

## 4 Faroe Plateau cod

### Summary

The input data consisted of the catch-at-age matrix (ages 2-10+ years) for the period 1961-2012 and two age-disaggregated abundance indices obtained from the two Faroese groundfish surveys: the spring survey 1994-2013 (shifted back to the previous year) and the summer survey 1996-2012. The number of strata in the spring survey was reduced from 20 to 19 (to reduce the influence of one large haul) and an extremely low value for age 2 in 2012 (shifted to age 1 in 2011) was replaced by the second lowest value in the series. The maturities were obtained from the spring survey 1983-2013.

The assessment settings were the same as in the 2012 assessment. An XSA was run and tuned with the two survey indices. The fishing mortality in 2011 (average of ages 3-7 years) was estimated at 0.41, which was higher than the preliminary  $F_{msy}$  of 0.32 but lower than  $F_{lim}$  of 0.68. The total stock size (age 2+) in the beginning of 2012 was estimated at 29 000 tonnes and the spawning stock biomass at 24 000 tonnes, which was slightly above the limit biomass of 21 000 tonnes.

The short term prediction until year 2015 showed a steady state in terms of total stock biomass and a slightly decreasing spawning stock biomass to 21 000 tonnes.

The recruitment seems to be positively correlated with the total stock size of cod. It is, therefore, advised to reduce the fishing mortality so that the stock increases.

### 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 (Division Vb2), on the Faroe Plateau (Division Vb1) 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

#### 4.2.1 Trends in landings and fisheries

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 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 4.2.3).

#### 4.2.2 Catch-at-age

The catch-at-age was updated to account for a change in the nominal landings for 2011 and an error in 1990 when the catches were not correctly summed up. Landings-at-age for 2012 are provided for the Faroese fishery in Table 4.2.4. Faroese landings from most of the fleet categories were sampled (Table 4.2.5). The catch-at-age is 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 ex-

pected. This could be due to catchability for longliners depending on fish growth, causing atypical catch curves for longliners.

#### 4.2.3 Weight-at-age

Mean weight-at-age data 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 2012 showed a discrepancy of 0 %. The weights have decreased in recent years (Figure 4.2.2).

#### 4.2.4 Maturity-at-age

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 and in Figure 4.2.3. 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.

#### 4.2.5 Catch, effort and research vessel data

Fisheries independent cpue series

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), i.e., a decreasing trend after age 5. The extremely low cpue of age 2 in 2012 (shifted to age 1 in 2011) was replaced by the second lowest value in the series, to reduce the influence of this outlier on the assessment. The stratified mean catch of cod per unit effort (Figure 4.2.5) has been low in the recent years.

The other tuning series used is the Summer Groundfish Survey. The stratified mean catch of cod per unit effort has been low in recent years (Figure 4.2.5). The catch curves (Figure 4.2.6) 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.

Commercial cpue series

Three commercial cpue series (longliners and pairtrawlers) are also presented (Tables 4.2.10, 4.2.11, and 4.2.12 as well as Figure 4.2.7), although they are not used as tuning series. Note that the small boats (0-25 GRT) operating with lonlines and jigging reels close to land have had a relatively higher cpue in recent years compared with the other cpue series and the two tuning series. When that happens, the recruitment of 2-year old cod tends to be low.

### 4.3 Information from the fishing industry

The sampling of the catches is included in the 'scientific data'. The fishing industry has since 1996 gathered data on the size composition of the landings but this information has not been used in this assessment.

### 4.4 Methods

This is an update assessment using XSA and the procedure is described in stock annex 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 PA reference points for Faroe Plateau cod are the following:  $B_{pa} = 40\text{kt}$ ,  $B_{lim} = 21\text{kt}$ ,  $F_{pa} = 0.35$  and  $F_{lim} = 0.68$ .

The reference points based on the yield-per-recruit curve are the following:  $F_{max} = 0.25$ ,  $F_{0.1} = 0.11$ ,  $F_{35\%SPR} = 0.17$ ,  $F_{med} = 0.41$ ,  $F_{low} = 0.10$ ,  $F_{high} = 0.97$ .

The group adopted in 2011 following preliminary MSY reference points:  $F_{msy} = 0.32$ , see section 4.8. The  $B_{trigger}$  was set at  $B_{pa} = 40\text{ kt}$ .

#### 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 last year: to use the two surveys for tuning. The commercial series showed a similar overall tendency as the surveys (Figure 4.2.7) but were not used in the tuning. The XSA-run (Table 4.6.1) showed that the fit between the model and the tuning series (logQ residuals, Figure 4.6.1) was rather poor for the young ages and there seemed to be both year class effects and year effects.

The results from the XSA-run shows that fishing mortality ( $F_{3-7}$ ) has decreased in recent years (down to 0.41, Table 4.6.2, Figure 4.6.2), and other measures of fishing mortality have done so as well (Table 4.6.4, Figure 4.6.3). This might partly be due to the new area closures, which were introduced in July 2011, although the main objective was to protect young fish. The population numbers, total biomass and spawning stock biomass have been low compared with other years in the series (Table 4.6.3, Table 4.6.4, Figure 4.6.2). The poor state of the stock since 2005 has been due to poor recruitment (not poor individual growth). Prior to that time, extremely weak year classes (< 5 million individuals) were only observed two times, whereas it has happened three times since 2005. There has been a poor relationship between the size of the spawning stock and subsequent recruitment (Figure 4.6.4), since a small spawning stock biomass may be associated with low, as well as high recruitment. The spawning stock biomass in the terminal year was close to  $B_{lim}$  and the fishing mortality above  $F_{msy}$  (Figure 4.6.5).

In order to put the stock status 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, 1 cwt = 50.8 kg) 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 4.6.6. There was a decreasing trend in biomass from around 100 thousand tonnes to around 80 thousand 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 2012 was very low compared with the entire period.

#### 4.7 Short term forecast

##### 4.7.1 Input data

The input data for the short term prediction are given in Table 4.7.1. Note the extremely weak YC2010 and YC2011, which were both set to the face value from the

XSA-run, i.e., according to the Annex. 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 2010-2012 and rescaled to the terminal year (because of the downward trend). The weights at age in the catches in 2013 were estimated from the commercial catches in January-February or the spring survey (ages 2 and 4-6 years). The weights in the catches in 2014 were set to the values in 2013 and the average of 2011-2013 was expected for 2015. The proportion mature in 2012 was set to the 2012 values from the spring groundfish survey, and for 2013-2014 to the average values for 2010-2012.

#### 4.7.2 Results

Table 4.7.2 shows that the landings in 2013 are expected to be 7500 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 24 000 tonnes in 2013, 20 000 tonnes in 2014 and eventually 21 000 tonnes in 2015. The current short term prediction is therefore pessimistic. The “old” year classes (YC 2007 and YC2008) are still important for the SSB in 2014 and 2015 (Figure 4.7.1).

### 4.8 Long term forecast

The input to the traditional long term forecast (yield per recruit) is presented in Table 4.8.1 and the result is presented in Table 4.8.2 and Figure 4.8.1.

Single species long term forecasts for Faroe Plateau cod indicated  $F_{msy}$  values lower than  $F_{pa}$ . An FLR procedure (MSE, Management strategy evaluations using FLR standard packages; a simulation of management and stock response over a 20 yr period) for Faroe Plateau cod indicates that  $F_{msy}$  is 0.32. This value (0.32) was adopted by the NWWG 2012 as a preliminary  $F_{msy}$ . Work is ongoing to include more information from the ecosystem in the determination of reference points for cod.

### 4.9 Uncertainties in assessment and forecast

Since there is no incentive to discard fish or misreport catches under the effort management system, the catch figures are considered adequate, as well as the catch-at-age, although the number of otoliths should have been higher.

The summer survey in 2012 was delayed by 3 weeks due to technical problems with the research vessel, causing more young (age 0) fish to be caught in the survey. The extremely low value for 2-year old cod in the March survey in 2012 (1.4) had to be replaced by the second lowest figure (41.5), in order to reduce the influence of this outlier on the assessment. Despite this, the YC2010 and YC2011 were in the XSA estimated to be below the lowest observed.

There was a clear retrospective pattern (Figure 4.9.1), indicating uncertainties in the assessment.

Steingrund et al. (2010) found that the recruitment of Faroe Plateau cod (age 2) could be rather precisely estimated as the ratio between cod biomass (age 3+) and the amount of cannibalistic cod in nearshore waters in June-October the previous year. This approach showed that the YC2010 and YC2011 were extremely weak (Figure 4.9.2).

#### 4.10 Comparison with previous assessment and forecast

The assessment settings were according to the Annex. The 2013 assessment was much in line with the 2012 assessment and forecast (Figure 4.10.1).

#### 4.11 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 demersal fisheries in Vb. This was before ICES introduced PA and MSY reference values and at the time it was believed that the purpose was achieved, if the total allowable number of fishing days was set such, that on average 33% of the cod exploitable stock in numbers would be harvested annually. This translates into an average  $F$  of 0.45, above the  $F_{pa}$  of 0.35. ICES considers this to be inconsistent with the PA and MSY approaches. Work is ongoing in the Faroes to move away from the  $F_{target}$  of 0.45 to be more consistent with the ICES advice.

#### 4.12 Management considerations

The cod stock is assessed to be in a very poor state and is predicted to remain so for the next two years due to poor recruitment. Although the environmental conditions have been rather special since 2007 (lots of mackerel) and may partly be responsible for the poor state of the cod stock, it is certainly necessary to protect the cod stock as much as possible. The reason is not only that it may prevent a total collapse of the stock but also that the stock may recover faster in the future.

Hence, the number of fishing days has to be further reduced and further area closures might be necessary.

#### 4.13 Ecosystem considerations

The effects of the cod-fishery on the ecosystem (e.g. damage on the bottom) are expected to be small since the majority of the cod catch is taken by longlines. Regarding the ecosystem effects on fishing, this issue is partly addressed in the ecological modelling work presented in the Overview section for Faroese stocks.

#### 4.14 Regulations and their effects

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 help to reduce fishing mortality, but they cause practical problems for the fishing fleets (e.g. high concentrations of vessels in certain areas). Area restrictions may be best suited to protect certain fish species/sizes in certain areas, whereas the number of fishing days remains the only tool to reduce the overall fishing mortality.

The area closure (for commercial longliners close to land) introduced in July 2011 to protect young fish has not yet resulted in strong recruitment, since the 2008 year class is of average size, and the 2009-2011 year classes either poor or exceptionally poor. On the other hand, it is not known how they would have been if the areas were not closed.

#### 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 recent years 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 and jiggers still exploit the shallow areas.

#### 4.16 Changes in the environment

The primary production has been low for a number of years, albeit high in 2008 to 2010, but it is not believed that this has any relationship with a change in the environment.

#### 4.17 References

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## Faroe Plateau cod

Table 4.2.1. Faroe Plateau cod (sub-division Vb1). Nominal catches (tonnes) by countries, 1986-2012, as officially reported to ICES.

	Denmark	Faroe Islands	France	Germany	Iceland	Norway	Greenland	Portugal	UK (E/W/N)	UK (Scotland)	United Kingdom	Total
1986	8	34,492	4	8		83	-		-	-	-	34,595
1987	30	21,303	17	12		21	-		8	-	-	21,391
1988	10	22,272	17	5		163	-		-	-	-	22,467
1989	-	20,535	-	7		285	-		-	-	-	20,827
1990	-	12,232	-	24		124	-		-	-	-	12,380
1991	-	8,203	- <sup>1</sup>	16		89	-		1	-	-	8,309
1992	-	5,938	3 <sup>2</sup>	12		39	-		74	-	-	6,066
1993	-	5,744	1 <sup>2</sup>	+		57	-		186	-	-	5,988
1994	-	8,724	-	2		36	-		56	-	-	8,818
1995	-	19,079	2 <sup>2</sup>	2		38	-		43	-	-	19,164
1996	-	39,406	1 <sup>2</sup>	+		507	-		126	-	-	40,040
1997	-	33,556	-	+		410	-		61 <sup>2</sup>	-	-	34,027
1998	-	23,308	-	-		405	-		27 <sup>2</sup>	-	-	23,740
1999	-	19,156	-	39		450	-		51	-	-	19,696
2000	-		1	2		374	-		18	-	-	395
2001	-	29,762	9 <sup>2</sup>	9		531 <sup>+</sup>	-		50	-	-	30,361
2002	-	40,602	20	6	5	573	-		42	-	-	41,248
2003	-	30,259	14	7		447	-		15	-	-	30,742
2004	-	17,540	2	3 <sup>2</sup>		414	-	1	15	-	-	17,975
2005	-	13,556	-			201	-		24	-	-	13,781
2006	-	11,629	7	1 <sup>2</sup>		49	5		1	-	-	11,692
2007	-	9,905	1 <sup>2</sup>			71	7		3	358	-	10,345
2008	-	9,394	1			40				383	-	9,818
2009	-	10,736	1			14	7			300	-	11,058
2010	-	13,878	1			10				312	-	14,201
2011	-	11,497	-								-	11,497
2012	-	7,671	0		29						-	7,700

<sup>1</sup> Preliminary, <sup>2</sup> Included in Vb2, <sup>3</sup> Reported as Vb.

Table 4.2.2. Faroe Plateau cod (sub-division Vb1). Nominal catch (tonnes) of COD in sub-division Vb1 (Faroe Plateau) 1986-2012, as used in the assessment.

	Faroese catches:					Catches reported as Vb2:			Foreign catches:			Used in the assessment	
	Officially reported	in Vb1	Corrections in Vb1	on Faroe-Iceland ridge	in IIA within Faroe area jurisdiction	UK (E/W/N)	UK (Scotland)	UK	French <sup>2</sup>	Greenland <sup>2</sup>	Russia <sup>2</sup>		UK <sup>2</sup>
1986	34595												34595
1987	21391												21391
1988	22467					715							23182
1989	20827					1229				12			22068
1990	12380					1090 -			205	17			13692
1991	8309					351 -			90				8750
1992	6066					154 +			176				6396
1993	5988						1		118				6107
1994	8818						1		227				9046
1995	19164	3330 <sup>3</sup>				-			551				23045
1996	40040					-			382				40422
1997	34027					-			277				34304
1998	23740					-			265				24005
1999	19696					-1600			210				18306
2000	395	21793 <sup>+</sup>				-1400			245				21033
2001	30361		-1766			-700			288				28183
2002	41248		-2409			-600			218 -				38457
2003	30742		-1795			-4700			254 -				24501
2004	17975		-1041			-4000			244 -				13178
2005	13781		-804			-4200			1129 -				9906
2006	11692		-690			-800			278				10480
2007	10345		-588			-1800			53		6		8016
2008	9818		-557			-1828			32				7465
2009	11058		-637			-487			38		26	4	10002
2010	14201		-823			-680			54		5		12757
2011	11497		-682			-918					3		9900
2012	7700 <sup>+</sup>		-455			-760					5		6490

<sup>1</sup> Preliminary, <sup>2</sup> In order to be consistent with procedures used previous years, <sup>3</sup> Reported to Faroese Coastal Guard, <sup>4</sup> expected misreporting/discard.

**Table 4.2.3. Faroe Plateau cod (sub-division Vb1). The landings of Faroese fleets (in percents) of total catch (tonnes). 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-netters	Jiggers	Singletrawl 400-1000 HP	Singletrawl >1000 HP	Pairtrawl <1000 HP	Pairtrawl >1000 HP	Longliners >100 GRT	Industrial trawlers	Others	Faro 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
2009	6.9	41.6	4.3	0.3	10.1	2.5	1.9	2.8	6.5	23.0	0.0	0.0	7,146
2010	6.2	31.9	2.7	0.0	12.6	1.3	1.4	3.4	9.6	30.8	0.0	0.0	10,258
2011	3.6	26.5	3.4	0.1	6.7	1.3	1.4	3.1	21.9	31.9	0.0	0.0	9,502
2012	2.7	23.5	4.9	0.0	5.3	1.1	2.6	5.3	21.5	32.9	0.0	0.0	6,378
Average	4.4	26.0	5.6	0.8	9.3	4.0	7.8	7.7	12.5	21.3	0.4	0.1	

**Table 4.2.4. Faroe Plateau cod (sub-division Vb1). Catch in numbers at age per fleet in 2012. Numbers are in thousands and the catch is in tonnes, gutted weight.**

Age\Fleet	Open boats	Longliners <100 GRT	Jiggers	Single trawl 0-399 HP	Single trawl 400-1000 HP	Single trawl >1000 HP	Pair trawl 700-999 HP	Pair trawl >1000 HP	Longliners >100 GRT	Gill-netters	Others (scaling)	Catch-at -age
2	4	37	12	0	0	0	0	0	0	0	-9	44
3	39	330	83	0	25	13	3	32	38	0	-97	466
4	71	627	139	0	94	59	18	205	251	0	-251	1213
5	22	193	37	0	38	34	10	143	127	0	-104	500
6	6	55	11	0	13	14	4	59	56	0	-37	181
7	4	34	6	0	4	7	2	19	34	0	-21	89
8	2	21	4	0	1	3	1	6	36	0	-12	62
9	0	2	1	0	1	3	1	6	13	0	-5	22
10+	0	1	0	0	1	3	1	7	10	0	-4	19
Sum	148	1300	293	0	177	136	40	477	565	0	-540	2596
G.weight	232	1994	450	0	457	460	122	1593	1749	0	-1210	5847

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



**Table 4.2.5. Faroe Plateau cod (sub-division Vb1). Number of samples, lengths, otoliths, and individual weights in 2012.**

Fleet	Size	Samples	Lengths	Otoliths	Weights
Open boats		3	451	180	451
Longliners	<100 GRT	14	2,524	341	2,524
Longliners	>100 GRT	29	5,417	599	5,148
Jiggers		0	0	0	0
Gillnetters		0	0	0	0
Sing. traw lers	<400 HP	0	0	0	0
Sing. traw lers	400-1000 HP	13	2,531	360	2,531
Sing. traw lers	>1000 HP	0	0	0	0
Pair traw lers	<1000 HP	3	565	60	565
Pair traw lers	>1000 HP	10	2,055	180	1,848
<b>Total</b>		<b>72</b>	<b>13,543</b>	<b>1,720</b>	<b>13,067</b>

Table 4.2.6. Faroe Plateau cod (sub-division Vb1). Catch in numbers at age 1961-2012.

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	190	446	2130	616	300	141	92	52	24
1992	0	199	442	453	886	285	128	52	29	33
1993	0	118	786	591	218	323	94	32	22	25
1994	0	559	768	1035	519	122	172	38	22	16
1995	0	2552	2651	1960	988	454	115	171	43	48
1996	0	348	5124	4572	1530	1514	591	146	344	47
1997	0	198	1268	6656	3701	652	634	169	51	119
1998	0	450	737	1541	5083	1512	157	117	28	25
1999	0	1296	1086	874	1211	2434	480	65	19	8
2000	0	2236	2820	836	456	721	865	111	8	1
2001	0	4024	3867	2161	378	377	739	449	37	6
2002	0	2038	7140	3306	1639	460	522	405	284	7
2003	0	943	2959	6358	2680	890	246	127	160	28
2004	0	128	879	1606	2678	936	305	82	54	47
2005	0	594	712	1056	1351	991	245	49	22	37
2006	0	978	966	413	584	705	294	67	9	3
2007	0	546	1321	779	340	311	275	92	22	3
2008	0	413	1094	1126	618	269	226	225	82	28
2009	0	881	2281	868	623	299	86	55	44	17
2010	0	2146	2065	874	475	488	181	58	34	39
2011	0	388	2773	1460	432	222	149	59	23	3
2012	0	53	563	1464	604	218	108	75	27	23

**Table 4.2.7. Faroe Plateau cod (sub-division Vb1). Catch weight at age 1961-2012.**

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	10.270
1962	0	1.000	2.270	3.350	4.580	4.930	9.080	6.590	6.660	10.270
1963	0	1.040	1.940	3.510	4.600	5.500	6.780	8.710	11.720	10.820
1964	0	0.970	1.830	3.150	4.330	6.080	7.000	6.250	6.190	14.390
1965	0	0.920	1.450	2.570	3.780	5.690	7.310	7.930	8.090	11.110
1966	0	0.980	1.770	2.750	3.510	4.800	6.320	7.510	10.340	11.650
1967	0	0.960	1.930	3.130	4.040	4.780	6.250	7.000	11.010	10.690
1968	0	0.880	1.720	3.070	4.120	4.650	5.500	7.670	10.950	9.280
1969	0	1.090	1.800	2.850	3.670	4.890	5.050	7.410	8.660	14.390
1970	0	0.960	2.230	2.690	3.940	5.140	6.460	10.310	7.390	9.340
1971	0	0.810	1.800	2.980	3.580	3.940	4.870	6.480	6.370	10.220
1972	0	0.660	1.610	2.580	3.260	4.290	4.950	6.480	6.900	11.550
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	1.280	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	4.899	5.893	9.669	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	2.181	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	1.804	2.281	3.482	5.436	5.856	7.972	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	5.564	7.280	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
2009	0	0.805	1.431	2.287	2.723	3.435	5.081	6.281	8.312	9.959
2010	0	1.049	1.642	2.400	3.212	3.678	4.774	5.973	7.094	9.800
2011	0	0.815	1.367	2.413	3.493	4.525	5.076	6.631	6.863	10.089
2012	0	1.007	1.315	1.893	3.102	4.279	5.573	5.871	7.482	9.206

**Table 4.2.8. Faroe Plateau cod (sub-division Vb1). Proportion mature at age 1961-2012. From 1961-1982 the average from 1983-1996 is used (as it was used in the 1990s).**

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	1.00	1.00
1962	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1963	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1964	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1965	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1966	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1967	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1968	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1969	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1970	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1971	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1972	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1973	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1974	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1975	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1976	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1977	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1978	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1979	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1980	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1981	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1982	0	0.17	0.64	0.87	0.95	1.00	1.00	1.00	1.00	1.00
1983	0	0.03	0.71	0.93	0.94	1.00	1.00	1.00	1.00	1.00
1984	0	0.07	0.96	0.98	0.97	1.00	1.00	1.00	1.00	1.00
1985	0	0.00	0.50	0.96	0.96	1.00	1.00	1.00	1.00	1.00
1986	0	0.00	0.38	0.93	1.00	1.00	0.96	0.94	1.00	1.00
1987	0	0.00	0.67	0.91	1.00	1.00	1.00	1.00	1.00	1.00
1988	0	0.06	0.72	0.90	0.97	1.00	1.00	1.00	1.00	1.00
1989	0	0.05	0.54	0.98	1.00	1.00	1.00	1.00	1.00	1.00
1990	0	0.00	0.68	0.90	0.99	0.96	0.98	1.00	1.00	1.00
1991	0	0.00	0.72	0.86	1.00	1.00	1.00	1.00	1.00	1.00
1992	0	0.06	0.50	0.82	0.98	1.00	1.00	1.00	1.00	1.00
1993	0	0.03	0.73	0.78	0.91	0.99	1.00	1.00	1.00	1.00
1994	0	0.05	0.33	0.88	0.96	1.00	0.96	1.00	1.00	1.00
1995	0	0.09	0.35	0.33	0.66	0.97	1.00	1.00	1.00	1.00
1996	0	0.04	0.43	0.74	0.85	0.94	1.00	1.00	1.00	1.00
1997	0	0.00	0.64	0.91	0.97	1.00	1.00	1.00	1.00	1.00
1998	0	0.00	0.62	0.90	0.99	0.99	1.00	1.00	1.00	1.00
1999	0	0.02	0.43	0.88	0.98	1.00	1.00	1.00	1.00	1.00
2000	0	0.02	0.39	0.69	0.92	0.99	1.00	1.00	1.00	1.00
2001	0	0.07	0.47	0.86	0.94	1.00	1.00	1.00	1.00	1.00
2002	0	0.04	0.37	0.76	0.97	0.93	0.97	1.00	1.00	1.00
2003	0	0.00	0.29	0.79	0.88	0.98	1.00	1.00	1.00	1.00
2004	0	0.00	0.51	0.78	0.92	0.89	0.87	1.00	1.00	1.00
2005	0	0.05	0.66	0.90	0.93	0.98	0.92	1.00	1.00	1.00
2006	0	0.04	0.59	0.80	0.99	0.99	1.00	1.00	1.00	1.00
2007	0	0.00	0.47	0.78	0.91	0.99	0.97	1.00	1.00	1.00
2008	0	0.10	0.78	0.91	0.90	0.95	1.00	1.00	1.00	1.00
2009	0	0.09	0.61	0.81	0.96	0.94	0.96	1.00	1.00	1.00
2010	0	0.08	0.61	0.77	0.94	0.97	1.00	1.00	1.00	1.00
2011	0	0.06	0.51	0.69	0.84	0.93	0.98	1.00	1.00	1.00
2012	0	0.00	0.63	0.85	0.94	0.97	1.00	1.00	1.00	0.83

**Table 4.2.9. Faroe Plateau cod (sub-division Vb1). Summer survey tuning series (number of individuals per 200 stations) and spring survey tuning series (number of individuals per 100 stations). In the spring survey tuning series for age 1 in 2011 (yearclass 2010) the original value of 1.4 was set to the second lowest value 41.1 in that series (shown in grey).**

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FAROE PLATEAU COD (ICES SUBDIVISION VB1)    Surveys_revised_lreplaced_value.TXT
102
SUMMER SURVEY
1996 2012
1 1 0.6 0.7
2 8
200 707      6576.5   3705.1   1298.1   701.5   233.1   48.5
200 512.7    1500.7   6754.6   1466.6   178.4   137.8   30.1
200 524.9    505.1    979.4    3675.2   902.6   50      37
200 373.3    1256.8   753.1    675.3    1422.5   238     40.4
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
200 428.2    1980.6   817.7    551.4    393.1   132.1   47.8
200 1239.3   1543.9   1012     363.4    243.6   148.9   41.5
200 301.7    1373.6   1084.2   380.1    160.6   104.6   37.4
200 22.1     230.8    1081.8   511.7    88.4    35.8    19.5
SPRING SURVEY (shifted back to december)
1993 2012
1 1 0.9 1.0
1 8
100 612.5    336.9    912.8    508.5    129.7    187.2    28.6    0.1
100 623.2    845.7    1528.4   1525.2   1191.4   285.6    350.8    48.9
100 215.5    4043.9   3984.4   1892.1   1372     420.8    82.8    169.7
100 72.5     834.4    5398.3   2359.5   333.9    227     58.8    5.3
100 69.7     425.2    1572.1   4919.3   1136     82.3    40.7    35.2
100 704.7    674.9    991.3    1225.2   2079.2   252.1    25.2    13.4
100 316      1432.4   746.1    441      506.7    836.7    63.8    3.1
100 938.4    2387.8   1993.8   456.2    324.4    578.6    128.6    3.9
100 383      4564.1   2892.1   1579.7   331.9    231.8    178.9    131.9
100 90.2     719      3915     1260.4   528.7    67.4     51.7    39.7
100 609.5    575.8    844.6    1175.1   292.9    66       22.2    11.9
100 383.1    438.2    1151.7   1440.2   844.5    140.6    14       3.8
100 167.5    156.7    177.3    360.1    292      95       15.5    4
100 41.1     270.9    286.6    155.2    170.4    105.1    37.8    14.4
100 176.6    474.5    851.9    479.2    151.5    83.9     39.4    13.3
100 307.8    475.5    977.7    1159.1   427.3    73.7     31.6    24.9
100 697.6    1318.8   745.6    538.1    381      98.9     41       17.2
100 148.4    1319     1240.3   562.4    300.2    237.8    85.2    21.9
100 41.1     273.8    1303.8   326.7    73.6     27       23.7    6.2
100 68      377.6    1699.8   2053.2   295.6    32.6     22.4    17.7

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**Table 4.2.10. Faroe Plateau cod (sub-division Vb1). Pairtrawler abundance index (number of individuals per 1000 fishing hours). This series was not used in the tuning of the XSA. The season is June – December. The otoliths are selected from deep (> 150 m) locations.**

year	age							
	2	3	4	5	6	7	8	9
1989	1200	1638	1783	1381	928	719	297	194
1990	116	2856	2057	834	465	419	200	0
1991	8	148	1401	869	329	225	65	93
1992	84	487	696	1234	760	353	129	62
1993	51	1081	2192	746	1062	398	67	107
1994	1314	2129	1457	2208	697	1241	461	53
1995	577	3645	5178	4199	2769	543	539	106
1996	242	10608	16683	7985	4410	194	0	723
1997	28	674	6038	9375	2413	944	113	0
1998	80	731	1805	5941	4904	801	286	0
1999	444	2082	1933	3008	5136	2220	218	4
2000	3478	3956	1737	956	1003	1694	382	0
2001	3385	6700	3009	555	415	797	862	25
2002	571	6409	5019	1235	432	400	41	228
2003	63	1341	4450	3630	870	270	152	145
2004	23	0	278	2534	2831	1733	274	184
2005	42	399	655	1766	2171	860	148	70
2006	93	135	699	755	1580	612	787	71
2007	64	916	1767	1392	802	656	206	46
2008	54	295	418	573	387	456	487	182
2009	11	734	801	756	448	247	147	105
2010	1578	2917	1787	543	603	190	0	81
2011	22	1487	4078	1967	622	441	95	25
2012	0	95	1531	1789	950	223	40	107

**Table 4.2.11. Faroe Plateau cod (sub-division Vb1). 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	age							
	1	2	3	4	5	6	7	8
1993	405	2610	9306	3330	806	2754	847	258
1994	101	8105	14105	7863	4659	962	1187	71
1995	0	15249	23062	2895	2505	1568	708	1073
1996	0	2269	18658	13265	4153	8435	4513	1147
1997	0	1738	5837	26368	18089	2805	2807	402
1998	1892	4490	2025	2565	11738	2732	131	19
1999	849	10968	3811	985	1891	3759	548	109
2000	2695	10983	6710	998	780	1473	2136	109
2001	287	12999	7409	2660	515	1135	1808	2545
2002	105	6862	20902	10819	7759	1561	1945	1265
2003	16	2099	6057	15910	7778	1830	708	650
2004	59	510	1773	2438	3214	1059	293	71
2005	297	2169	1543	2313	2327	1360	170	13
2006	151	5813	5319	674	2205	2352	1148	56
2007	274	3578	6383	2778	1927	1159	1118	134
2008	1270	2243	4449	4773	2564	1133	816	716
2009	294	2670	15107	6308	3028	2491	683	132
2010	23	20287	16914	8733	2595	4780	1878	864
2011	160	2817	28218	14391	4295	2207	1252	195
2012	0	1833	9562	8309	2364	1296	403	197

**Table 4.2.12. Longliner abundance index (number of individuals per day) for longliners < 25 GRT operating mainly nearshore. This series was not used in the tuning of the XSA. The age composition was obtained from all longliners.**

year	age							
	1	2	3	4	5	6	7	8
1983	0.9	7.5	4.7	3.8	1.6	0.9	0.5	0.2
1984	0	33.3	32.1	13.2	5.8	6.3	1	0.7
1985	0	3.4	45.8	32.1	23.2	12.9	17.9	5.3
1986	0	5.4	40.4	23.3	14.9	6.6	6	2.1
1987	0	6.2	10.3	15.2	25.2	11.3	4.8	0.8
1988	0	2.5	5.1	10.5	6.9	15.4	5.2	2.1
1989	0	30.9	15.1	14.5	9.8	5.3	11.4	1.6
1990	0	6.4	32.6	7	9.9	5.2	6.3	3.4
1991	0	0	4.5	23.4	7.6	3.4	2.1	0.6
1992	0	5.8	15.9	6.4	3.6	3.4	1.7	1.3
1993	0.4	4.8	20	7.5	1.5	1.4	0.3	1.3
1994	0	13.1	16.2	13.6	5.8	1.8	2.3	0.4
1995	0	44.7	39.9	10.2	7	4.3	1.6	2.6
1996	0	5.8	75	51.2	12.9	28.3	14.1	4.1
1997	0	4.4	15.8	68.3	51.8	7.5	7.3	0.8
1998	4.8	10.1	4.7	6.8	27.6	8.2	0.3	0.3
1999	0.2	23.2	7.9	3.7	5.5	12.6	2	0
2000	5.4	22.5	13.1	0.7	0.7	1.3	2.3	0.3
2001	0.5	82.8	41.7	14.6	2.5	4.9	10.8	11.1
2002	0.1	38.5	78.7	35.2	24.3	5.9	9.3	5.5
2003	0	14.8	31.6	89.8	49.9	10.9	3.4	1.3
2004	0	5.2	16.1	15.7	23.2	6.1	0.2	0
2005	0.4	8.9	12.5	11.2	19.9	9.4	0.9	0
2006	1.4	40.7	32.6	6.3	7.3	9.5	2.8	0.3
2007	0.1	8.8	18.2	7	3.3	3.8	2.8	0.5
2008	0.3	3	14.2	18.4	12.5	2.9	1.3	1.8
2009	1.1	11.4	52.7	19.6	11.6	8	3.3	2
2010	1.4	72.9	79	33.5	14.7	15.3	4.6	1
2011	0	17.9	142.3	59.1	22.9	14.1	7.7	1.8
2012	0.3	4.6	39.3	59.0	15.1	5.2	2.6	1.3



**Table 4.6.1. Faroe Plateau cod (sub-division Vb1). The XSA-run.**

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Lowestoft VPA Version 3.1
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Extended Survivors Analysis
COD FAROE PLATEAU (ICES SUBDIVISION Vb1)          COD_ind_Surveys_revised
CPUE data from file Surveys_revised_lreplacedvalue.TXT

Catch data for 52 years. 1961 to 2012. Ages 1 to 10.
Fleet      First Last First Last Alpha Beta
           year year age  age
SUMMER SURVEY      1996 2012    2    8    .600    .700
SPRING SURVEY (shift 1993 2012    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 32 iterations

Regression weights
1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000

Fishing mortalities
Age 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
1 .000 .000 .000 .000 .000 .000 .000 .000 .000 .000
2 .128 .031 .094 .189 .126 .051 .112 .168 .080 .029
3 .304 .186 .257 .333 .329 .269 .684 .412 .291 .152
4 .664 .298 .381 .358 .383 .344 .543 .608 .487 .235
5 .851 .755 .472 .609 .439 .393 .491 .649 .585 .363
6 .904 .984 .773 .819 .592 .481 .507 .922 .612 .638
7 .900 1.117 .838 .953 .686 .719 .409 .661 .678 .650
8 .936 1.062 .560 1.010 .691 1.209 .583 .548 .398 .852
9 1.780 2.073 1.126 .282 .805 1.493 1.495 .867 .345 .297

XSA population numbers (Thousands)
AGE
YEAR 1 2 3 4 5 6 7 8 9
2003 4.45E+03 6.24E+03 8.97E+03 1.04E+04 3.72E+03 1.19E+03 3.30E+02 1.65E+02 1.53E+01
2004 7.47E+03 3.64E+03 4.50E+03 5.42E+03 4.39E+03 1.30E+03 3.94E+02 1.10E+02 5.31E+01
2005 9.28E+03 6.11E+03 2.89E+03 3.06E+03 3.30E+03 1.69E+03 3.97E+02 1.06E+02 3.11E+01
2006 6.16E+03 7.60E+03 4.56E+03 1.83E+03 1.71E+03 1.68E+03 6.39E+02 1.41E+02 4.94E+01
2007 7.94E+03 5.04E+03 5.15E+03 2.68E+03 1.05E+03 7.62E+02 6.08E+02 2.02E+02 4.20E+01
2008 1.11E+04 6.50E+03 3.64E+03 3.04E+03 1.49E+03 5.53E+02 3.45E+02 2.51E+02 8.27E+01
2009 1.85E+04 9.10E+03 5.06E+03 2.28E+03 1.76E+03 8.25E+02 2.80E+02 1.38E+02 6.13E+01
2010 5.89E+03 1.51E+04 6.66E+03 2.09E+03 1.08E+03 8.83E+02 4.07E+02 1.52E+02 6.29E+01
2011 2.07E+03 4.82E+03 1.05E+04 3.61E+03 9.31E+02 4.64E+02 2.87E+02 1.72E+02 7.20E+01
2012 3.27E+03 1.69E+03 3.64E+03 6.41E+03 1.82E+03 4.24E+02 2.06E+02 1.20E+02 9.45E+01

Estimated population abundance at 1st Jan 2013
0.00E+00 2.68E+03 1.35E+03 2.56E+03 4.15E+03 1.03E+03 1.84E+02 8.80E+01 4.18E+01

Taper weighted geometric mean of the VPA populations:
1.47E+04 1.24E+04 9.60E+03 5.98E+03 3.20E+03 1.56E+03 7.09E+02 2.88E+02 1.17E+02

Standard error of the weighted Log(VPA populations) :
.7032 .6702 .6036 .5980 .6051 .6277 .6528 .7058 .8132

Log catchability residuals.
Fleet : SUMMER SURVEY

Age 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002
1 No data for this fleet at this age
2 99.99 99.99 99.99 -.14 .23 .37 -.85 .15 .68 1.12
3 99.99 99.99 99.99 .18 -.17 -.55 .57 -.37 .12 .65
4 99.99 99.99 99.99 .19 .32 -.59 -.12 .07 .11 .10
5 99.99 99.99 99.99 .67 -.05 .26 -.68 -.77 -.10 .14
6 99.99 99.99 99.99 .18 -.17 .62 .15 -.61 -.55 -.30
7 99.99 99.99 99.99 .31 -.02 -.36 .56 .07 -.28 -.38
8 99.99 99.99 99.99 -.12 -.26 .12 .41 -.23 -.02 -.43
Age 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
1 No data for this fleet at this age
2 -.05 .64 .51 .81 -.25 -1.78 -.24 .35 .02 -1.58
    
```

3	-.31	.09	.45	-.03	-.58	-.46	1.16	.46	-.19	-1.01
4	.11	-.19	.22	-.19	-.66	-.77	.56	.90	.34	-.40
5	-.32	.46	.27	-.30	-.47	-.05	.16	.33	.49	-.03
6	-.69	.30	.69	-.36	-.36	.06	.58	.30	.33	-.17
7	-1.36	.12	.51	-.04	-.65	-.43	.50	.41	.42	-.34
8	-1.04	.23	.49	.04	-.44	-.44	.31	.05	-.28	-.27

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	-7.9080	-6.8179	-6.3972	-6.1740	-6.1571	-6.1571	-6.1571
S.E(Log q)	.7864	.5430	.4400	.4097	.4400	.5122	.3956

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	.70	1.605	8.24	.65	17		.52		-7.91	
3	.89	.622	7.05	.66	17		.49		-6.82	
4	.99	.040	6.41	.73	17		.45		-6.40	
5	.97	.189	6.22	.76	17		.41		-6.17	
6	.97	.157	6.18	.72	17		.44		-6.16	
7	.95	.284	6.22	.65	17		.50		-6.21	
8	1.25	-1.324	6.51	.65	17		.46		-6.27	

Fleet : SPRING SURVEY (shift

Age	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1	-.04	-.55	-.42	-.82	-.77	.66	-.46	.22	.13	-.56
2	-.92	-.90	.19	-.23	-.21	.38	.26	.48	.75	-.26
3	-.65	-.01	.10	-.05	-.17	.09	.05	.19	.29	.36
4	-.55	.01	.61	-.03	.22	-.19	-.48	-.11	.36	.01
5	-.56	.77	.40	-.11	.28	.22	-.54	-.31	.10	.29
6	-.64	.87	.51	-.11	-.06	.24	.39	.34	.11	-.27
7	-.34	.34	.17	-.16	-.25	-.24	.14	-.73	.04	.13
8	-4.64	.73	.04	-1.48	.88	.02	-1.35	-1.61	.13	-.05
Age	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1	1.89	.90	-.14	-1.14	.07	.29	.60	.19	-.04	.00
2	.21	.38	-1.10	-.68	.23	-.09	.65	.19	-.32	1.00
3	-.52	.37	-.99	-.89	.07	.50	.30	.27	-.25	.94
4	-.23	.27	-.46	-.81	-.04	.68	.39	.58	-.62	.40
5	-.39	.41	-.64	-.39	-.18	.46	.28	.67	-.64	-.13
6	-.48	.27	-.59	-.44	-.09	.00	-.08	1.12	-.70	-.40
7	-.29	-.72	-.89	-.36	-.53	-.15	.03	.62	-.29	-.04
8	-.18	-.80	-1.18	.24	-.50	.40	.03	.14	-1.39	.46

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	-8.2884	-6.8876	-5.9749	-5.7326	-5.7555	-5.9733	-5.9733	-5.9733
S.E(Log q)	.6856	.5779	.4733	.4372	.4452	.4929	.4159	1.3414

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	1.10	-.447	8.19	.55	20		.77		-8.29	
2	1.09	-.489	6.68	.60	20		.65		-6.89	
3	.98	.142	6.04	.67	20		.47		-5.97	
4	.91	.662	5.99	.74	20		.40		-5.73	
5	.89	.816	5.98	.76	20		.40		-5.76	
6	.90	.608	6.09	.69	20		.45		-5.97	
7	.98	.146	6.15	.76	20		.38		-6.15	
8	.61	1.622	6.03	.49	20		.73		-6.48	

Terminal year survivor and F summaries :

Age 1 Catchability constant w.r.t. time and dependent on age  
Year class = 2011

Fleet	Estimated Survivors	Int s.e	Ext s.e	Var Ratio	N	Scaled Weights	Estimated F
SUMMER SURVEY	1.	.000	.000	.00	0	.000	.000
SPRING SURVEY (shift	2678.	.703	.000	.00	1	1.000	.000
F shrinkage mean	0.	2.00				.000	.000

Weighted prediction :

Survivors at end of year	Int s.e	Ext s.e	N	Var Ratio	F
2678.	.70	.00	1	.000	.000

Age 2 Catchability constant w.r.t. time and dependent on age  
Year class = 2010

Fleet	Estimated Survivors	Int s.e	Ext s.e	Var Ratio	N	Scaled Weights	Estimated F
SUMMER SURVEY	277.	.809	.000	.00	1	.229	.134
SPRING SURVEY (shift	2370.	.453	.515	1.14	2	.732	.017
F shrinkage mean	350.	2.00				.039	.108

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
1346.	.39	.60	4	1.543	.029

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

Year class = 2009

Fleet	Estimated	Int	Ext	Var	N Scaled	Estimated
	Survivors	s.e	s.e	Ratio	Weights	F
SUMMER SURVEY	1278.	.460	.475	1.03	2	.338
SPRING SURVEY (shift	3830.	.331	.392	1.18	3	.641
F shrinkage mean	858.	2.00				.400

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
2561.	.27	.34	6	1.263	.152

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

Year class = 2008

Fleet	Estimated	Int	Ext	Var	N Scaled	Estimated
	Survivors	s.e	s.e	Ratio	Weights	F
SUMMER SURVEY	3229.	.328	.167	.51	3	.416
SPRING SURVEY (shift	5104.	.271	.176	.65	4	.568
F shrinkage mean	1797.	2.00				.477

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
4149.	.21	.14	8	.673	.235

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

Year class = 2007

Fleet	Estimated	Int	Ext	Var	N Scaled	Estimated
	Survivors	s.e	s.e	Ratio	Weights	F
SUMMER SURVEY	1176.	.273	.124	.46	4	.472
SPRING SURVEY (shift	932.	.249	.197	.79	5	.512
F shrinkage mean	670.	2.00				.516

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
1035.	.18	.11	10	.621	.363

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

Year class = 2006

Fleet	Estimated	Int	Ext	Var	N Scaled	Estimated
	Survivors	s.e	s.e	Ratio	Weights	F
SUMMER SURVEY	229.	.263	.269	1.02	5	.507
SPRING SURVEY (shift	145.	.260	.194	.75	6	.470
F shrinkage mean	187.	2.00				.629

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
184.	.19	.16	12	.863	.638

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

Year class = 2005

Fleet	Estimated	Int	Ext	Var	N Scaled	Estimated
	Survivors	s.e	s.e	Ratio	Weights	F
SUMMER SURVEY	92.	.259	.161	.62	6	.448
SPRING SURVEY (shift	85.	.248	.185	.74	7	.529
F shrinkage mean	91.	2.00				.636

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
88.	.18	.11	14	.628	.650

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

Year class = 2004

Fleet	Estimated	Int	Ext	Var	N Scaled	Estimated
	Survivors	s.e	s.e	Ratio	Weights	F
SUMMER SURVEY	38.	.264	.138	.52	7	.621
SPRING SURVEY (shift	47.	.265	.200	.76	8	.343
F shrinkage mean	56.	2.00				.692

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
42.	.20	.11	16	.547	.852

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

Year class = 2003

Fleet	Estimated	Int	Ext	Var	N Scaled	Estimated
	Survivors	s.e	s.e	Ratio	Weights	F
SUMMER SURVEY	55.	.238	.151	.63	7	.604
SPRING SURVEY (shift	65.	.231	.247	1.07	8	.370
F shrinkage mean	27.	2.00				.552

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
57.	.18	.13	16	.754	.297

Table 4.6.2. Faroe Plateau cod (sub-division Vb1). Fishing mortality at age.

year	age									FBAR 3-7
	2	3	4	5	6	7	8	9	10+	
1963	0.253	0.414	0.517	0.512	0.541	0.488	0.327	0.481	0.481	0.494
1964	0.109	0.300	0.452	0.523	0.566	0.668	0.353	0.516	0.516	0.502
1965	0.121	0.252	0.450	0.562	0.660	0.531	0.435	0.532	0.532	0.491
1966	0.083	0.197	0.255	0.450	0.502	0.968	0.852	0.611	0.611	0.474
1967	0.079	0.239	0.269	0.344	0.578	0.520	1.044	0.556	0.556	0.390
1968	0.101	0.232	0.395	0.534	0.447	0.713	0.333	0.488	0.488	0.464
1969	0.110	0.306	0.381	0.418	0.571	0.512	0.846	0.550	0.550	0.438
1970	0.053	0.208	0.365	0.341	0.371	0.656	0.421	0.434	0.434	0.388
1971	0.031	0.134	0.223	0.385	0.557	0.465	0.753	0.480	0.480	0.353
1972	0.046	0.148	0.207	0.250	0.606	0.469	0.246	0.358	0.358	0.336
1973	0.066	0.232	0.305	0.281	0.253	0.372	0.326	0.309	0.309	0.289
1974	0.082	0.157	0.205	0.295	0.380	0.533	0.305	0.346	0.346	0.314
1975	0.077	0.319	0.436	0.413	0.454	0.350	0.449	0.424	0.424	0.395
1976	0.093	0.172	0.367	0.557	0.517	0.762	0.643	0.574	0.574	0.475
1977	0.048	0.304	0.475	0.753	0.733	1.114	0.778	0.778	0.778	0.676
1978	0.059	0.190	0.429	0.429	0.485	0.597	0.567	0.505	0.505	0.426
1979	0.043	0.262	0.431	0.505	0.491	0.448	0.690	0.517	0.517	0.427
1980	0.054	0.239	0.370	0.434	0.518	0.412	0.644	0.479	0.479	0.395
1981	0.052	0.288	0.341	0.437	0.564	0.694	0.502	0.512	0.512	0.465
1982	0.059	0.223	0.360	0.389	0.405	0.693	0.553	0.483	0.483	0.414
1983	0.099	0.467	0.559	0.641	0.784	1.078	0.942	0.809	0.809	0.706
1984	0.107	0.371	0.579	0.661	0.453	0.476	0.479	0.534	0.534	0.508
1985	0.066	0.354	0.508	0.613	0.923	1.108	1.320	0.904	0.904	0.701
1986	0.025	0.354	0.623	0.703	0.826	0.840	0.541	0.713	0.713	0.669
1987	0.029	0.221	0.475	0.485	0.556	0.490	0.622	0.530	0.530	0.445
1988	0.067	0.353	0.564	0.549	0.773	0.798	0.864	0.716	0.716	0.607
1989	0.165	0.440	0.761	0.761	0.961	1.057	1.099	0.938	0.938	0.796
1990	0.078	0.332	0.639	0.800	0.713	0.851	1.135	0.836	0.836	0.667
1991	0.032	0.199	0.443	0.602	0.743	0.580	0.716	0.622	0.622	0.513
1992	0.020	0.100	0.325	0.340	0.644	0.882	0.443	0.531	0.531	0.458
1993	0.013	0.102	0.187	0.253	0.197	0.449	0.566	0.332	0.332	0.238
1994	0.026	0.113	0.191	0.250	0.221	0.154	0.331	1.045	1.045	0.186
1995	0.070	0.162	0.465	0.280	0.361	0.335	0.225	0.776	0.776	0.321
1996	0.031	0.193	0.453	0.809	0.906	1.142	0.929	0.945	0.945	0.701
1997	0.035	0.149	0.413	0.835	1.046	1.401	1.360	1.049	1.049	0.769
1998	0.089	0.176	0.273	0.652	1.059	0.790	1.172	0.873	0.873	0.590
1999	0.096	0.284	0.290	0.318	0.665	1.080	0.788	0.498	0.498	0.528
2000	0.125	0.319	0.380	0.248	0.327	0.544	0.828	0.191	0.191	0.363
2001	0.157	0.345	0.455	0.308	0.351	0.698	0.647	0.786	0.786	0.431
2002	0.190	0.490	0.599	0.821	0.829	1.365	1.237	1.337	1.337	0.821
2003	0.128	0.304	0.664	0.851	0.904	0.900	0.936	1.780	1.780	0.724
2004	0.031	0.186	0.298	0.755	0.984	1.117	1.062	2.073	2.073	0.668
2005	0.094	0.257	0.381	0.472	0.773	0.838	0.560	1.126	1.126	0.544
2006	0.189	0.333	0.358	0.609	0.819	0.953	1.010	0.282	0.282	0.615
2007	0.126	0.329	0.384	0.439	0.592	0.686	0.691	0.805	0.805	0.486
2008	0.051	0.269	0.344	0.393	0.481	0.719	1.209	1.493	1.493	0.441
2009	0.112	0.684	0.543	0.491	0.507	0.409	0.583	1.495	1.495	0.527
2010	0.168	0.412	0.608	0.649	0.922	0.661	0.548	0.867	0.867	0.651
2011	0.080	0.291	0.487	0.585	0.612	0.678	0.398	0.345	0.345	0.531
2012	0.029	0.152	0.235	0.363	0.638	0.650	0.852	0.298	0.298	0.407

**Table 4.6.3. Faroe Plateau cod (sub-division Vb1). Stock number at age.**

year	age									TOTAL
	2	3	4	5	6	7	8	9	10+	
1961	12019	7385	3747	2699	666	668	155	66	0	27405
1962	20654	7042	3616	1863	1245	335	210	56	0	35021
1963	20290	12907	3503	1825	752	584	190	87	0	40138
1964	21834	12893	6986	1710	895	358	294	112	0	45082
1965	8269	16037	7823	3639	830	416	151	169	0	37334
1966	18566	5999	10207	4085	1698	351	200	80	0	41186
1967	23451	13990	4034	6475	2133	842	109	70	0	51104
1968	17582	17744	9020	2525	3757	980	410	31	0	52049
1969	9325	13012	11522	4976	1212	1967	393	240	0	42647
1970	8608	6840	7843	6447	2682	561	965	138	0	34084
1971	11928	6684	4548	4456	3754	1516	238	519	0	33643
1972	21320	9469	4788	2981	2483	1760	779	92	0	43672
1973	12573	16664	6689	3187	1901	1109	902	499	400	43924
1974	30480	9639	10816	4037	1969	1209	626	533	342	59651
1975	38319	23000	6747	7217	2460	1103	581	378	476	80281
1976	18575	29035	13683	3572	3908	1279	636	304	466	71458
1977	9995	13853	20010	7765	1676	1909	489	274	18	55989
1978	10748	7799	8372	10190	2993	659	513	184	154	41612
1979	14998	8298	5282	4463	5433	1509	297	238	103	40621
1980	23583	11759	5226	2811	2206	2723	789	122	52	49271
1981	14001	18286	7580	2957	1491	1076	1477	339	150	47357
1982	22128	10878	11228	4413	1564	694	440	732	348	52425
1983	25162	17087	7128	6412	2450	854	284	207	200	59784
1984	47768	18656	8767	3339	2765	916	238	91	174	82714
1985	17323	35131	10538	4023	1412	1439	466	121	146	70599
1986	9513	13280	20182	5194	1784	459	389	102	81	50984
1987	9918	7598	7628	8866	2106	640	162	185	69	37172
1988	8716	7888	4989	3883	4470	989	321	71	53	31380
1989	16283	6675	4538	2325	1836	1689	365	111	16	33838
1990	3650	11307	3519	1736	889	575	480	99	50	22305
1991	6665	2765	6641	1520	639	357	201	126	57	18971
1992	11398	5283	1856	3490	682	249	164	80	90	23292
1993	10103	9147	3914	1098	2033	293	84	86	97	26855
1994	25168	8163	6763	2659	698	1367	153	39	27	45037
1995	42544	20087	5970	4576	1696	458	960	90	99	76480
1996	12861	32466	13988	3071	2831	967	268	627	84	67163
1997	6455	10212	21908	7283	1119	937	253	87	200	48454
1998	5924	5104	7205	11865	2587	322	189	53	47	33296
1999	14344	4438	3505	4489	5064	735	120	48	20	32763
2000	19716	10672	2735	2146	2674	2133	204	45	6	40331
2001	29691	14250	6351	1532	1372	1579	1014	73	12	55874
2002	13259	20769	8265	3299	922	791	643	435	10	48393
2003	6245	8975	10415	3716	1189	330	165	153	26	31214
2004	3641	4499	5422	4390	1299	394	110	53	45	19853
2005	6113	2890	3058	3297	1689	397	106	31	48	17629
2006	7600	4558	1831	1711	1684	639	141	49	13	18226
2007	5041	5153	2675	1047	762	608	202	42	6	15536
2008	6499	3639	3035	1493	553	345	251	83	28	15926
2009	9100	5056	2277	1762	825	280	138	61	24	19523
2010	15126	6658	2088	1083	883	407	152	63	71	26531
2011	4819	10472	3611	931	464	287	172	72	8	20836
2012	1693	3642	6408	1816	424	206	120	94	81	14484

**Table 4.6.4. Faroe Plateau cod (sub-division Vb1). Summary table (1961-2012) and results from the short term prediction (2013-2015) are shown in bold.**

	RECRUITS Age 2	TOTALBIO	TOTSPBIO	LANDINGS	YIELD/SSB	FBAR 3-7
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	0.3900
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	153664	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	14998	85112	66723	23112	0.3464	0.4273
1980	23583	85038	58887	20513	0.3483	0.3945
1981	14001	88411	63562	22963	0.3613	0.4648
1982	22128	98964	67033	21489	0.3206	0.4138
1983	25162	123256	78543	38133	0.4855	0.7056
1984	47768	152160	96774	36979	0.3821	0.5081
1985	17323	131243	84788	39484	0.4657	0.7013
1986	9513	99278	73696	34595	0.4694	0.6691
1987	9918	78374	62247	21391	0.3436	0.4452
1988	8716	66178	52136	23182	0.4446	0.6073
1989	16283	59144	38417	22068	0.5744	0.7961
1990	3650	38407	29351	13692	0.4665	0.6670
1991	6665	28815	21179	8750	0.4131	0.5133
1992	11398	35868	20912	6396	0.3058	0.4583
1993	10103	51298	33301	6107	0.1834	0.2376
1994	25168	84147	42738	9046	0.2117	0.1855
1995	42544	144438	54495	23045	0.4229	0.3206
1996	12861	142504	85325	40422	0.4737	0.7006
1997	6455	96497	81232	34304	0.4223	0.7689
1998	5924	65902	55547	24005	0.4322	0.5898
1999	14344	64736	44726	18306	0.4093	0.5275
2000	19716	90804	45857	21033	0.4587	0.3633
2001	29691	109665	58765	28183	0.4796	0.4312
2002	13259	98130	55766	38457	0.6896	0.8207
2003	6245	60469	40436	24501	0.6059	0.7244
2004	3641	37077	27094	13178	0.4864	0.6679
2005	6113	31945	23528	9906	0.4210	0.5441
2006	7600	30350	20967	10480	0.4998	0.6145
2007	5041	27344	17443	8016	0.4596	0.4861
2008	6499	29731	20391	7465	0.3661	0.4412
2009	9100	30429	19533	10002	0.5121	0.5271
2010	15126	42532	22211	12757	0.5743	0.6505
2011	4819	35473	21369	9900	0.4633	0.5306
2012	1693	29377	23561	6490	0.2755	0.4074
<b>2013</b>	<b>2678</b>	<b>26564</b>	<b>23747</b>	<b>7457</b>	<b>0.3140</b>	<b>0.4074</b>
<b>2014</b>	<b>7213</b>	<b>28679</b>	<b>20281</b>	<b>7520</b>	<b>0.3708</b>	<b>0.4074</b>
<b>2015</b>	<b>7213</b>	<b>30164</b>	<b>20679</b>			
Avg.61-12	15223	82685	57077	22221	0.4038	0.5066

Table 4.7.1. Faroe Plateau cod (sub-division Vb1). Input to management option table.

		Stock size	
		Age	2013 Source
		2	2678 XSA-output
		3	1346 XSA-output
		4	2561 XSA-output
		5	4149 XSA-output
		6	1035 XSA-output
		7	184 XSA-output
		8	88 XSA-output
		9	42 XSA-output
		10+	107 XSA-output

		Recr.	Source
2012	YC2010	1693	XSA-output
2013	YC2011	2678	XSA-output
2014	YC2012	7213	Average R 2010-12
2015	YC2013	7213	Average R 2010-12

Age	Maturity			Exploitation pattern (rescaled to last year)			Weights		
	Observed 2013	Av. 11-13 2014	Av. 11-13 2015	Av. 10-12 2013	Av. 10-12 2014	Av. 10-12 2015	As 2013 2013	As 2013 2014	Av.11-13 2015
2	0.24	0.10	0.10	0.0710	0.0710	0.0710	1.007	1.007	0.943
3	0.82	0.65	0.65	0.2194	0.2194	0.2194	1.315	1.315	1.332
4	0.95	0.83	0.83	0.3412	0.3412	0.3412	1.938	1.938	2.081
5	0.98	0.92	0.92	0.4095	0.4095	0.4095	2.411	2.411	3.002
6	1.00	0.97	0.97	0.5569	0.5569	0.5569	4.041	4.041	4.282
7	1.00	0.99	0.99	0.5100	0.5100	0.5100	5.058	5.058	5.236
8	1.00	1.00	1.00	0.4609	0.4609	0.4609	8.53	8.53	7.011
9	1.00	1.00	1.00	0.3872	0.3872	0.3872	7.62	7.62	7.322
10+	1.00	0.94	0.94	0.3872	0.3872	0.3872	8.848	8.848	9.381

Table 4.7.2. Faroe Plateau cod (sub-division Vb1). Management option table.

2013						
<b>Biomass</b>	<b>SSB</b>	<b>FMult</b>	<b>FBar</b>	<b>Landings</b>		
26564	23747	1.0000	0.4074	7458		
2014						
<b>Biomass</b>	<b>SSB</b>	<b>FMult</b>	<b>FBar</b>	<b>Landings</b>	2015	
<b>Biomass</b>	<b>SSB</b>				<b>Biomass</b>	<b>SSB</b>
28679	20281	0.0000	0.0000	0	39532	29579
.	20281	0.1000	0.0407	910	38394	28493
.	20281	0.2000	0.0815	1780	37306	27456
.	20281	0.3000	0.1222	2612	36267	26467
.	20281	0.4000	0.1630	3408	35274	25522
.	20281	0.5000	0.2037	4170	34325	24620
.	20281	0.6000	0.2445	4899	33417	23758
.	20281	0.7000	0.2852	5598	32549	22935
.	20281	0.8000	0.3259	6266	31718	22149
.	20281	0.9000	0.3667	6906	30924	21397
.	20281	1.0000	0.4074	7520	30164	20679
.	20281	1.1000	0.4482	8108	29436	19993
.	20281	1.2000	0.4889	8671	28739	19337
.	20281	1.3000	0.5296	9211	28072	18709
.	20281	1.4000	0.5704	9729	27434	18109
.	20281	1.5000	0.6111	10226	26822	17535
.	20281	1.6000	0.6519	10703	26235	16986
.	20281	1.7000	0.6926	11160	25673	16460
.	20281	1.8000	0.7334	11599	25135	15957
.	20281	1.9000	0.7741	12021	24618	15476
.	20281	2.0000	0.8148	12426	24123	15015

Input units are thousands and kg - output in tonnes



Table 4.8.1. Faroe Plateau cod (sub-division Vb1). Input to yield per recruit calculations (long term prediction).

	Expl. pattern	Weight at age	Prop mature
Age	Average 2001-2012 Not rescaled	Average 1978-2012	Average 1983-2013
2	0.1138	1.0395	0.08
3	0.3362	1.5647	0.57
4	0.4412	2.2704	0.84
5	0.5372	3.0638	0.94
6	0.6721	3.8379	0.98
7	0.7859	4.8622	0.99
8	0.8122	6.0937	1.00
9	0.9906	7.6254	1.00
10+	0.9906	9.5570	0.99

Table 4.8.2. Faroe Plateau cod (sub-division Vb1). Output from yield per recruit calculations (long term prediction).

Reference point	F multiplier	Absolute F
$F_{\text{bar}(3-7)}$	1.0000	0.5545
$F_{\text{Max}}$	0.4539	0.2517
$F_{0.1}$	0.2085	0.1156
$F_{35\%SPR}$	0.3157	0.1750
$F_{\text{low}}$	0.1886	0.1046
$F_{\text{med}}$	0.7258	0.4025
$F_{\text{high}}$	1.7138	0.9503

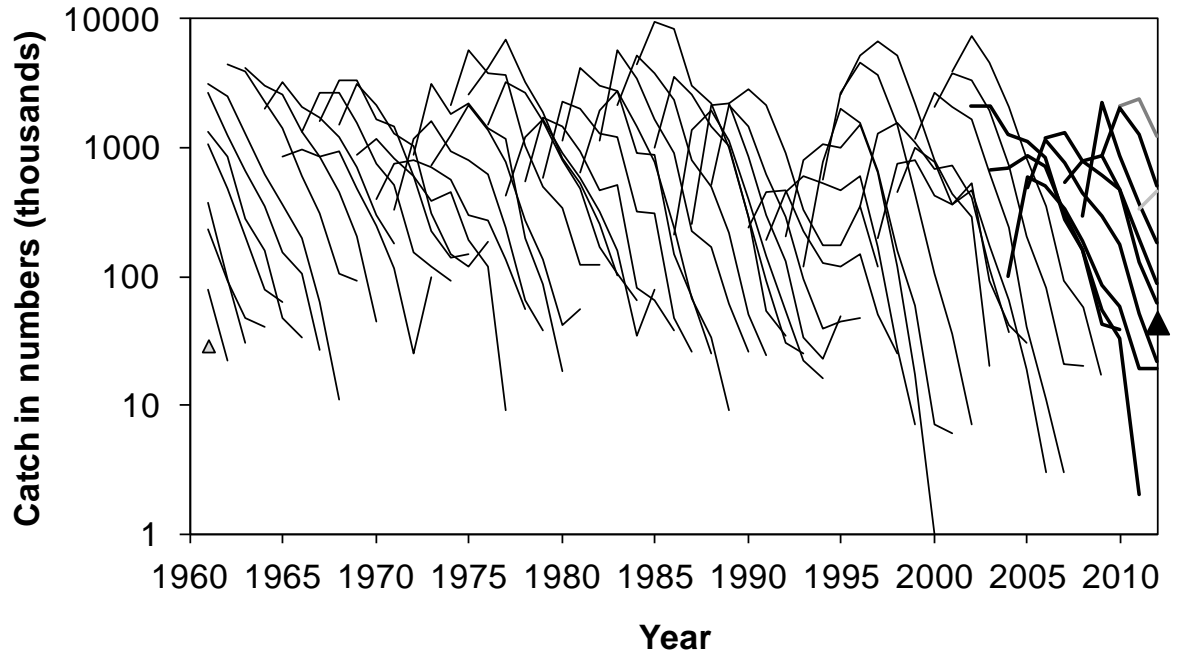


Figure 4.2.1. Faroe Plateau cod (sub-division Vb1). Catch in numbers at age shown as catch curves.

Commercial landings

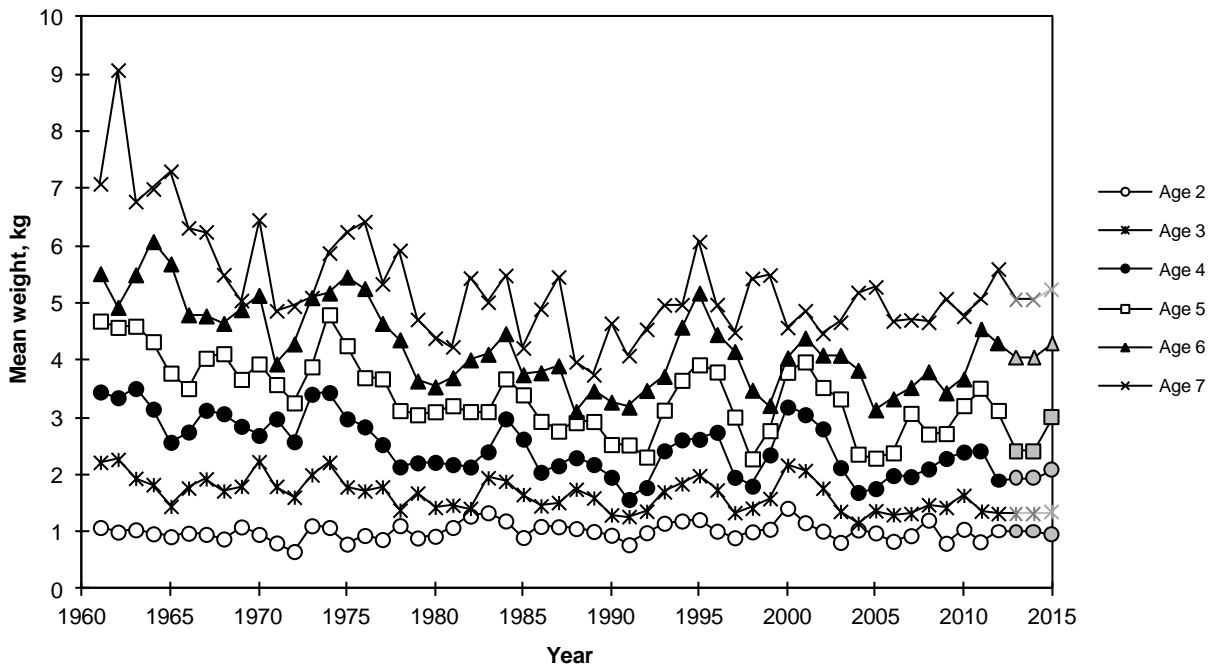


Figure 4.2.2. Faroe Plateau cod (sub-division Vb1). Mean weight at age 1961-2012. The estimated weights in 2012 are also shown. The weights in 2014 are set to the 2013 values. The weights in 2015 are set to the average values for 2011-2013.

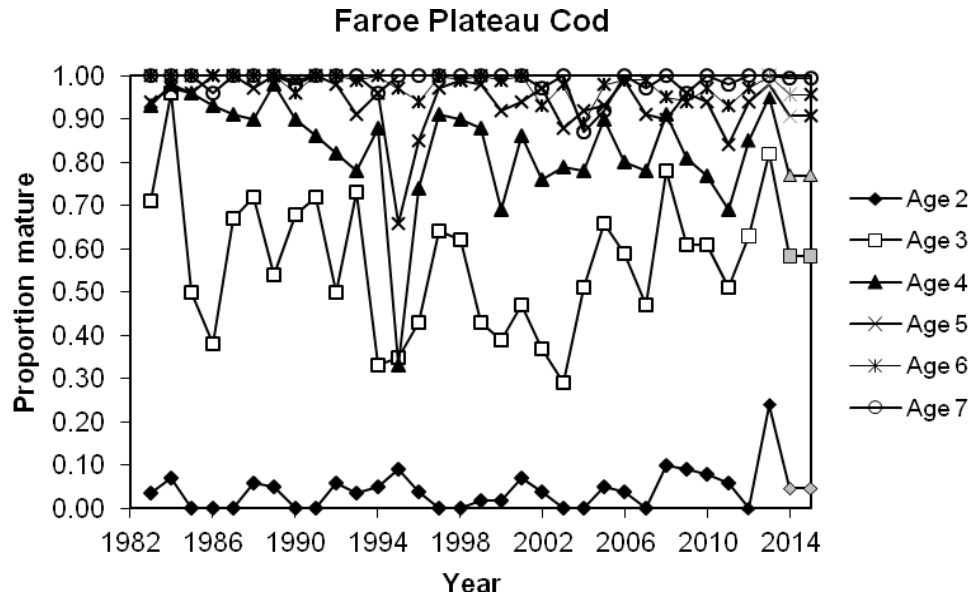


Figure 4.2.3. Faroe Plateau cod (sub-division Vb1). Proportion mature at age as observed in the spring groundfish survey. The values in 2014 and 2015 are estimated as the average of the 2011-2013 values.

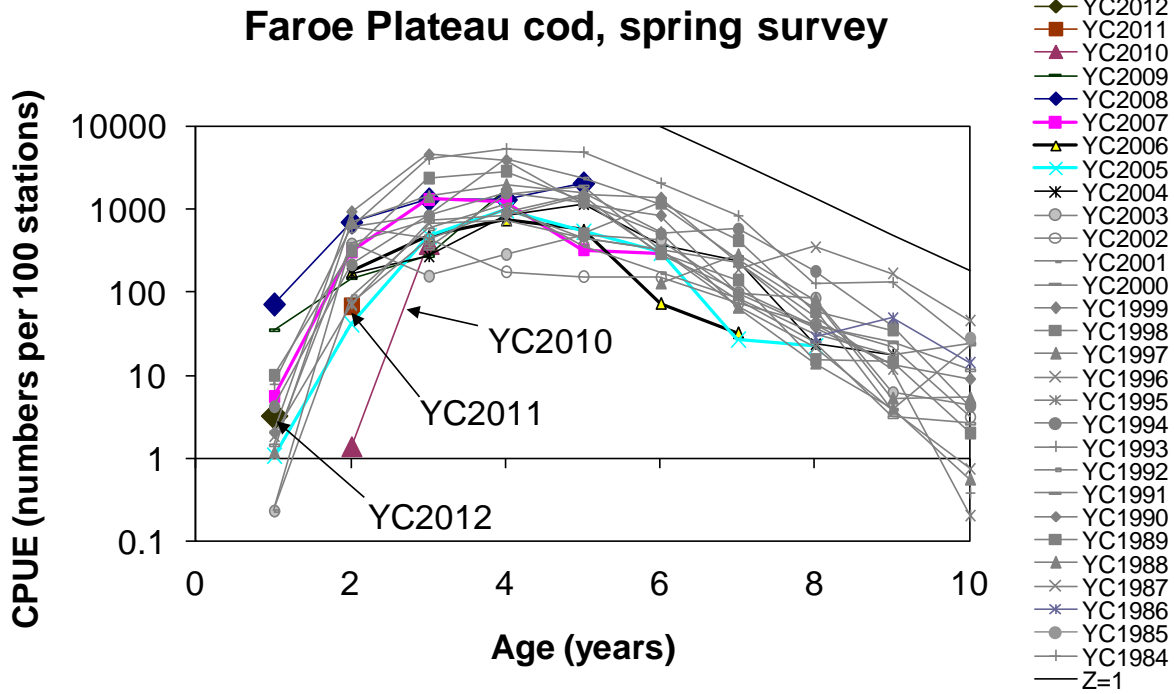


Figure 4.2.4. Faroe Plateau cod (sub-division Vb1). Catch curves from the spring groundfish survey.

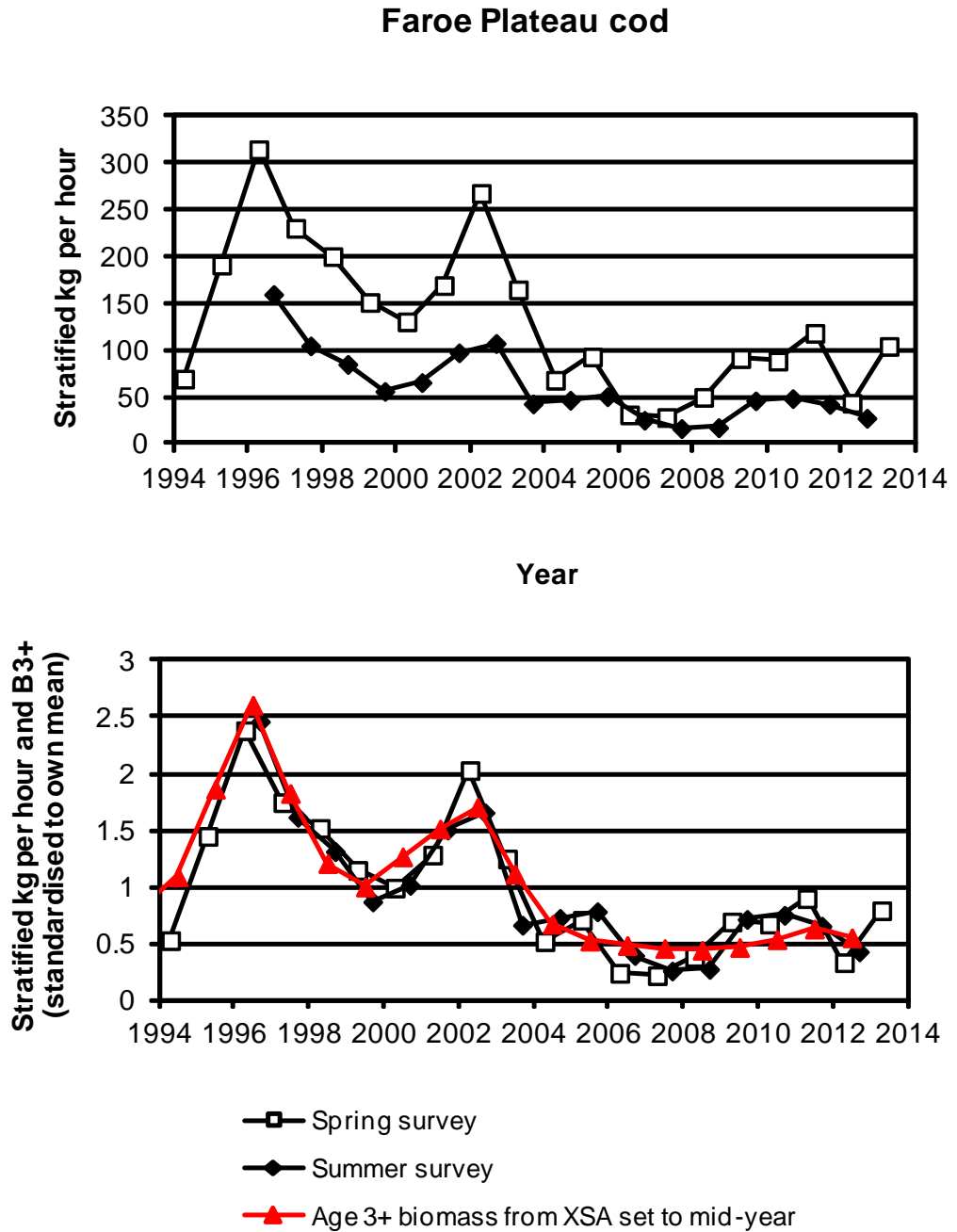


Figure 4.2.5. Faroe Plateau cod (sub-division Vb1). Stratified kg/hour in the spring and summer surveys (upper figure). The age 3+ biomass obtained from the assessment is also included as an index.

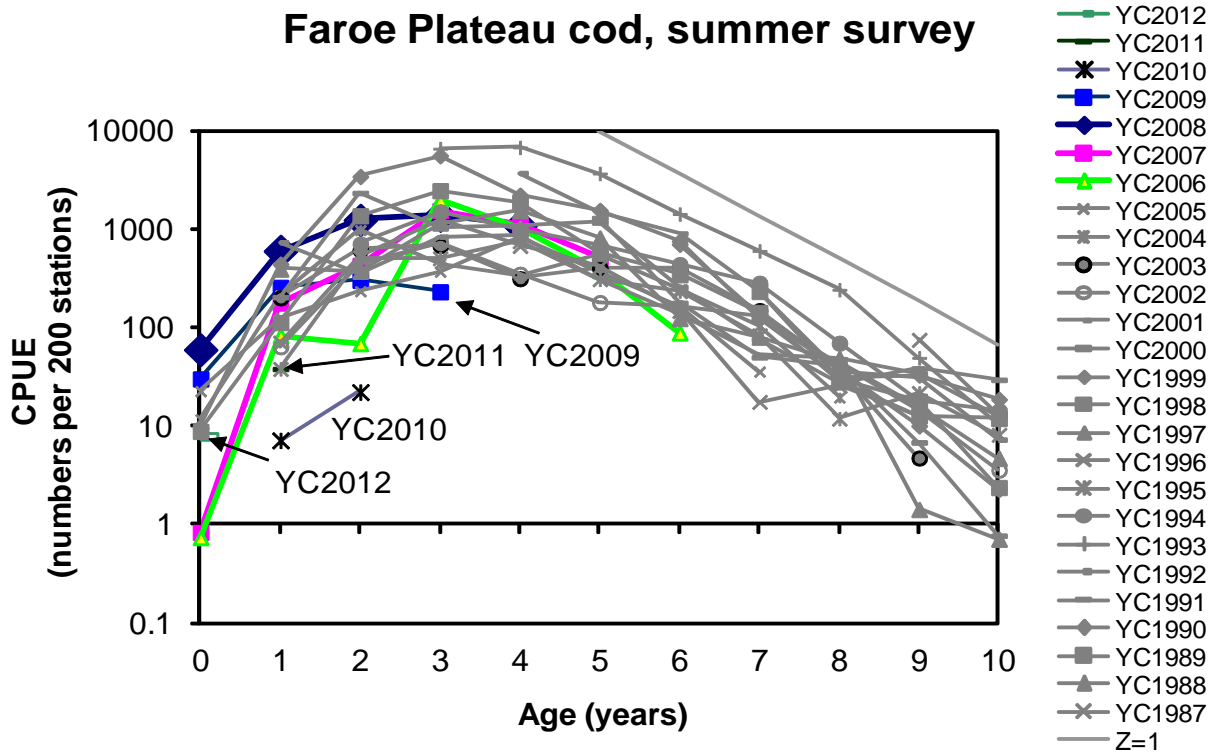


Figure 4.2.6. Faroe Plateau cod (sub-division Vb1). Catch curves from the summer groundfish survey.

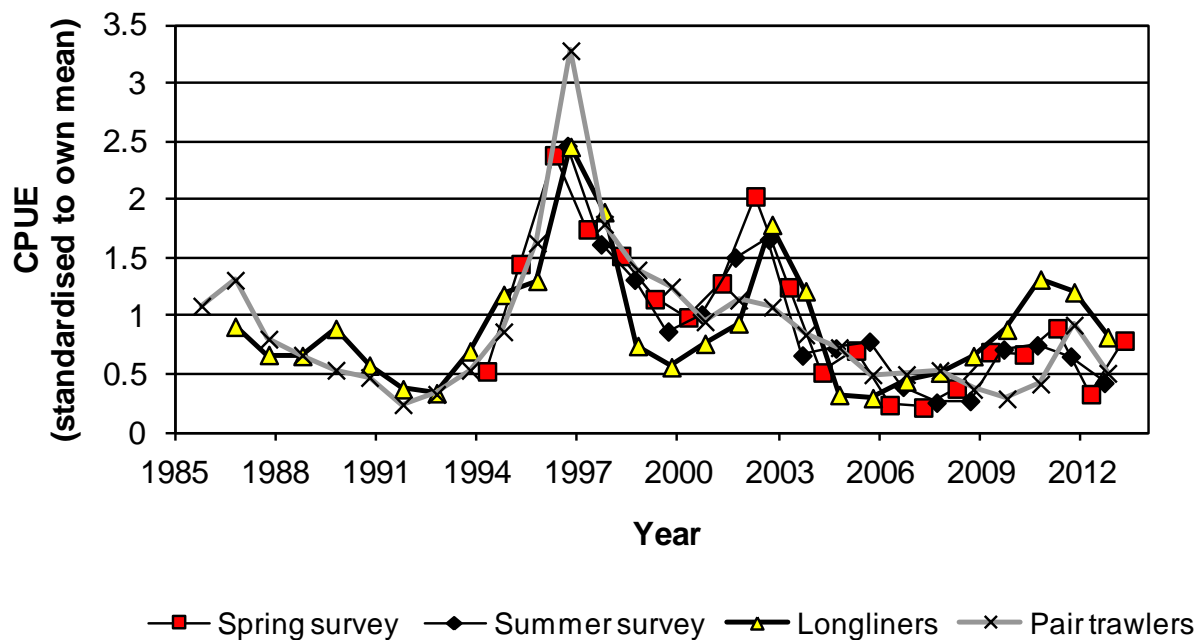


Figure 4.2.7. Faroe Plateau cod (sub-division Vb1). Standardised catch per unit effort for pair trawlers and longliners. The two surveys are shown as well.

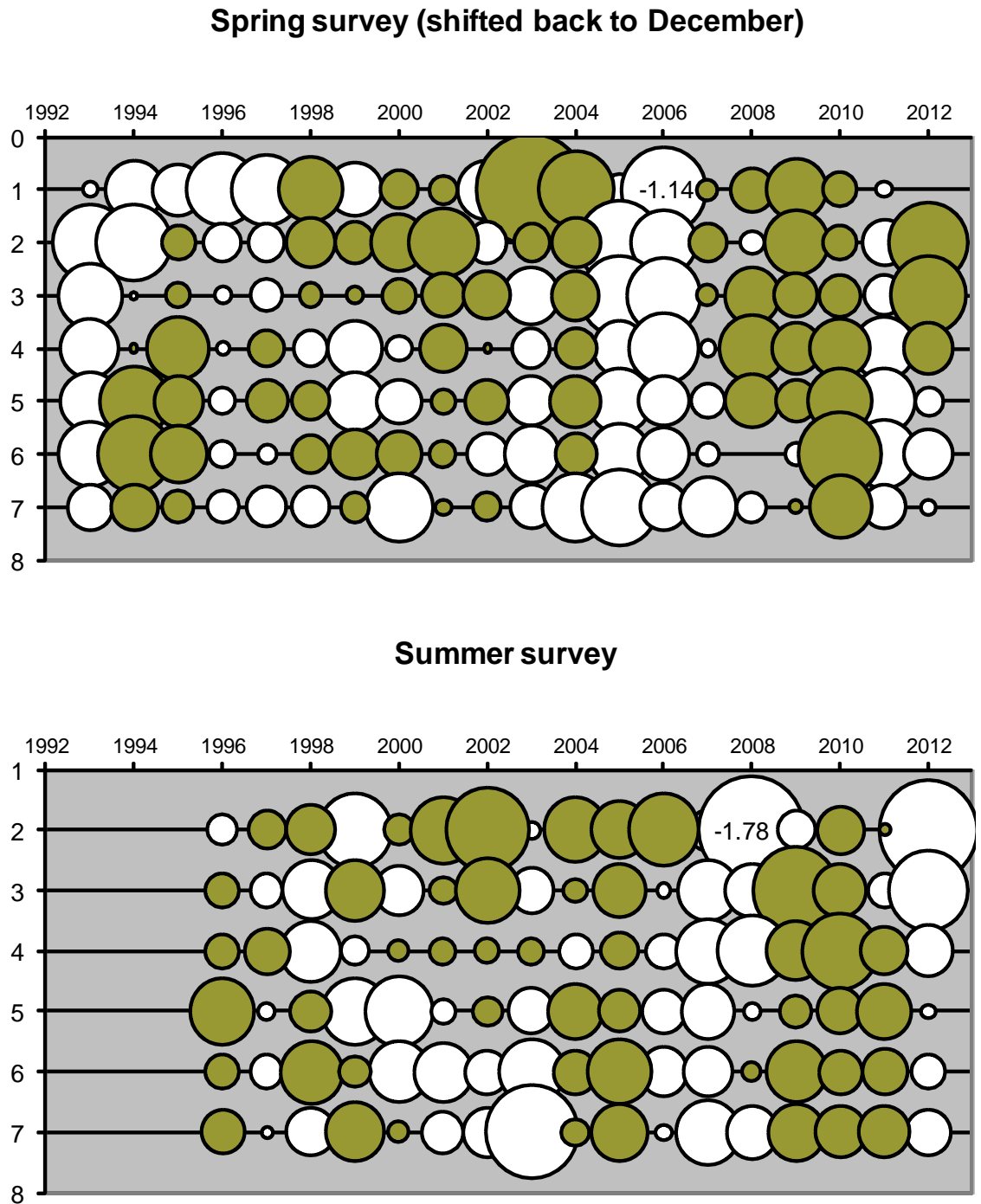


Figure 4.6.1. Faroe Plateau cod (sub-division Vb1). Log catchability residuals for age 2 to 7 for the spring (upper figure) and summer survey. The residuals for age 8 are not presented because some values were off scale. White bubbles indicate negative residuals.

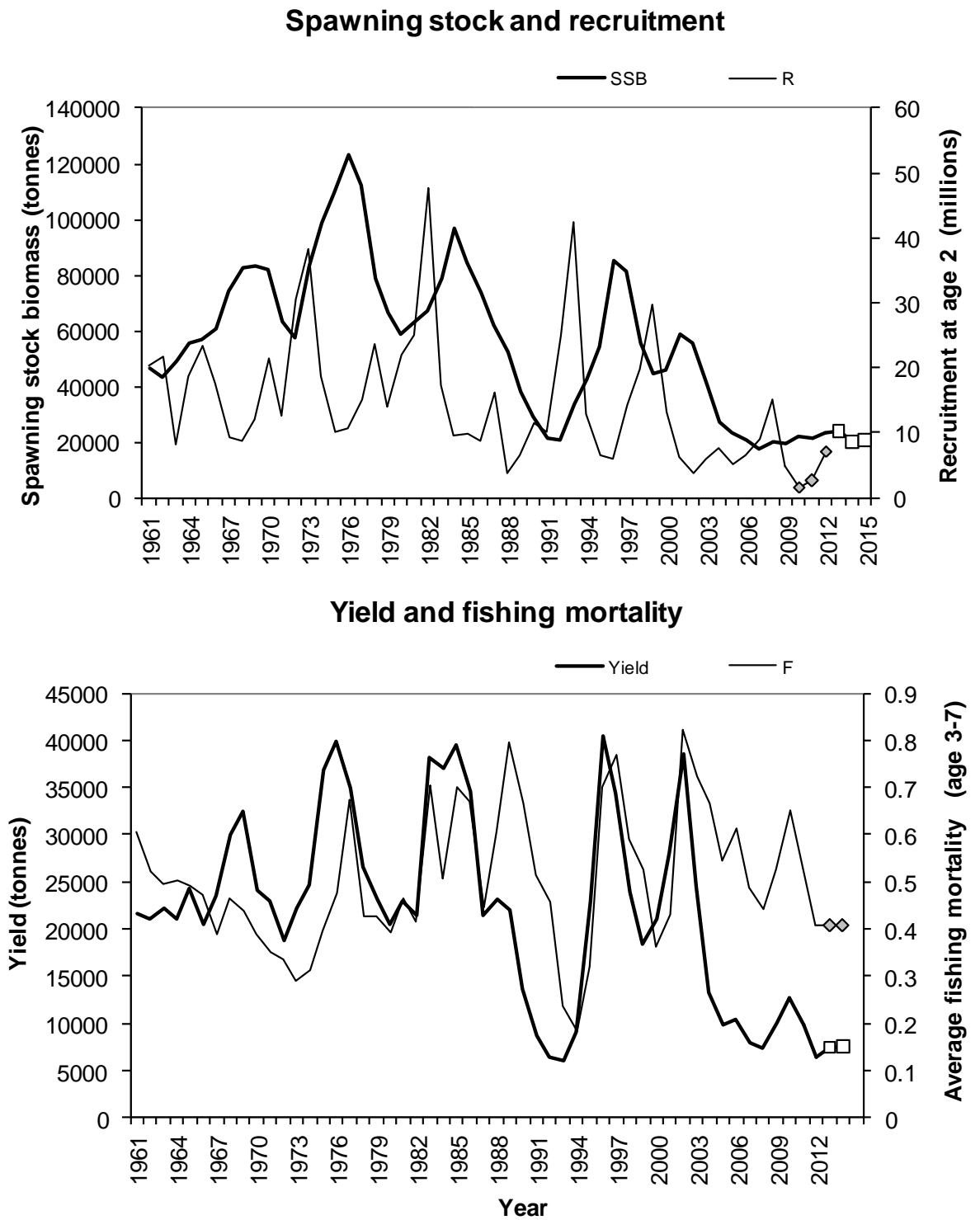


Figure 4.6.2. Faroe Plateau cod (sub-division Vb1). Spawning stock biomass (SSB) and recruitment (year class) versus year (upper figure) and yield and fishing mortality versus year. Points (white and grey) are taken from the short term projections.

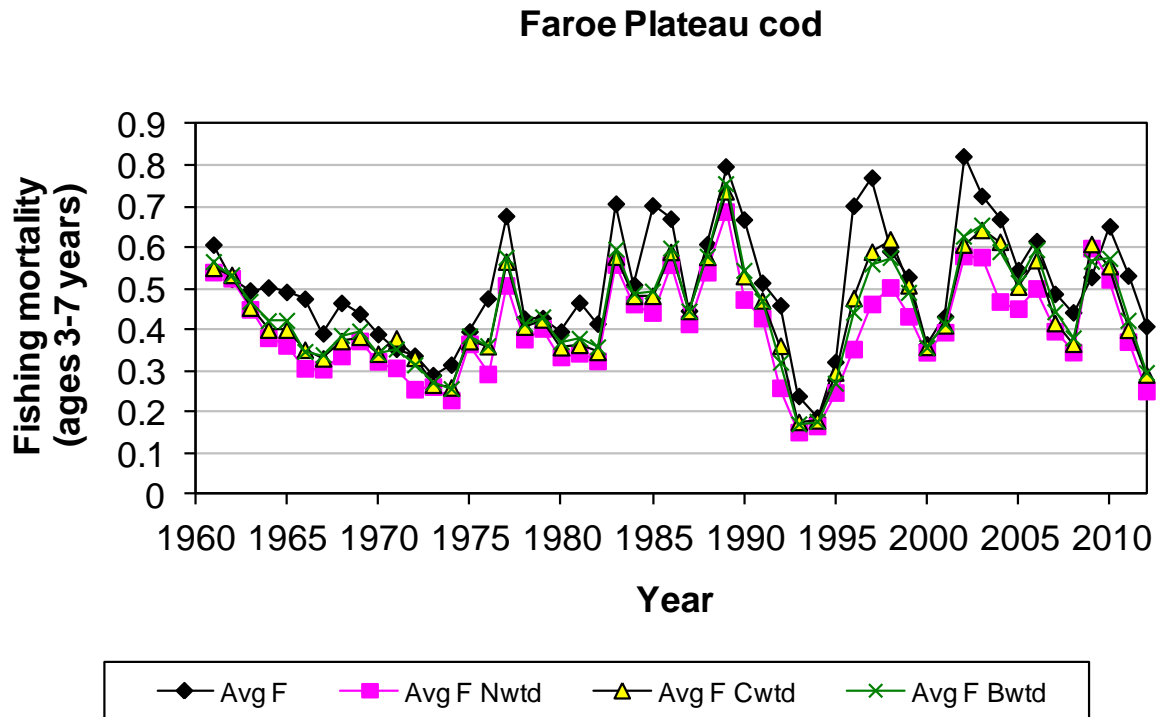


Figure 4.6.3. Faroe Plateau cod (sub-division Vb1). Different measures of fishing mortality: straight arithmetic average (Avg F), weighted by stock numbers (Nwtd), weighted by stock biomass (Bwtd) or weighted by catch (Cwtd).



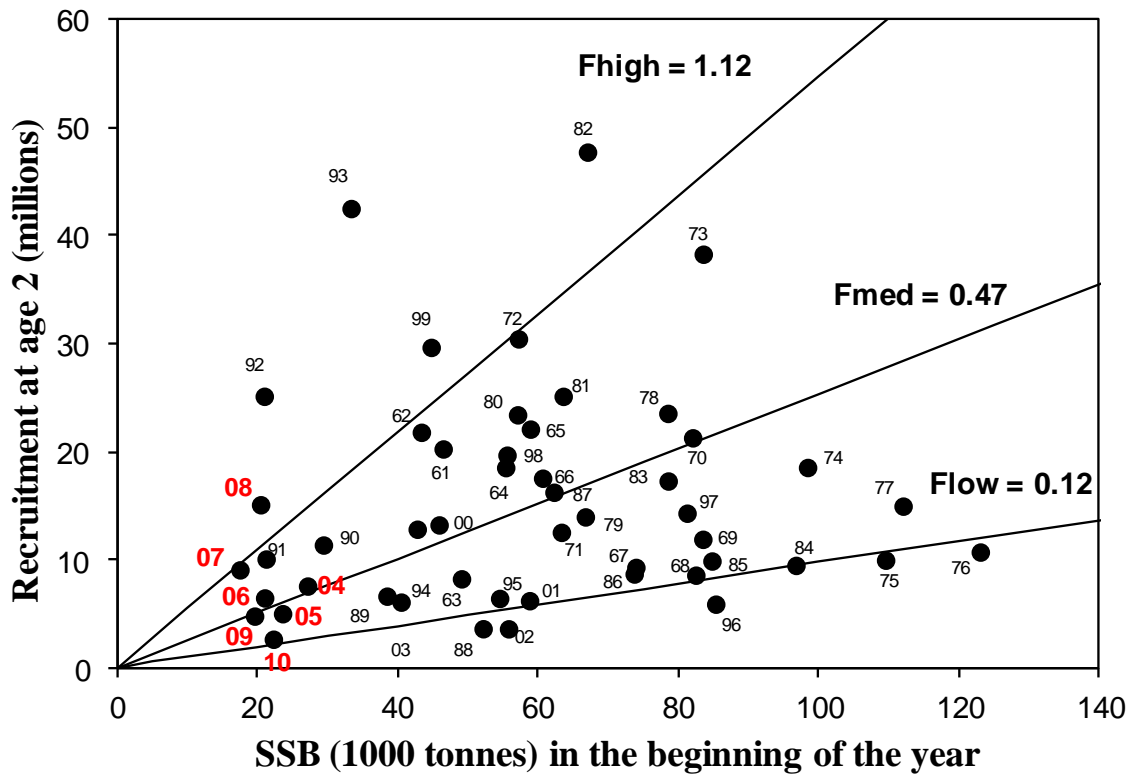


Figure 4.6.4. Faroe Plateau cod (sub-division Vb1). Spawning stock – recruitment relationship 1961-2009. Years are shown at each data point.

### Precautionary Approach Plot Period 1961-2013

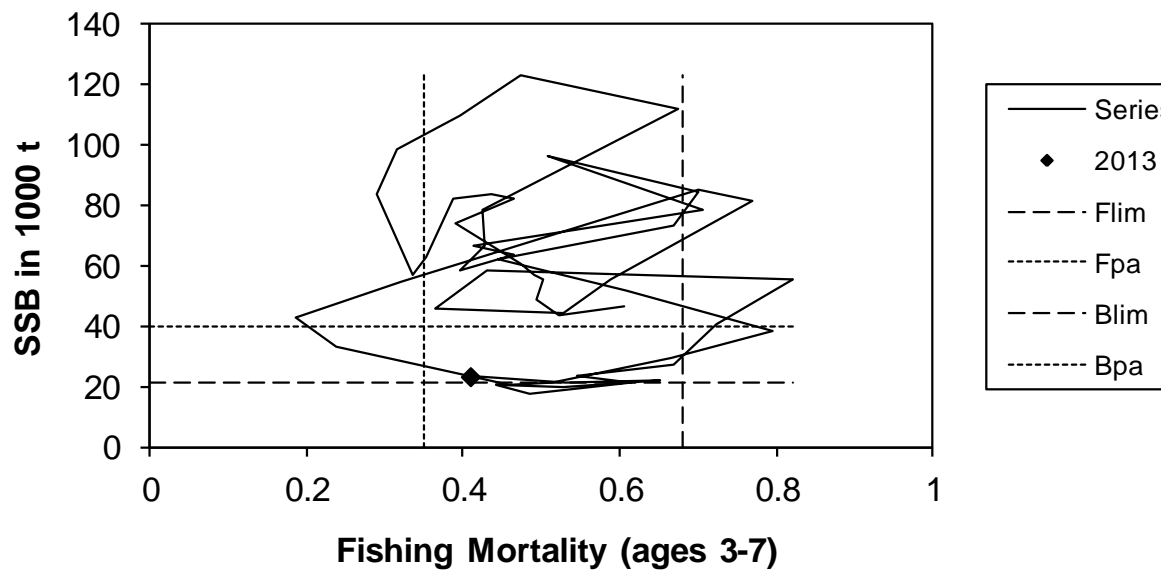


Figure 4.6.5. Faroe Plateau cod (sub-division Vb1). Spawning stock biomass versus fishing mortality 1961-2012.

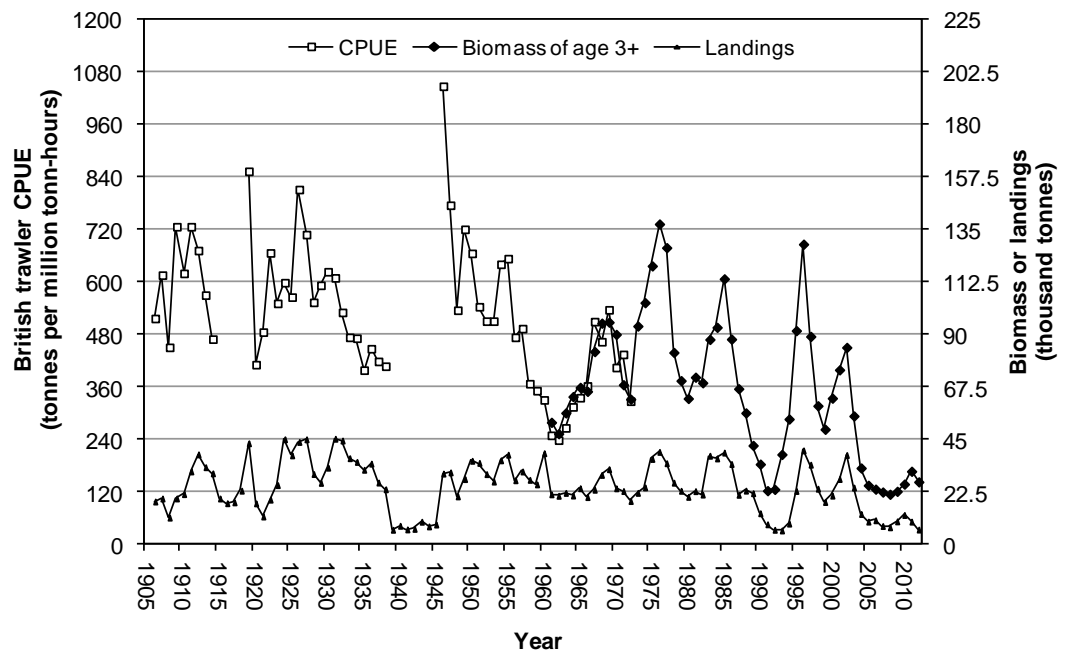
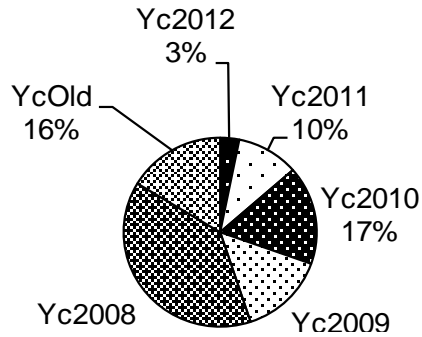


Figure 4.6.6. Faroe Plateau cod (sub-division Vb1). Stock development 1906-2012 based on cpues from british steam trawlers (1906-1925: cwts per days of absence from port), cpues from british trawlers (1924-1972: tonnes per million tonn hours) and the XSA-estimates (1961-2010: absolute biomass). The 1906-1925 series was scaled to the 1924-1972 series and the CPUEs refer to the first (left) axis while the XSA-estimates refer to the second axis.

SSB 2014



SSB 2015

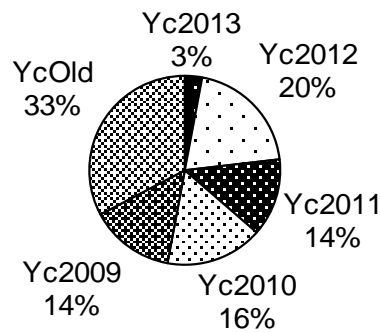


Figure 4.7.1. Faroe Plateau cod (sub-division Vb1). Contribution of various year classes to the spawning stock biomass in 2014 (upper figure) and 2015.

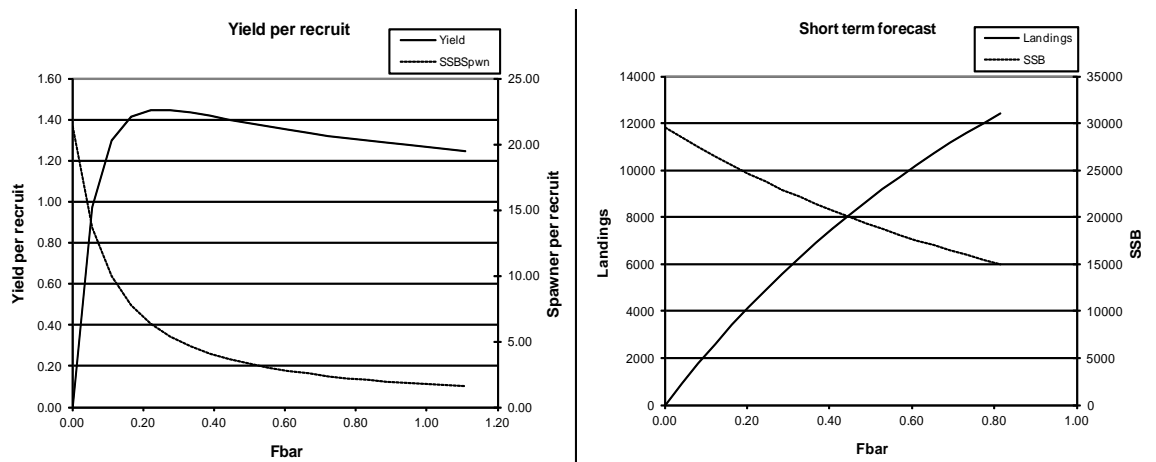


Figure 4.8.1. Faroe Plateau cod (sub-division Vb1). Yield per recruit and spawning stock biomass (SSB) per recruit versus fishing mortality (left figure). Landings and SSB versus Fbar (3-7).

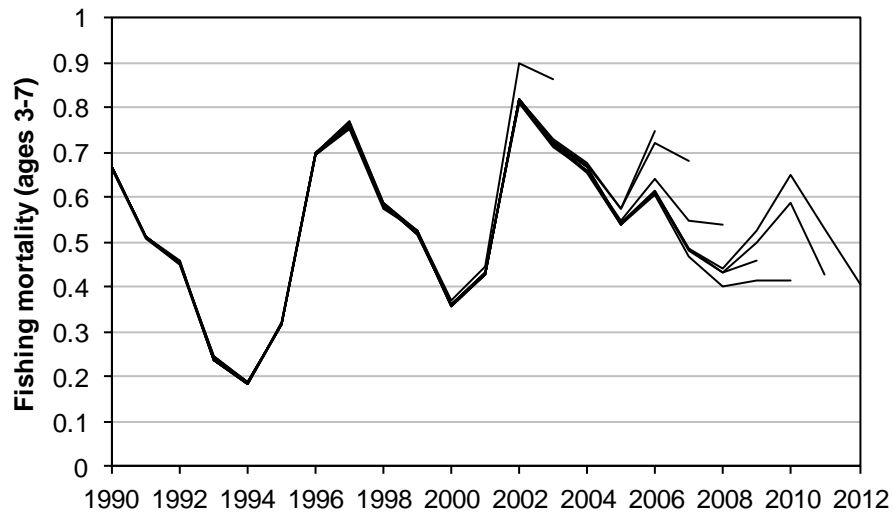


Figure 4.9.1. Faroe Plateau cod (sub-division Vb1). Results from the XSA retrospective analysis of fishing mortality (ages 3-7).

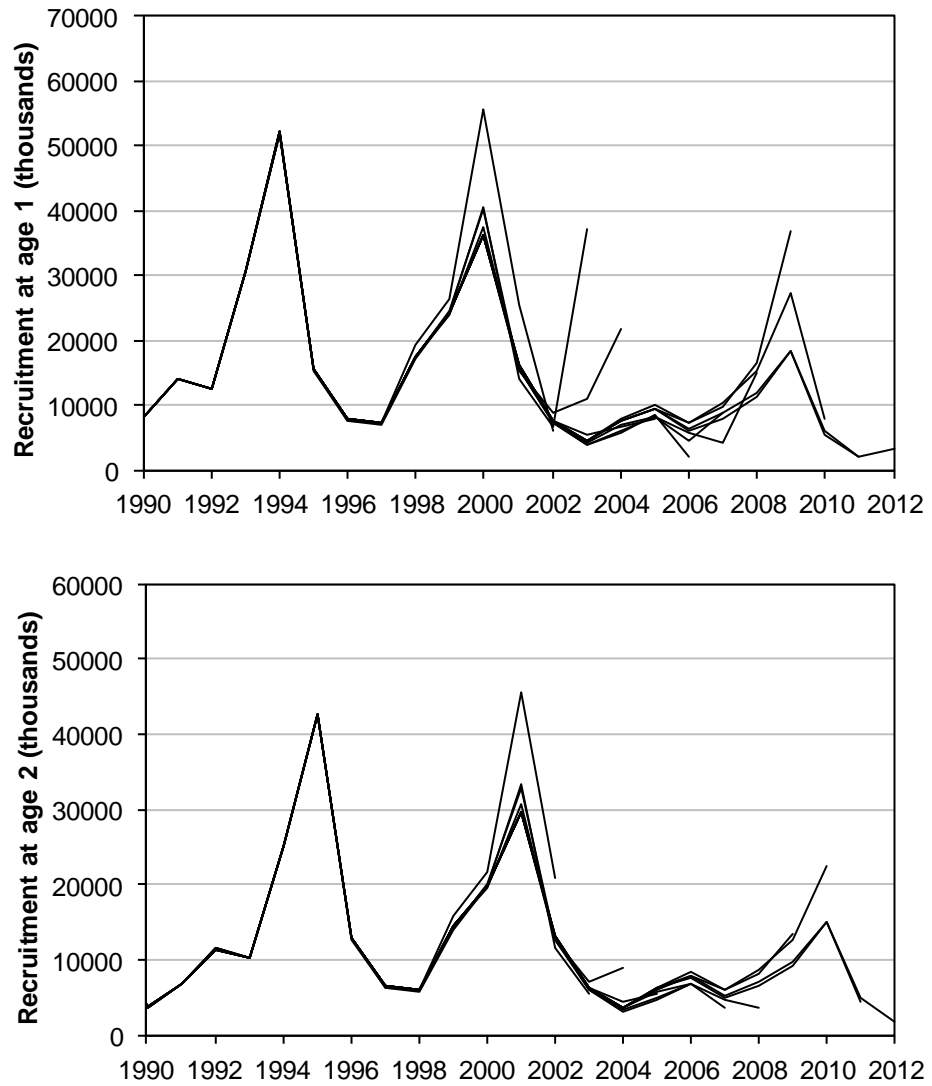


Figure 4.9.1. Faroe Plateau cod (sub-division Vb1). Results from the XSA retrospective analysis (continued). Recruitment at age 1 (upper figure) and at age 2.

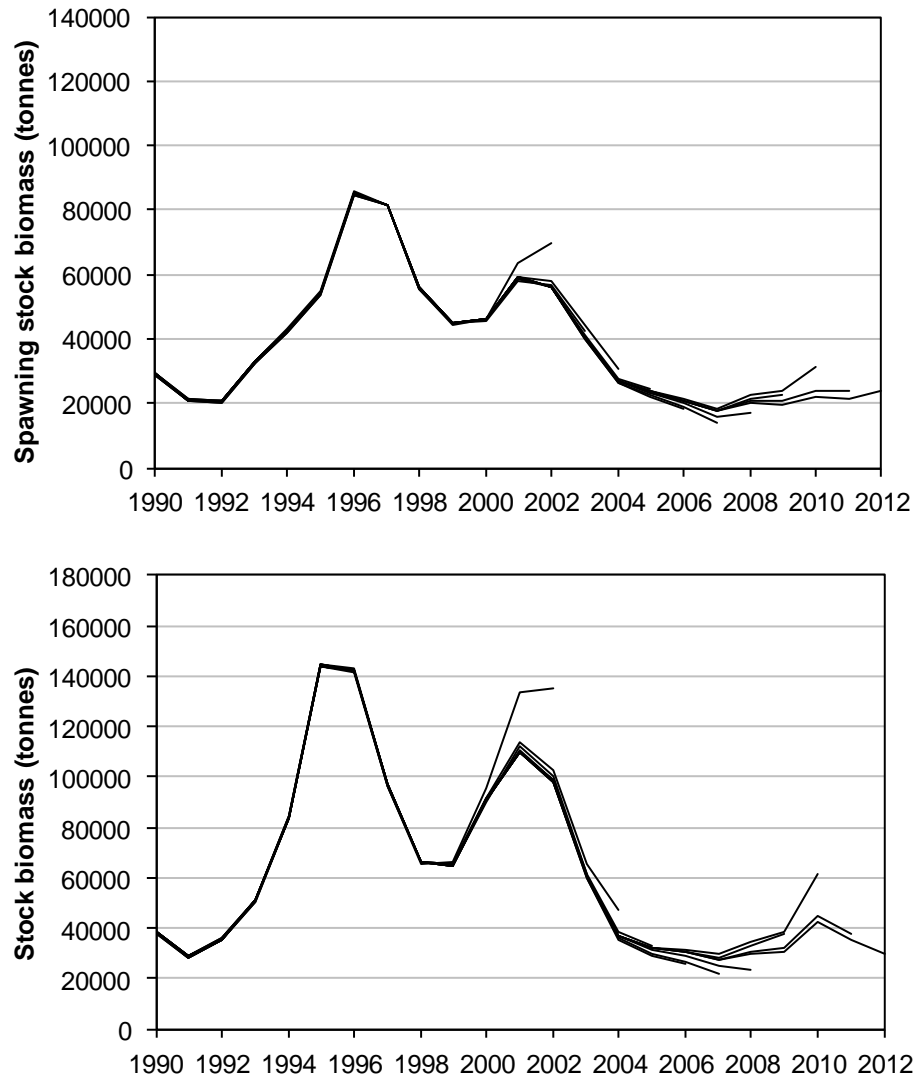


Figure 4.9.1. Faroe Plateau cod (sub-division Vb1). Results from the XSA retrospective analysis (continued). Spawning stock biomass (upper figure) and total stock biomass.

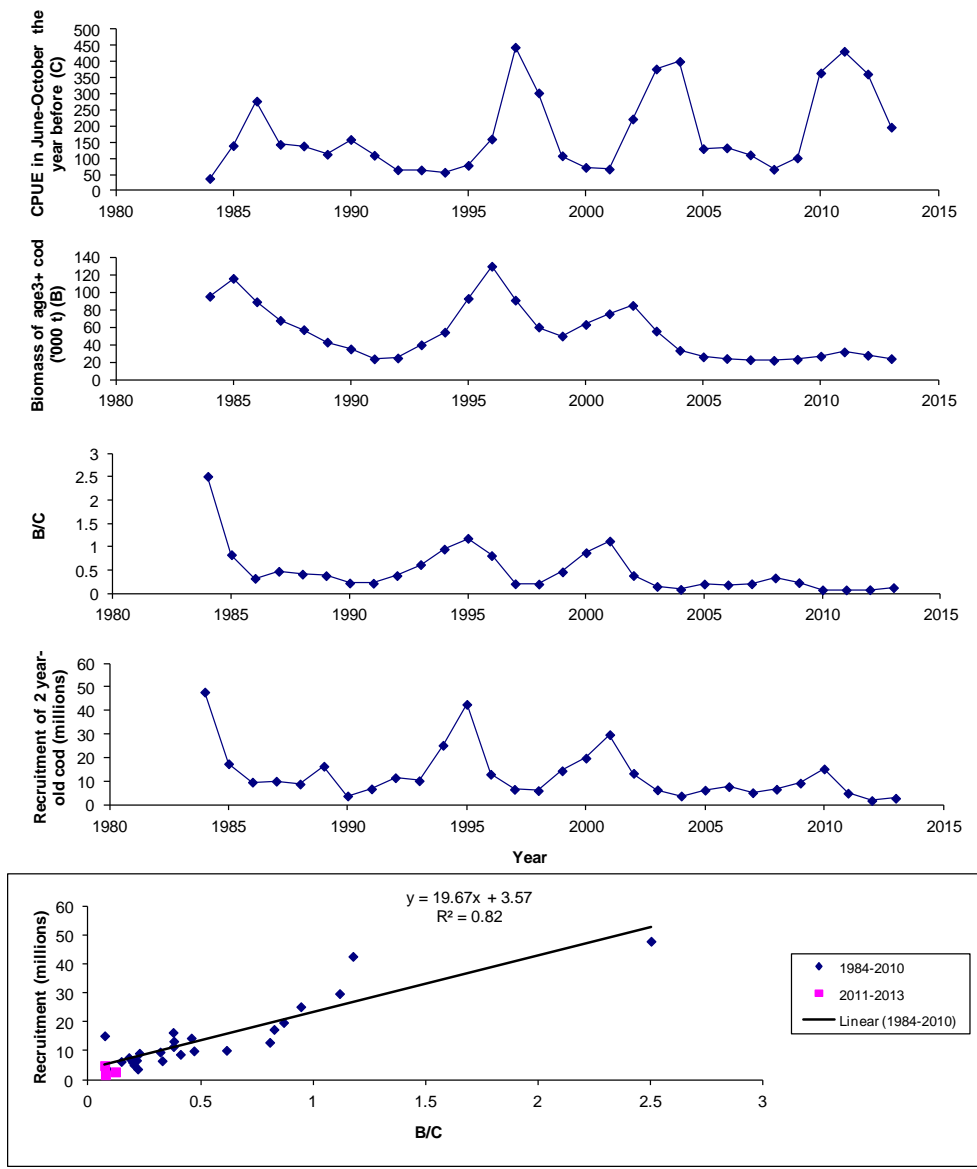


Figure 4.9.2. Faroe Plateau cod (sub-division Vb1). Modelling cod recruitment in three steps. First, the catch-per-unit –effort of cod (C) for small boats operating close to land, as being indicative of the amount of cannibalistic cod. Second, the amount of cod (older than the recruiting cod) (B), as being indicative of e.g. the amount of schools to which recruiting cod can join and hide in. Third, the ratio between B and C, as indicative of recruitment success. Fourth and fifth, a comparison with observed recruitment. Note that the model predicts that the recruitment in 2011-2013 (YC 2009 to 2011) is very poor.

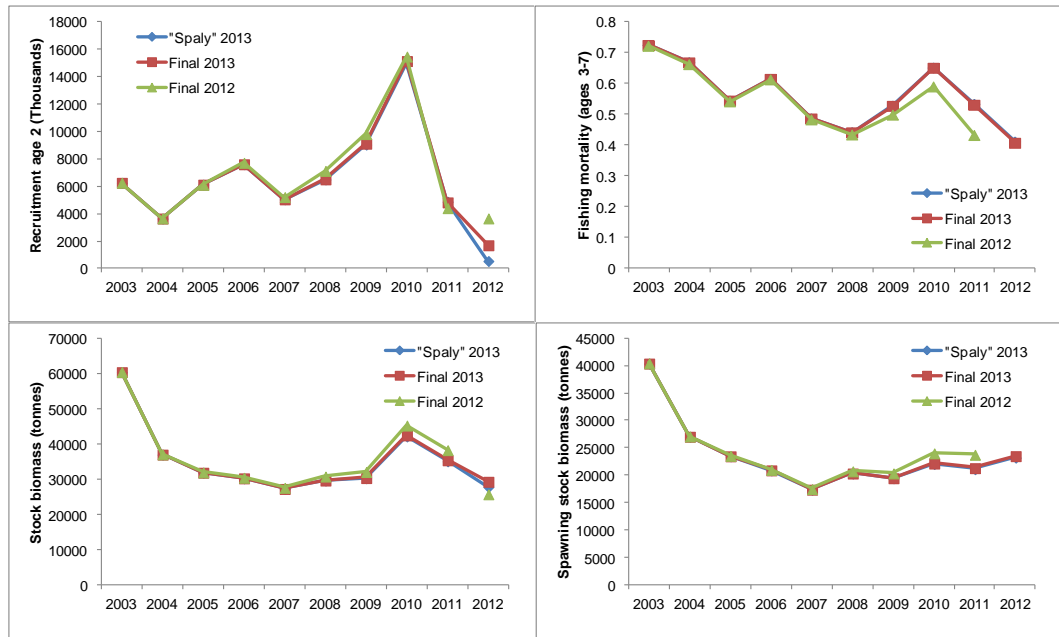


Figure 4.10.1. Faroe Plateau cod (sub-division Vb1). Comparison between the results from the current assessment (Final 2013), "Spaly" 2013 and last years final (Final 2012) for recruitment (upper left), fishing mortality (upper right), stock biomass (lower left) and spawning stock biomass (lower right).