,	.37,	-6.23,
6,	.86,	.756,	6.40,	.71,	13,	.40,	-6.24,
7,	.82,	.880,	6.35,	.69,	13,	.42,	-6.32,
8,	1.21,	-1.017,	6.52,	.68,	13,	.47,	-6.33,

1

Fleet : SPRING SURVEY (shift

Age	1993,	1994,	1995,	1996,	1997,	1998
1,	-.04,	-.36,	.26,	-.52,	-.61,	.45
2,	-.83,	-.87,	.26,	-.02,	-.12,	.43
3,	-.57,	.02,	.08,	.04,	-.10,	.15
4,	-.52,	.02,	.58,	-.02,	.23,	-.17
5,	-.58,	.77,	.37,	-.12,	.27,	.19
6,	-.56,	.85,	.48,	-.11,	-.08,	.23
7,	-.37,	.44,	.09,	-.18,	-.27,	-.29
8,	-4.70,	.69,	.11,	-1.61,	.80,	-.07

Age	1999,	2000,	2001,	2002,	2003,	2004,	2005,	2006,	2007,	2008
1,	-.48,	.22,	.09,	-.62,	1.60,	.75,	-.23,	-1.00,	.49,	.00
2,	.33,	.53,	.76,	-.17,	.06,	.38,	-1.04,	-.53,	.27,	.58
3,	.11,	.25,	.34,	.54,	-.52,	.41,	-.98,	-.80,	.20,	.84
4,	-.45,	-.09,	.37,	.11,	-.19,	.27,	-.48,	-.83,	.02,	1.16
5,	-.54,	-.31,	.09,	.33,	-.37,	.39,	-.69,	-.42,	-.23,	.85
6,	.36,	.34,	.10,	-.33,	-.49,	.26,	-.65,	-.51,	-.13,	.24
7,	.11,	-.79,	.03,	.07,	-.31,	-.78,	-.95,	-.48,	-.66,	.33
8,	-1.46,	-1.70,	-.01,	-.13,	-.19,	-.86,	-1.33,	.10,	-.72,	1.08

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,	-8.3631,	-6.9839,	-6.0587,	-5.7713,	-5.7691,	-5.9901,	-5.9901,	-5.9901,
S.E(Log q),	.6383,	.5565,	.4916,	.4785,	.4775,	.4281,	.4861,	1.5290,

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,	1.16,	-.619,	8.19,	.52,	16,	.76,	-8.36,
2,	.98,	.127,	7.04,	.66,	16,	.56,	-6.98,
3,	.88,	.730,	6.40,	.74,	16,	.44,	-6.06,
4,	.87,	.802,	6.13,	.74,	16,	.42,	-5.77,
5,	.89,	.633,	6.00,	.72,	16,	.44,	-5.77,
6,	1.02,	-.085,	5.97,	.64,	16,	.45,	-5.99,
7,	.93,	.444,	6.26,	.72,	16,	.39,	-6.24,
8,	.54,	1.887,	6.08,	.55,	16,	.69,	-6.62,

1

Terminal year survivor and F summaries :

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

Year class = 2007

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
SUMMER SURVEY	1.	.000,	.000,	.00,	0,	.000,	.000
SPRING SURVEY (shift,	11321.,	.658,	.000,	.00,	1,	1.000,	.000
F shrinkage mean	0.,	2.00,,,,				.000,	.000

Weighted prediction :

Survivors,	Int,	Ext,	N,	Var,	F
at end of year,	s.e,	s.e,	,	Ratio,	
11321.,	.66,	.00,	1,	.000,	.000

1

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

Year class = 2006

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
SUMMER SURVEY	702.,	.688,	.000,	.00,	1,	.273,	.427
SPRING SURVEY (shift,	4740.,	.432,	.044,	.10,	2,	.691,	.076
F shrinkage mean	2915.,	2.00,,,,				.037,	.121

Weighted prediction :

Survivors,	Int,	Ext,	N,	Var,	F
at end of year,	s.e,	s.e,	,	Ratio,	
2766.,	.36,	.49,	4,	1.355,	.127

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

Year class = 2005

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
SUMMER SURVEY	1324.,	.348,	.035,	.10,	2,	.472,	.558
SPRING SURVEY (shift,	2184.,	.330,	.511,	1.55,	3,	.505,	.374
F shrinkage mean	2885.,	2.00,,,,				.023,	.295

Weighted prediction :

Survivors,	Int,	Ext,	N,	Var,	F
at end of year,	s.e,	s.e,	,	Ratio,	
1736.,	.24,	.26,	6,	1.081,	.451

1

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

Year class = 2004

Fleet,	Estimated,	Int,	Ext,	Var,	N,	Scaled,	Estimated
,	Survivors,	s.e,	s.e,	Ratio,	, Weights,	F	
SUMMER SURVEY	833.,	.238,	.209,	.88,	3,	.603,	.799
SPRING SURVEY (shift,	1685.,	.282,	.392,	1.39,	4,	.378,	.473
F shrinkage mean	1937.,	2.00,,,,				.019,	.423

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
1105.,	.18,	.22,	8,	1.221,	.654

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

Year class = 2003

Fleet, ,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, ,	Scaled, Weights,	Estimated F
SUMMER SURVEY ,	501.,	.217,	.214,	.99,	4,	.573,	.749
SPRING SURVEY (shift,	637.,	.255,	.368,	1.44,	5,	.409,	.630
F shrinkage mean ,	648.,	2.00,,,,				.019,	.622

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
556.,	.17,	.19,	10,	1.124,	.696

1

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

Year class = 2002

Fleet, ,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, ,	Scaled, Weights,	Estimated F
SUMMER SURVEY ,	229.,	.205,	.163,	.79,	5,	.529,	.724
SPRING SURVEY (shift,	209.,	.231,	.284,	1.23,	6,	.452,	.772
F shrinkage mean ,	198.,	2.00,,,,				.019,	.802

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
219.,	.16,	.15,	12,	.954,	.747

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

Year class = 2001

Fleet, ,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, ,	Scaled, Weights,	Estimated F
SUMMER SURVEY ,	80.,	.224,	.095,	.42,	6,	.491,	1.270
SPRING SURVEY (shift,	85.,	.242,	.135,	.56,	7,	.471,	1.228
F shrinkage mean ,	150.,	2.00,,,,				.039,	.859

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
84.,	.18,	.08,	14,	.469,	1.233

1

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

Year class = 2000

Fleet, ,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, ,	Scaled, Weights,	Estimated F
SUMMER SURVEY ,	27.,	.240,	.129,	.54,	7,	.599,	2.142
SPRING SURVEY (shift,	21.,	.256,	.186,	.73,	8,	.298,	2.384
F shrinkage mean ,	167.,	2.00,,,,				.103,	.796

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
30.,	.26,	.19,	16,	.711,	2.049

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

Year class = 1999

Fleet, ,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, , Weights,	Estimated F
SUMMER SURVEY	9.,	.278,	.187,	.67,	7, .565,	2.182
SPRING SURVEY (shift,	8.,	.296,	.147,	.50,	8, .239,	2.312
F shrinkage mean	38.,	2.00,,,,			.196,	1.088

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
12.,	.43,	.19,	16,	.451,	1.975

Table 4.6.2. Faroe Plateau (subdivision Vb1) COD. Fishing mortality at age.

YEAR	2	3	4	5	6	7	8	9	10+	FBAR 3-7
1961	0.3346	0.5141	0.4986	0.5737	0.4863	0.9566	0.8116	0.6715	0.6715	0.6059
1962	0.2701	0.4982	0.4838	0.7076	0.5569	0.3662	0.6826	0.5641	0.5641	0.5226
1963	0.2534	0.4138	0.5172	0.5124	0.5405	0.4879	0.3269	0.4806	0.4806	0.4944
1964	0.1086	0.2997	0.4523	0.5229	0.5659	0.6677	0.3531	0.5164	0.5164	0.5017
1965	0.1209	0.2518	0.4498	0.5622	0.6604	0.5305	0.4345	0.5318	0.5318	0.4909
1966	0.0829	0.1969	0.2552	0.4499	0.5016	0.968	0.852	0.6106	0.6106	0.4743
1967	0.0789	0.2389	0.2687	0.3442	0.5779	0.5203	1.0438	0.5556	0.5556	0.39
1968	0.101	0.2318	0.3949	0.5339	0.4472	0.7132	0.3331	0.4882	0.4882	0.4642
1969	0.1099	0.3063	0.3806	0.418	0.5709	0.5118	0.8457	0.5499	0.5499	0.4375
1970	0.053	0.2081	0.3654	0.3409	0.3709	0.6559	0.4208	0.4339	0.4339	0.3882
1971	0.0309	0.1337	0.2225	0.3845	0.5572	0.4651	0.7528	0.48	0.48	0.3526
1972	0.0464	0.1476	0.207	0.2497	0.6058	0.4686	0.2464	0.3578	0.3578	0.3358
1973	0.0657	0.2322	0.3048	0.2813	0.2526	0.3722	0.3259	0.3091	0.3091	0.2886
1974	0.0816	0.1568	0.2046	0.2953	0.3797	0.533	0.3052	0.3457	0.3457	0.3139
1975	0.0774	0.3193	0.4359	0.4134	0.4544	0.3504	0.4485	0.4235	0.4235	0.3947
1976	0.0933	0.1723	0.3665	0.5568	0.5167	0.7619	0.6429	0.5738	0.5738	0.4749
1977	0.0481	0.3036	0.4748	0.7532	0.7333	1.1138	0.7776	0.7783	0.7783	0.6757
1978	0.0588	0.1896	0.4291	0.4289	0.4851	0.5968	0.5674	0.5054	0.5054	0.4259
1979	0.0433	0.2623	0.4309	0.5049	0.4906	0.448	0.6903	0.517	0.517	0.4273
1980	0.0544	0.2391	0.3695	0.4337	0.5182	0.4119	0.6437	0.479	0.479	0.3945
1981	0.0523	0.2877	0.3409	0.4369	0.5644	0.694	0.5015	0.5115	0.5115	0.4648
1982	0.0586	0.2227	0.3602	0.3887	0.4047	0.6926	0.5526	0.4834	0.4834	0.4138
1983	0.0992	0.4673	0.5585	0.6411	0.7836	1.078	0.9417	0.8088	0.8088	0.7057
1984	0.1073	0.3712	0.5791	0.6609	0.4534	0.4761	0.4792	0.5341	0.5341	0.5082
1985	0.0658	0.3545	0.5077	0.6135	0.9236	1.1084	1.3206	0.9044	0.9044	0.7015
1986	0.0247	0.3547	0.6229	0.7035	0.8259	0.8403	0.5411	0.7135	0.7135	0.6694
1987	0.0291	0.221	0.4758	0.4855	0.5562	0.4899	0.6227	0.5303	0.5303	0.4457
1988	0.0669	0.3535	0.5644	0.5498	0.7749	0.7999	0.8654	0.7177	0.7177	0.6085
1989	0.1681	0.4414	0.763	0.7633	0.9646	1.0623	1.1062	0.9422	0.9422	0.7989
1990	0.0755	0.3351	0.6286	0.7867	0.7015	0.8401	1.1236	0.8245	0.8245	0.6584
1991	0.0323	0.1957	0.4577	0.5957	0.733	0.5736	0.7106	0.6196	0.6196	0.5111
1992	0.02	0.0997	0.3185	0.3569	0.632	0.8564	0.4357	0.5241	0.5241	0.4527
1993	0.0132	0.1017	0.186	0.2462	0.2097	0.435	0.5339	0.3241	0.3241	0.2357
1994	0.0255	0.1125	0.1901	0.2488	0.2132	0.1654	0.3153	0.9179	0.9179	0.186
1995	0.0699	0.1616	0.463	0.2794	0.3589	0.3202	0.2464	0.7148	0.7148	0.3166
1996	0.0306	0.192	0.4518	0.8036	0.9003	1.1267	0.8538	1.1294	1.1294	0.6949
1997	0.0348	0.1487	0.4093	0.8319	1.0271	1.3741	1.2967	0.8473	0.8473	0.7582
1998	0.0885	0.1758	0.2727	0.6409	1.0486	0.7551	1.0959	0.7647	0.7647	0.5786
1999	0.0955	0.2834	0.2901	0.3176	0.6442	1.0499	0.7156	0.4315	0.4315	0.517
2000	0.1245	0.3181	0.3786	0.2474	0.3258	0.5136	0.7709	0.1643	0.1643	0.3567
2001	0.1568	0.344	0.4533	0.3062	0.3501	0.6953	0.585	0.6757	0.6757	0.4298
2002	0.1885	0.488	0.5976	0.8144	0.822	1.3612	1.2226	1.034	1.034	0.8166
2003	0.1274	0.3003	0.6584	0.8459	0.8877	0.8831	0.9286	1.6866	1.6866	0.7151
2004	0.0306	0.1852	0.2929	0.7422	0.9689	1.0636	1.0111	1.9879	1.9879	0.6506
2005	0.0975	0.2546	0.379	0.4608	0.7457	0.8063	0.5038	0.9789	0.9789	0.5293
2006	0.2085	0.3508	0.3545	0.6035	0.7827	0.8764	0.9193	0.2416	0.2416	0.5936
2007	0.137	0.3757	0.4136	0.4306	0.5825	0.6217	0.578	0.6489	0.6489	0.4848
2008	0.1267	0.4513	0.6535	0.6963	0.7472	1.2325	2.0487	1.975	1.975	0.7562

Table 4.6.3. Faroe Plateau (subdivision Vb1) COD. Stock number at age.

YEAR	2	3	4	5	6	7	8	9	10+	TOTAL
1961	12019	7385	3747	2699	666	668	155	66	0	52630
1962	20654	7042	3616	1863	1245	335	210	56	0	59804
1963	20290	12907	3503	1825	752	584	190	87	0	66807
1964	21834	12893	6986	1710	895	358	294	112	0	55183
1965	8269	16037	7823	3639	830	416	151	169	0	60009
1966	18566	5999	10207	4085	1698	351	200	80	0	69829
1967	23451	13990	4034	6475	2133	842	109	70	0	72579
1968	17582	17744	9020	2525	3757	980	410	31	0	63439
1969	9325	13012	11522	4976	1212	1967	393	240	0	53161
1970	8608	6840	7843	6447	2682	561	965	138	0	48654
1971	11928	6684	4548	4456	3754	1516	238	519	0	59683
1972	21320	9469	4788	2981	2483	1760	779	92	0	59029
1973	12573	16664	6689	3187	1901	1109	902	499	400	81153
1974	30480	9639	10816	4037	1969	1209	626	533	342	106456
1975	38319	23000	6747	7217	2460	1103	581	378	476	102968
1976	18575	29035	13683	3572	3908	1279	636	304	466	83665
1977	9995	13853	20010	7765	1676	1909	489	274	18	69116
1978	10748	7799	8372	10190	2993	659	513	184	154	59930
1979	14997	8298	5282	4463	5433	1509	297	238	103	69423
1980	23582	11759	5226	2811	2206	2723	789	122	52	66369
1981	14000	18286	7579	2957	1491	1076	1477	339	150	74382
1982	22127	10878	11228	4413	1564	694	440	732	348	83152
1983	25157	17086	7128	6412	2449	854	284	207	200	118106
1984	47755	18653	8767	3339	2765	916	238	91	174	103844
1985	17314	35120	10535	4022	1411	1439	466	121	146	82186
1986	9506	13273	20173	5192	1783	459	389	102	81	63054
1987	9904	7593	7622	8859	2104	639	162	185	69	47762
1988	8699	7877	4984	3878	4464	988	321	71	53	50850
1989	15979	6661	4529	2321	1832	1684	363	110	16	38007
1990	3694	11058	3508	1729	886	572	477	98	50	30236
1991	6685	2805	6476	1532	645	360	202	127	57	32836
1992	11421	5299	1888	3355	691	254	166	81	91	35618
1993	10129	9166	3927	1124	1922	301	88	88	99	57623
1994	25200	8185	6778	2669	720	1276	159	42	29	97332
1995	42798	20113	5988	4589	1704	476	886	95	105	92477
1996	12874	32674	14010	3086	2841	975	283	567	75	75271
1997	6458	10222	22078	7301	1131	945	259	99	229	55970
1998	5934	5106	7213	12005	2601	332	196	58	51	51052
1999	14373	4447	3507	4496	5178	746	128	54	22	57063
2000	19743	10696	2742	2148	2679	2226	214	51	7	76882
2001	29783	14272	6371	1538	1373	1584	1090	81	13	72438
2002	13372	20844	8283	3315	927	792	647	497	12	56343
2003	6266	9067	10476	3731	1202	334	166	156	26	35902
2004	3666	4516	5498	4440	1311	405	113	54	46	27225
2005	5875	2911	3072	3359	1731	407	114	34	52	26032
2006	6940	4363	1848	1722	1735	672	149	57	15	23195
2007	4663	4612	2515	1061	771	649	229	49	7	19240
2008	3835	3329	2594	1362	565	353	285	105	35	26290
2009	11321	2766	1736	1105	556	219	84	30	16	17833

Table 4.6.4. Faroe Plateau (subdivision Vb1) COD. Summary table (1961-2007) and results from the short term prediction (2008-2010) are shown in bold.

	RECRUITS	TOTALBIO	TOTSPBIO	LANDINGS	YIELD/SSB	FBAR 3- 7
Age 2						
1961	12019	65428	46439	21598	0.4651	0.6059
1962	20654	68225	43326	20967	0.4839	0.5226
1963	20290	77602	49054	22215	0.4529	0.4944
1964	21834	84666	55362	21078	0.3807	0.5017
1965	8269	75043	57057	24212	0.4244	0.4909
1966	18566	83919	60629	20418	0.3368	0.4743
1967	23451	105289	73934	23562	0.3187	0.39
1968	17582	110433	82484	29930	0.3629	0.4642
1969	9325	105537	83487	32371	0.3877	0.4375
1970	8608	98398	82035	24183	0.2948	0.3882
1971	11928	78218	63308	23010	0.3635	0.3526
1972	21320	76439	57180	18727	0.3275	0.3358
1973	12573	110713	83547	22228	0.2661	0.2886
1974	30480	139266	98434	24581	0.2497	0.3139
1975	38319	153663	109566	36775	0.3356	0.3947
1976	18575	161260	123077	39799	0.3234	0.4749
1977	9995	136211	112057	34927	0.3117	0.6757
1978	10748	96227	78497	26585	0.3387	0.4259
1979	14997	85112	66722	23112	0.3464	0.4273
1980	23582	85037	58886	20513	0.3483	0.3945
1981	14000	88410	63561	22963	0.3613	0.4648
1982	22127	98960	67031	21489	0.3206	0.4138
1983	25157	123246	78539	38133	0.4855	0.7057
1984	47755	152133	96761	36979	0.3822	0.5082
1985	17314	131206	84768	39484	0.4658	0.7015
1986	9506	99230	73664	34595	0.4696	0.6694
1987	9904	78306	62198	21391	0.3439	0.4457
1988	8699	66088	52070	23182	0.4452	0.6085
1989	15979	58743	38319	22068	0.5759	0.7989
1990	3694	38036	29045	13487	0.4643	0.6584
1991	6685	28689	21060	8750	0.4155	0.5111
1992	11421	35741	20749	6396	0.3083	0.4527
1993	10129	51159	33114	6107	0.1844	0.2357
1994	25200	84043	42583	9046	0.2124	0.186
1995	42798	144675	54367	23045	0.4239	0.3166
1996	12874	142748	85325	40422	0.4737	0.6949
1997	6458	97290	81986	34304	0.4184	0.7582
1998	5934	66467	56096	24005	0.4279	0.5786
1999	14373	65378	45330	18306	0.4038	0.517
2000	19743	91541	46517	21033	0.4522	0.3567
2001	29783	110427	59394	28183	0.4745	0.4298
2002	13372	98928	56355	38457	0.6824	0.8166
2003	6266	60892	40718	24501	0.6017	0.7151
2004	3666	37503	27434	13178	0.4803	0.6506
2005	5875	32220	23998	9906	0.4128	0.5293
2006	6940	30084	21328	10480	0.4914	0.5936
2007	4663	26480	17372	8009	0.461	0.4848
2008	3835	25286	19063	10523	0.552	0.7562
2009	11321	30745	15877	8615	0.5426	0.61152
2010	6527	34997	20764	10572	0.5091	0.61152
2011	6527	34257	21554			
Avg.61-08	15776	86679	60080	23317	0.4023	0.5086

Table 4.7.1. Faroe Plateau (subdivision Vb1) COD. Input to management option table.

		Stock size	
		Age	2009 Source
		2	11321 XSA-output
		3	2766 XSA-output
		4	1736 XSA-output
		5	1105 XSA-output
		6	556 XSA-output
		7	219 XSA-output
		8	84 XSA-output
		9	30 XSA-output
		10+	16 XSA-output

		Maturity		Exploitation pattern (not rescaled)			Weights			
		Observed	Av. 07-09	Av. 07-09	Av. 06-08	Av. 06-08	Av. 06-08	As 2009	As 2009	As 2009
Age	Recr.	2009	2010	2011	2009	2010	2011	2009	2010	2011
2	3835 XSA-output	0.09	0.06	0.06	0.1574	0.1574	0.1574	1.104	1.104	1.104
3	11321 XSA-output	0.61	0.62	0.62	0.3926	0.3926	0.3926	2.148	2.148	2.148
4	6527 Average R in 2005-2009	0.81	0.83	0.83	0.4739	0.4739	0.4739	2.586	2.586	2.586
5	6527 Same as YC2008	0.96	0.92	0.92	0.5768	0.5768	0.5768	2.965	2.965	2.965
6		0.94	0.96	0.96	0.7041	0.7041	0.7041	4.308	4.308	4.308
7		0.96	0.98	0.98	0.9102	0.9102	0.9102	5.689	5.689	5.689
8		1.00	1.00	1.00	1.1820	1.1820	1.1820	5.6	5.6	5.6
9		1.00	1.00	1.00	0.9552	0.9552	0.9552	9.714	9.714	9.714
10+		1.00	1.00	1.00	0.9552	0.9552	0.9552	8.557	8.557	8.557

Table 4.7.2. Faroe Plateau (subdivision Vb1) COD. Management option table.

2009					
Biomass	SSB	FMult	FBar	Landings	
30745	15877		1	0.6115	8615

2010			2011			
Biomass	SSB	FMult	FBar	Landings	Biomass	SSB
34997	20764		0	0	46506	31927
.	20764	0.1	0.0612	1300	44998	30627
.	20764	0.2	0.1223	2537	43562	29393
.	20764	0.3	0.1835	3715	42195	28222
.	20764	0.4	0.2446	4838	40894	27109
.	20764	0.5	0.3058	5908	39654	26052
.	20764	0.6	0.3669	6930	38471	25046
.	20764	0.7	0.4281	7904	37343	24089
.	20764	0.8	0.4892	8834	36267	23178
.	20764	0.9	0.5504	9723	35239	22310
.	20764	1	0.6115	10572	34257	21484
.	20764	1.1	0.6727	11383	33319	20696
.	20764	1.2	0.7338	12160	32422	19944
.	20764	1.3	0.795	12902	31563	19227
.	20764	1.4	0.8561	13613	30742	18542
.	20764	1.5	0.9173	14294	29956	17889
.	20764	1.6	0.9784	14946	29203	17264
.	20764	1.7	1.0396	15571	28482	16667
.	20764	1.8	1.1007	16170	27790	16097
.	20764	1.9	1.1619	16744	27127	15551
.	20764	2	1.223	17295	26491	15028

Input units are thousands and kg - output in tonnes

Table 4.8.1. Faroe Plateau (subdivision Vb1) COD. Input to yield per recruit calculations (long term prediction).

	Expl. pattern	Weight at age	Prop mature
	Average 2000-2008	Average 1978-2008	Average 1983-2009
Age	Not rescaled		
2	0.1331	1.0540	0.08
3	0.3409	1.5729	0.56
4	0.4646	2.2611	0.84
5	0.5719	3.0562	0.94
6	0.6903	3.8339	0.98
7	0.8949	4.8511	0.98
8	0.952	6.0742	1.00
9	1.0437	7.6450	1.00
10+	1.0437	9.5190	1.00

Table 4.2.19. Faroe Plateau (subdivision Vb1) COD. Output from yield per recruit calculations (long term prediction).

Reference point	F multiplier	Absolute F
Fbar(3-7)	1.0000	0.5925
FMax	0.4249	0.2518
F0.1	0.1955	0.1158
F35%SPR	0.2928	0.1735
Flow	0.1657	0.0982
Fmed	0.5554	0.3291
Fhigh	1.5154	0.8979

Weights in kilograms

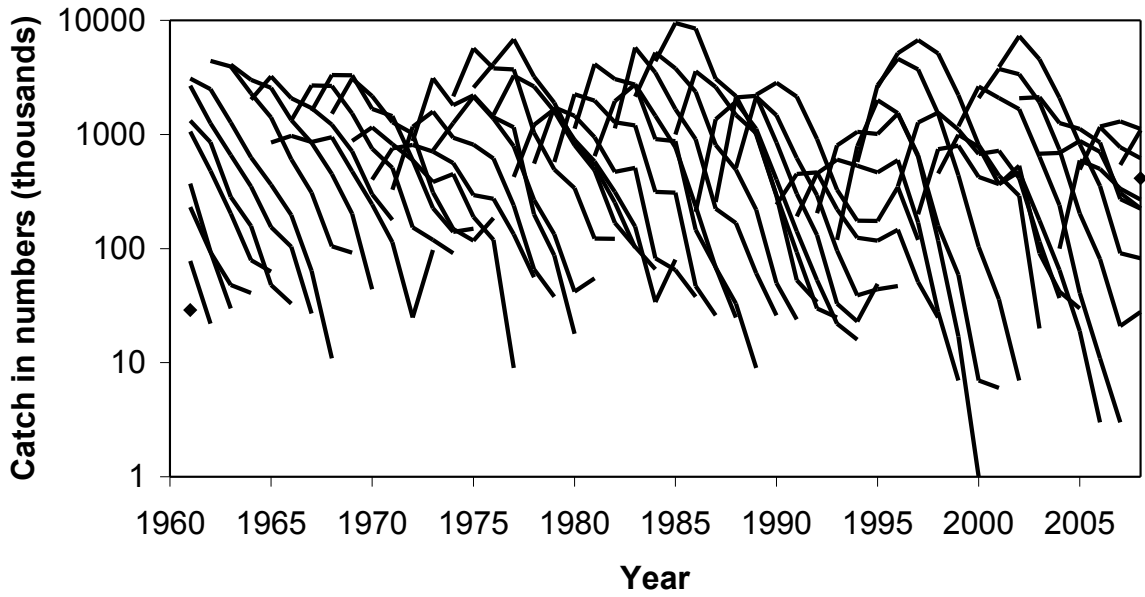


Figure 4.2.1. Faroe Plateau (subdivision VB1) COD. Catch in numbers at age shown as catch curves.

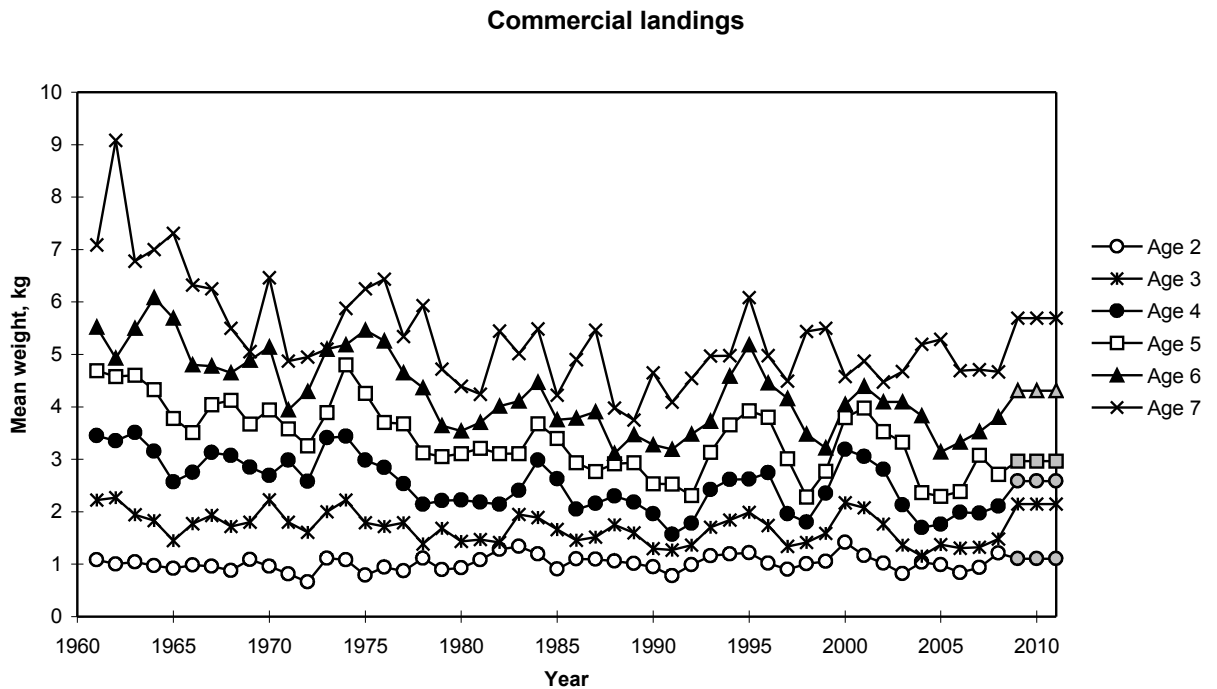


Figure 4.2.2. Faroe Plateau (subdivision VB1) COD. Mean weight at age 1961-2008. The estimated weights in 2009 are also shown. The weights in 2010 and 2011 are set to the 2009 values.

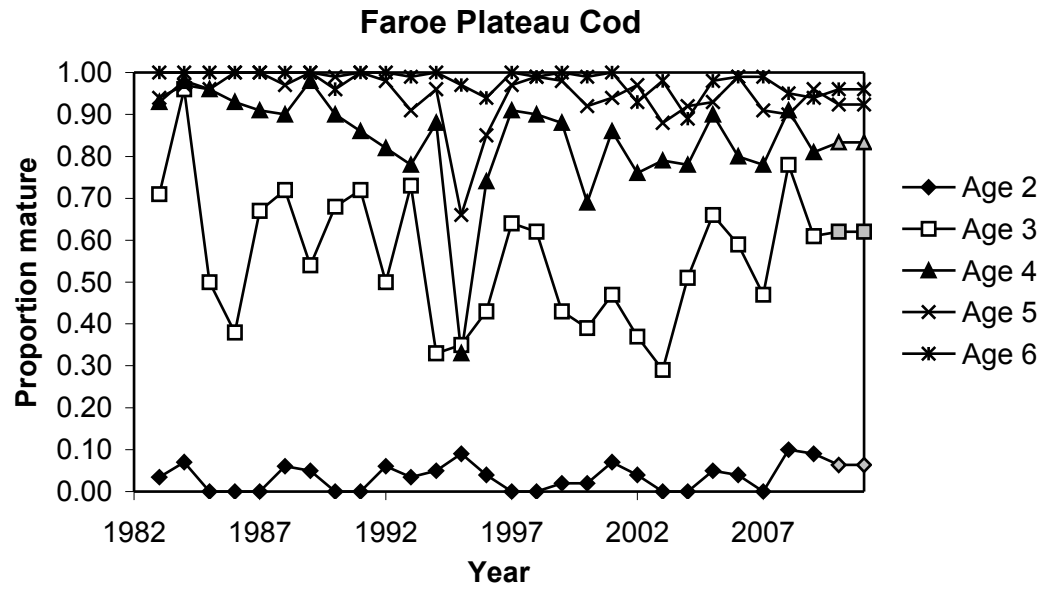


Figure 4.2.3. Faroe Plateau (subdivision VB1) COD. Proportion mature at age as observed in the spring groundfish survey. The values in 2009 and 2010 are estimated as the average of the 2006-2008 values.

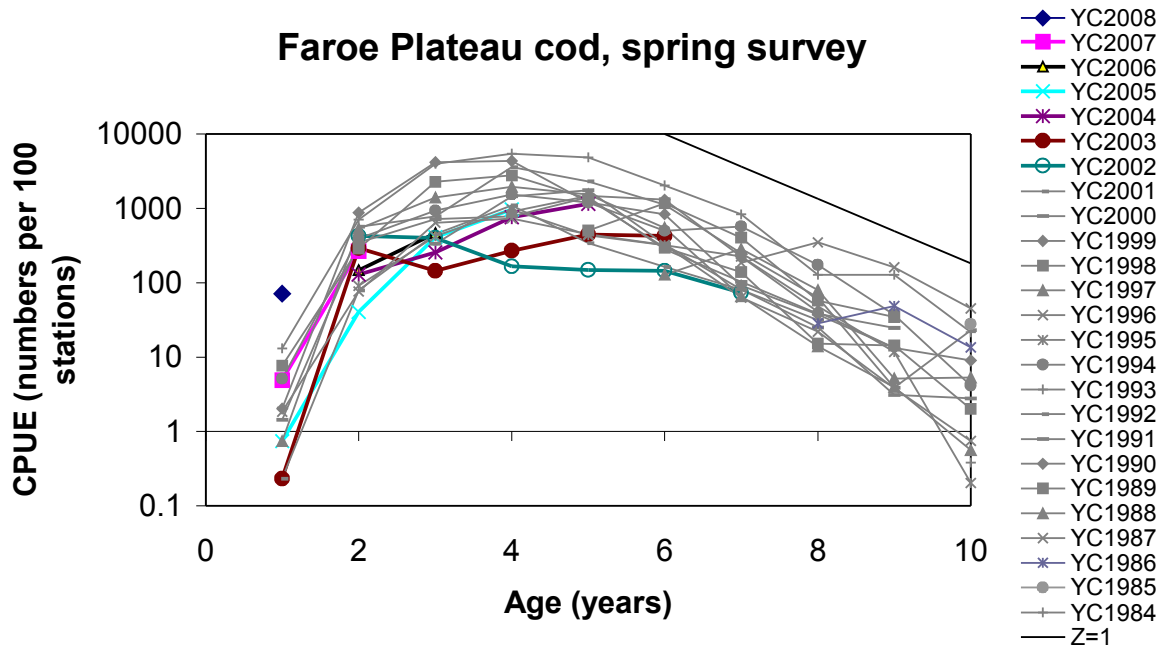


Figure 4.2.4. Faroe Plateau (subdivision VB1) COD. Catch curves from the spring groundfish survey.

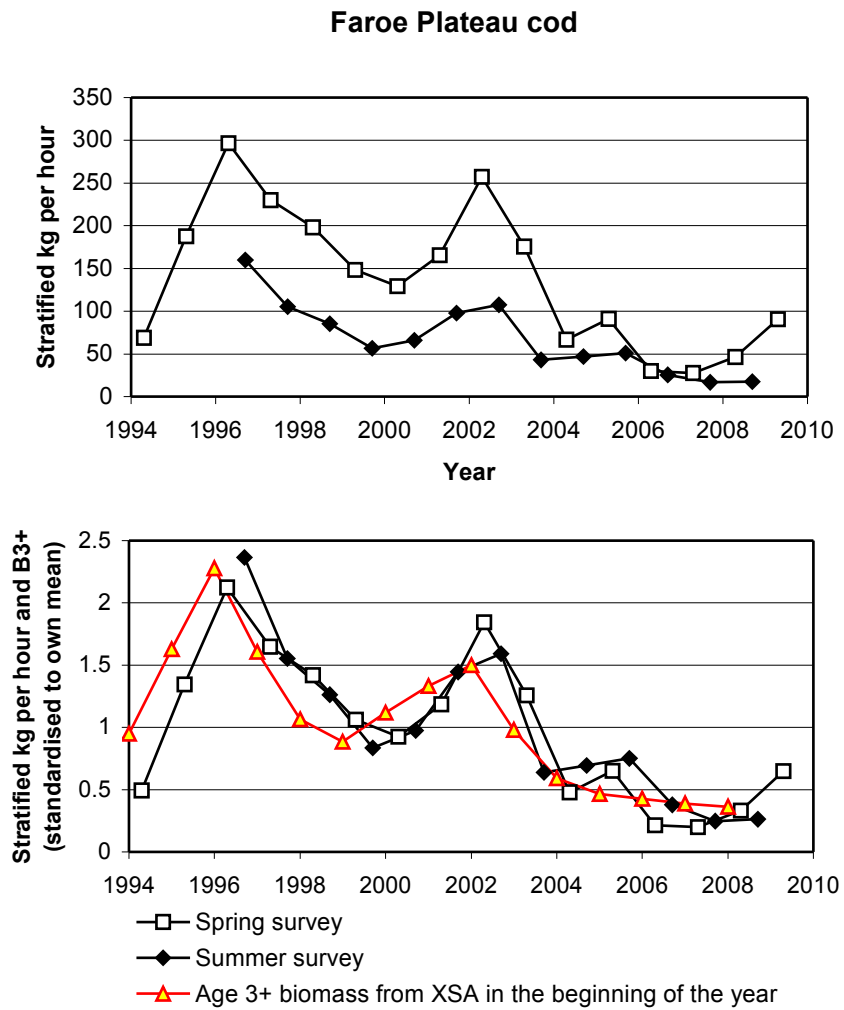


Figure 4.2.5. Faroe Plateau (subdivision VB1) COD. Stratified kg/hour in the spring and summer surveys. The age 3+ biomass obtained from the assessment is also included as an index.

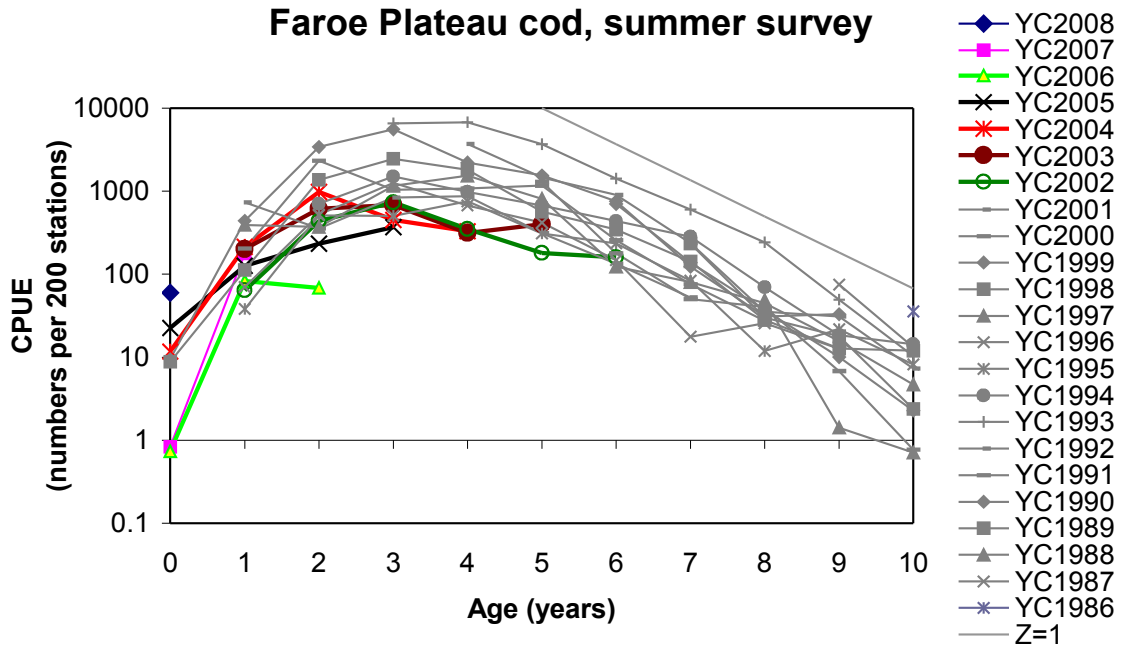


Figure 4.2.6. Faroe Plateau (subdivision VB1) COD. Catch curves from the summer groundfish survey.

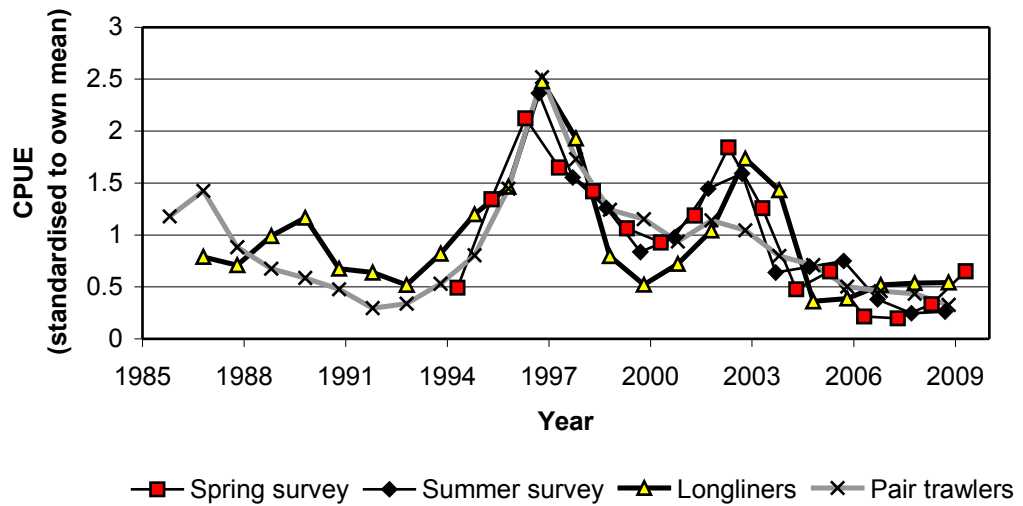
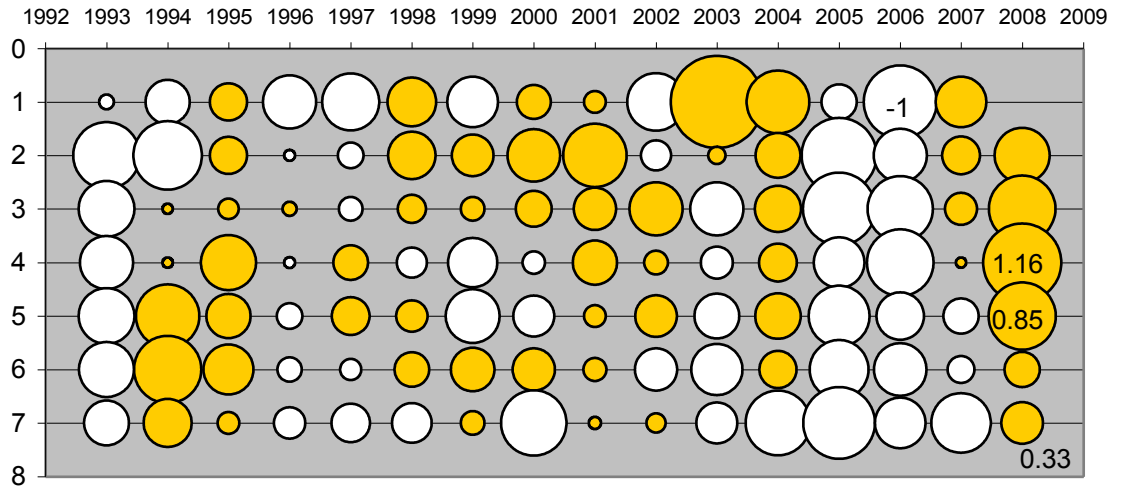


Figure 4.2.7. Faroe Plateau (subdivision VB1) COD. Standardised catch per unit effort for pair trawlers and longliners. The two surveys are shown as well.

Spring survey (shifted back to December)



Summer survey

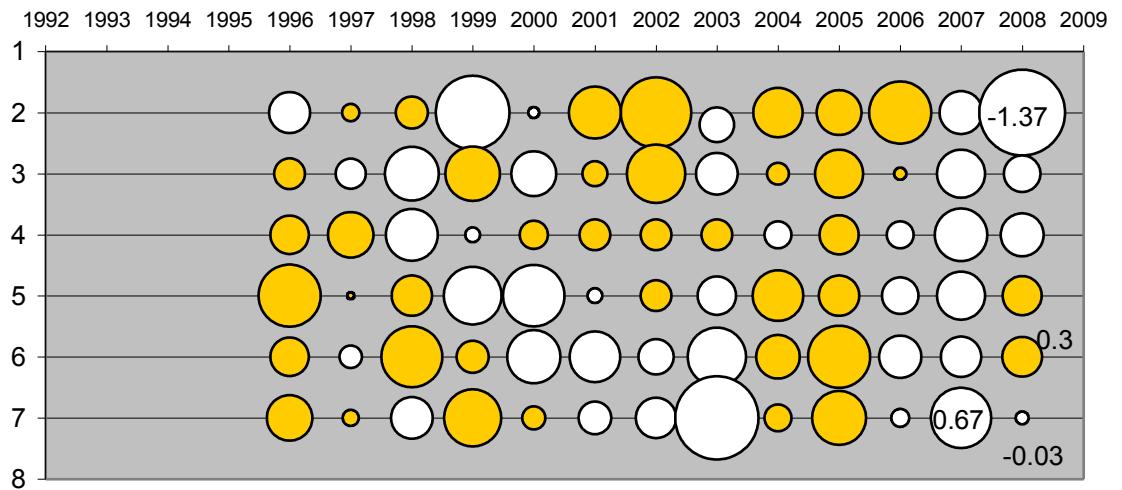


Figure 4.6.1. Faroe Plateau (subdivision VB1) COD. Log catchability residuals for the spring and summer survey. The residuals for age 8 are not presented because some values were off scale. White bubbles indicate negative residuals.

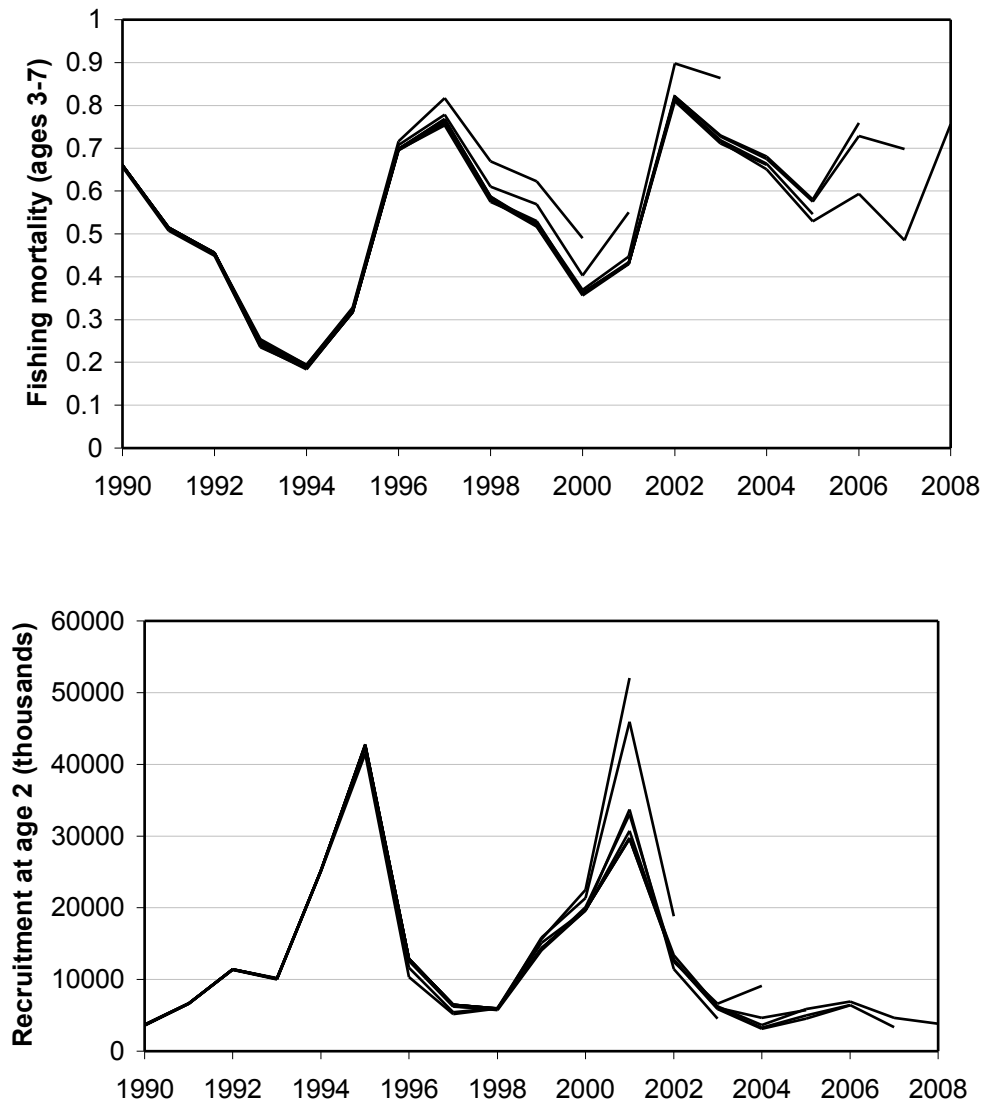


Figure 4.6.2. Faroe Plateau (subdivision VB1) COD. Results from the XSA retrospective analysis.

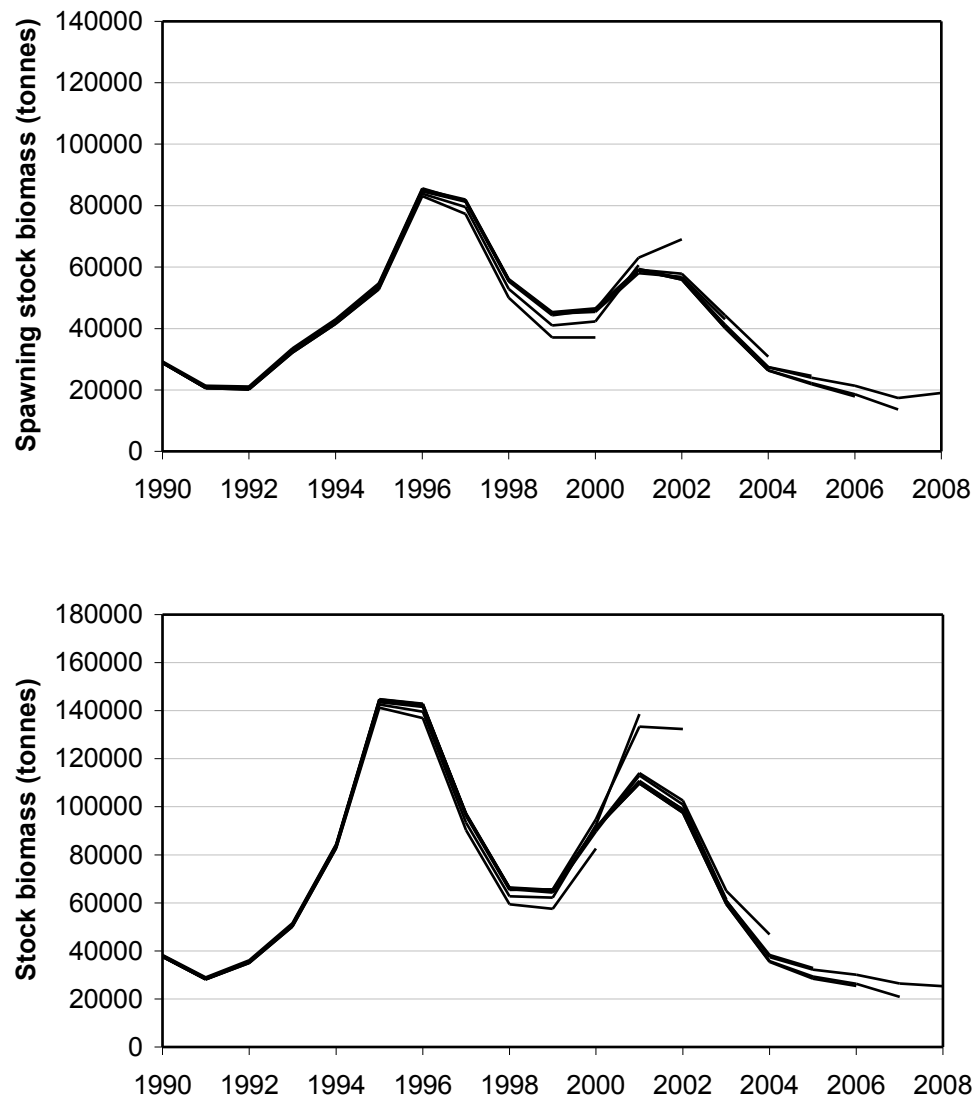


Figure 4.6.2. Faroe Plateau (subdivision VB1) COD. Results from the XSA retrospective analysis (continued).

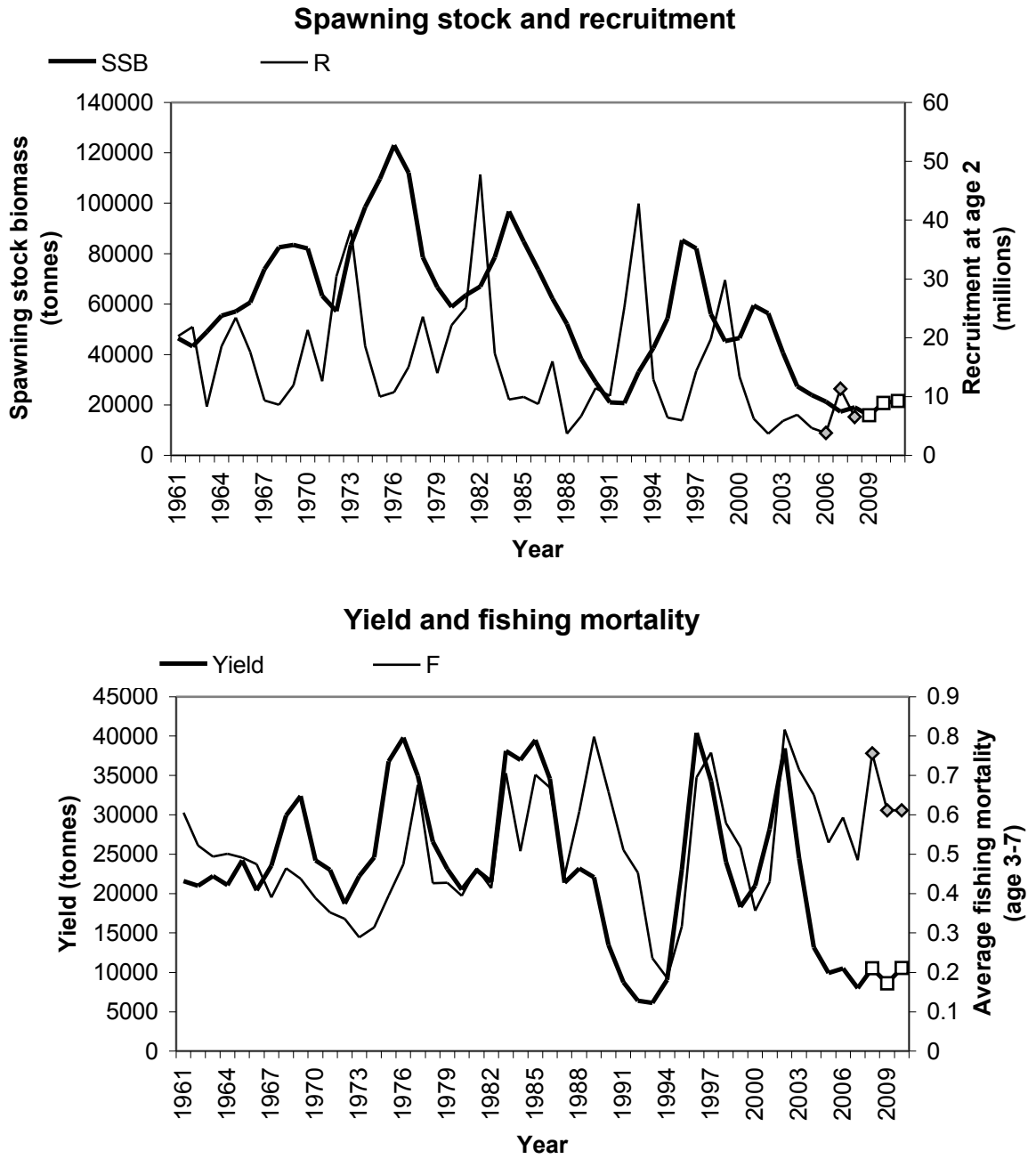


Figure 4.6.3. Faroe Plateau (subdivision VB1) COD. Yield and fishing versus year. Spawning stock biomass (SSB) and recruitment (year class) versus year. Points (white and grey) are taken from the short term projections.

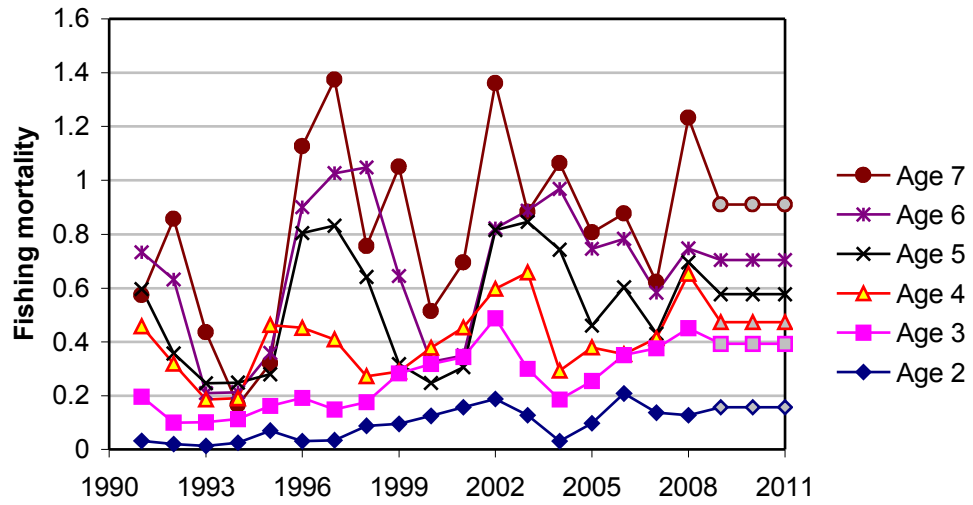


Figure 4.6.4. Faroe Plateau (subdivision VB1) COD. Fishing mortalities by age. The F-values in 2009-2011 are set to the average values in 2006-2008.

Faroe Plateau cod

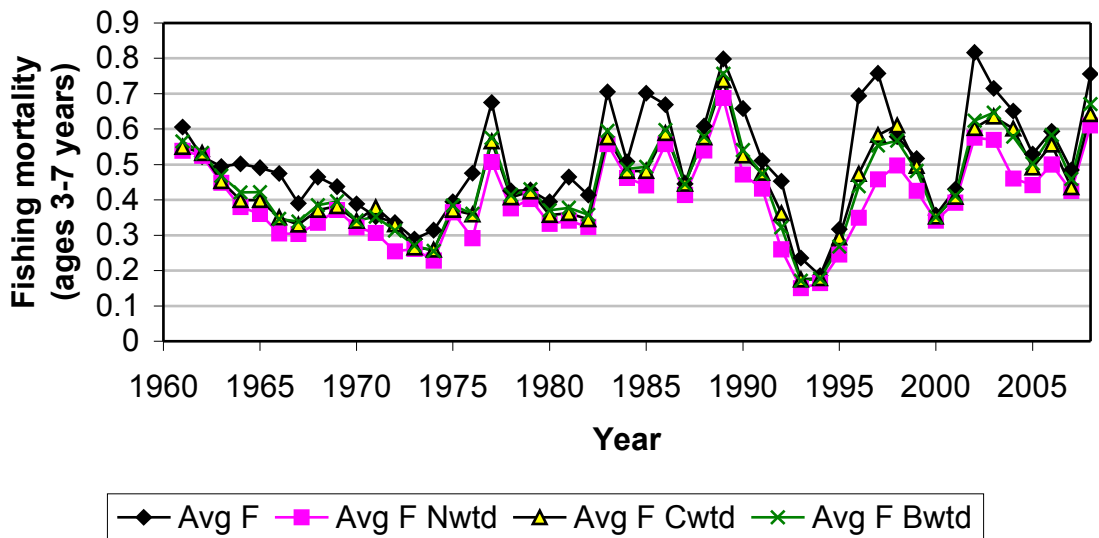


Figure 4.6.5. Faroe Plateau (subdivision VB1) COD. Different measures of fishing mortality: straight arithmetic average (Avg F), weighted by stock numbers (Nwtd), weighted by stock biomass (Bwtd) or weighted by catch (Cwtd).

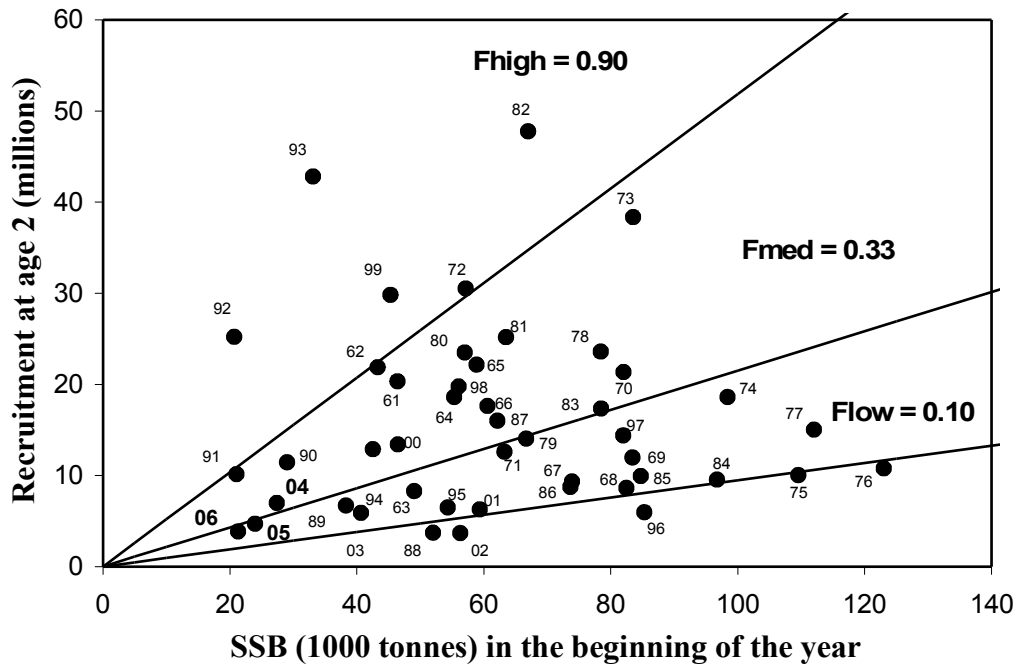


Figure 4.6.6. Faroe Plateau (subdivision VB1) COD. Spawning stock – recruitment relationship 1961-2006. Years are shown at each data point.

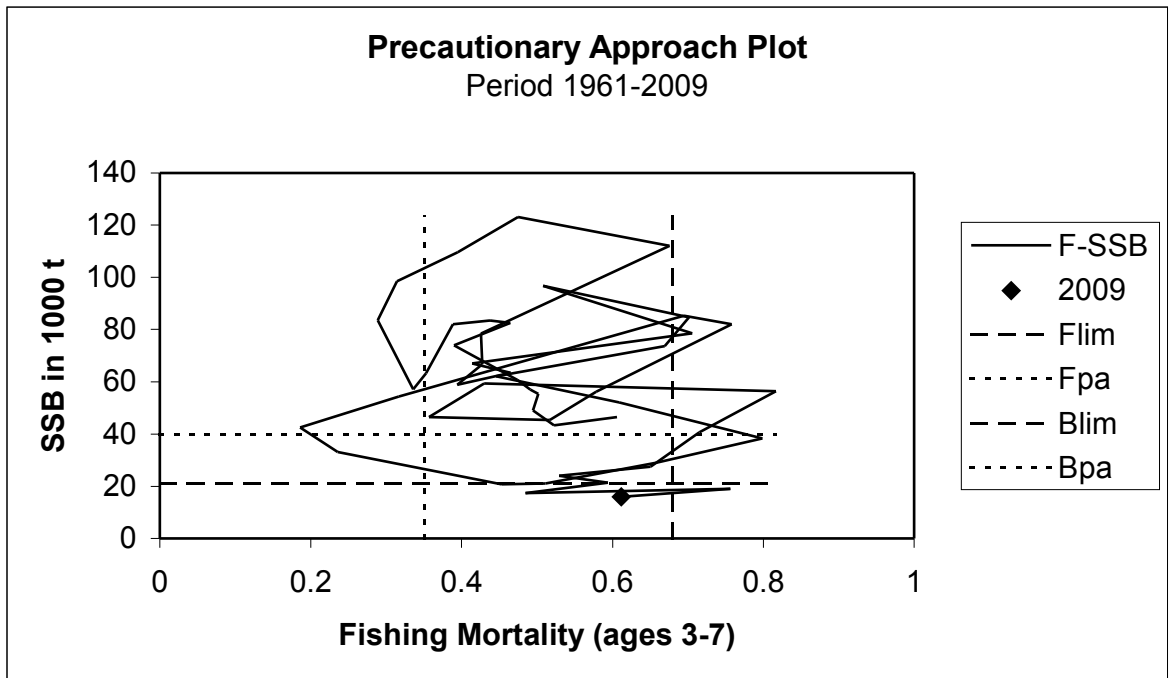


Figure 4.6.7. Faroe Plateau (subdivision VB1) COD. Spawning stock biomass versus fishing mortality 1961-2009.

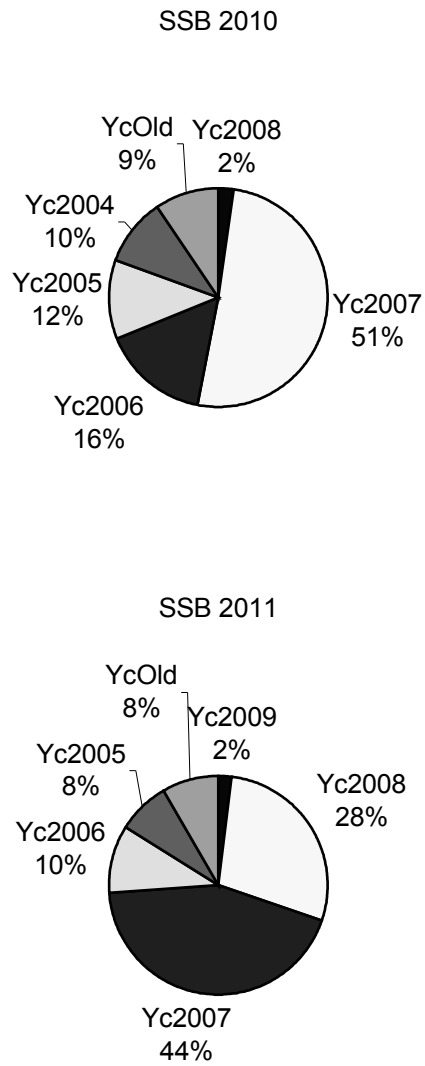
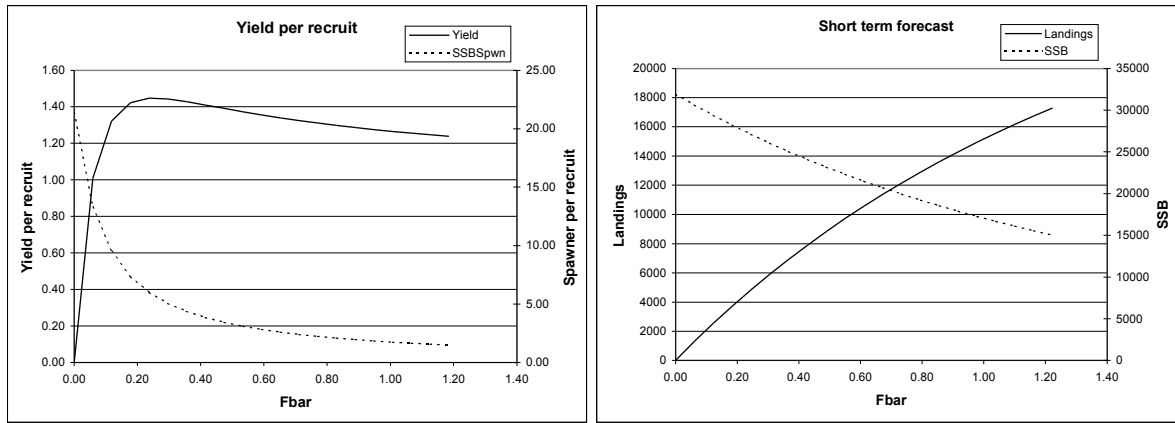


Figure 4.7.1. Contribution of various year classes to the spawning stock biomass in 2010 and 2011.



MFYPR version 1
 Run: Run2
 Time and date: 08:52 29/04/2009

Reference point	F multiplier	Absolute F
Fbar(3-7)	1.0000	0.5925
FMax	0.4249	0.2518
F0.1	0.1955	0.1158
F35%SPR	0.2928	0.1735
Flow	0.1657	0.0982
Fmed	0.5554	0.3291
Fhigh	1.5154	0.8979

Weights in kilograms

MFDP version 1
 Run: Run1
 Index file 29/4-2009
 Time and date: 08:37 29/04/2009
 Fbar age range: 3-7

Input units are thousands and kg - output in tonnes

Figure 4.8.1. Faroe Plateau (subdivision VB1) COD. Yield per recruit and spawning stock biomass (SSB) per recruit versus fishing mortality (left figure). Landings and SSB versus Fbar (3-7).

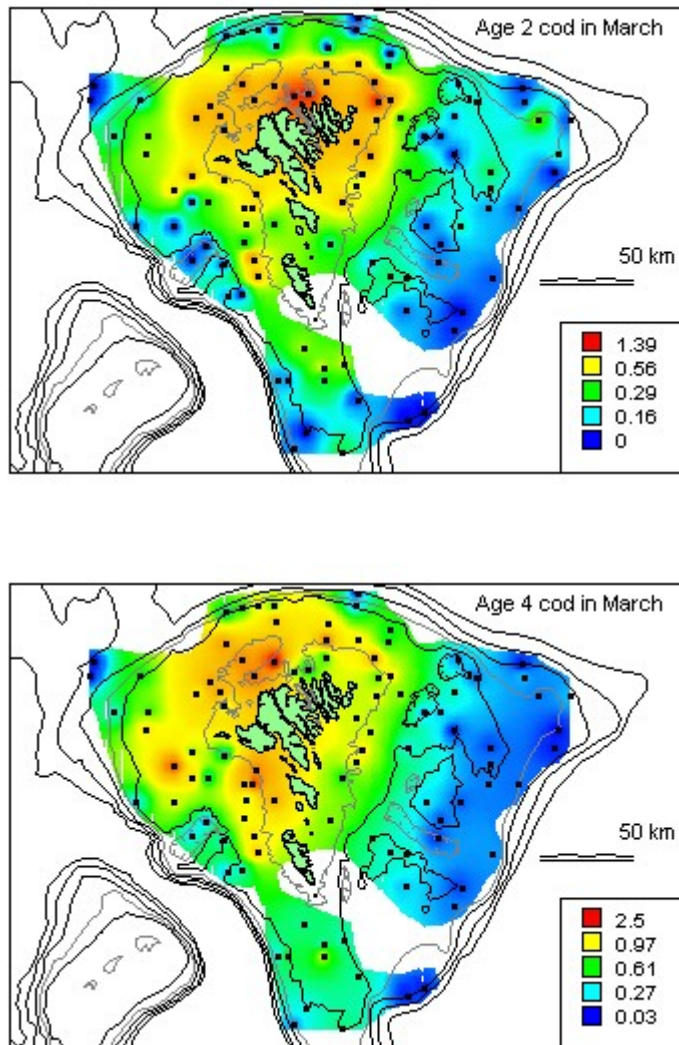


Figure 4.12.1. Mean abundance ($\log_{10}(\text{numbers}+1)$) of 2 and 4 year-old cod in March 1998-2006 as observed in the spring groundfish survey (from Steingrund et al., in prep.). 100 m depth contours are shown.

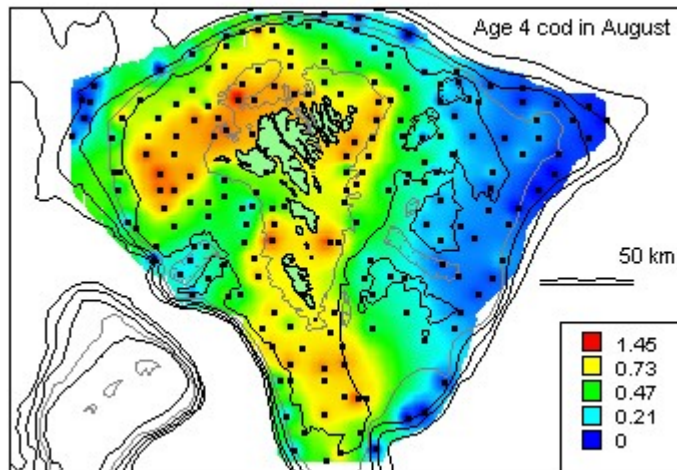
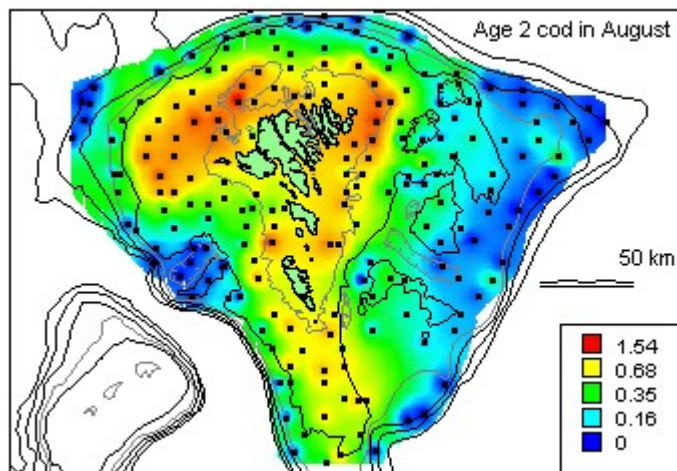


Figure 4.12.2. Mean abundance ($\log_{10}(\text{numbers}+1)$) of 2 and 4 year-old cod in August 1997-2005 as observed in the summer groundfish survey (from Steingrund et al., in prep.). 100 m depth contours are shown.