

## 6 Faroe Saithe

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### Executive summary

The most recent benchmark assessment was completed in 2005. The 2006-2009 assessments have been rejected because of a retrospective pattern believed to be due to decreased size at age. As size at age has not increased markedly, the retrospective pattern, which underestimates stock size and overestimates fishing mortality, is expected to continue to exist.

The working group concludes that the XSA assessment is useful to indicate stock trends, although the values themselves may be questionable.

Recent year classes are probably underestimated because of changes in catchability ( $q$ ) due to slower growth, and fishing mortality is probably overestimated. The Faroe saithe total biomass is estimated to be above average in 2008, whereas the spawning stock biomass is estimated below average for the whole time series back to 1961.

For Faroe saithe, the highest recruitment has been observed at or near the lowest SSB. The NWWG in 2007 therefore suggested that Bloss should be used as Bpa, not Blim. The working group recommended that Bpa for saithe be set at Bloss = 60 000t and that Blim be set at an arbitrarily lower value (45-50 000t) until more stock and recruitment data pairs are observed below Bloss. NWWG 2009 re-iterates this recommendation. Fishing mortality reference points need to be further considered.

### 6.1 Stock description and management units.

See the stock annex.

### 6.2 Scientific data

#### 6.2.1 Trends in landings and fisheries

Nominal landings of saithe from the Faroese grounds (Division Vb) have varied cyclically between 10 000 t and 68 000 t since 1960. After a third high of about 60 000 t in 1990, landings declined steadily to 20 000 t in 1996. Since then landings have increased to 68 000 tonnes in 2005 (Table 6.2.1.1, Figure 6.2.1.1) but has declined slightly to 57 000 tonnes in 2008.

Since the introduction of the 200 miles EEZ in 1977, the saithe fishery has been prosecuted mostly by Faroese vessels. The principal fleet consists of large pair trawlers (>1000 HP), which have a directed fishery for saithe, about 50 - 60% of the reported landings in 1992-2008 (Table 6.2.1.2). The smaller pair trawlers (<1000 HP) and larger single trawlers have a more mixed fishery and they have accounted for about 10-20% of the total landings of saithe in the 1997–2008 period while larger single trawlers contributed about 20% in 2008. The share of catches by the jigger fleet only account for 3 % of the total landings in 2008.

Cumulative landings of saithe from January to March in 2009 are shown in Figure 6.2.1.2, together with cumulative landings in the recent years.

Catches used in the assessment are presented in Table 6.2.1.1. Foreign catches that have been reported to the Faroese Authorities but not officially reported to ICES are also included in the Working Group estimates. Catches in Subdivision IIa, which lies

immediately north of the Faroes, have also been included. Little discarding is thought to occur in this fishery.

### **6.2.2 Catch at age**

Catch at age is based on length, weight and otoliths samples from Faroese landings of small and large single and pair trawlers, and landing statistics by fleet provided by the Faroese Authorities. Catch at age was calculated for each fleet by four-month periods and the total was raised by the foreign catches. The catch-at-age data for previous years were also revised according to the final catch statistics (Tables 6.2.2.1 and 6.2.2.2). Sampling intensity in 2008 was less than that in previous years (Table 6.2.2.3).

### **6.2.3 Weight at age**

Mean weights at age have varied by a factor of about 2 during the 1961–2008 period. Mean weights at age were generally high during the early 1980s and they subsequently decreased from the mid 1980s to the early 1990s (Table 6.2.3.1 and Figure 6.2.3.1). Mean weights increased again in the period 1992-96 but have shown a general decrease thereafter. Since 2006 weights at age for some age groups have showed a slight increase.

The observed decline in weights at age since the mid-1990s may cause overestimation in the catchability parameter (estimated as the ratio of tuning fleet CPUE at age by predicted numbers at age from the XSA assessment). The relation between catchability and weights at age (Figure 6.2.3.2) suggests that the former has declined in recent years.

Lower catchabilities will affect the assessment, in that partially recruited ages will be underestimated in the tuning when weights at age are low. These year classes will subsequently show up as stronger than initially estimated as they recruit to the fishery and appear in the catches. The SOP for weight at age in 2008 was 100%.

### **6.2.4 Maturity at age**

Maturity at age data from the spring survey is available from 1983 onward (Steingrund, 2003). Due to poor sampling in 1988 the proportion mature for that year was calculated as the average of the two adjacent years. The working group examined various smoothers in previous meetings and decided to use a three years running average to predict the maturity at age; this was repeated for 1983-2008 (Table 6.2.4.1 and Figure 6.2.4.1.) For 1961 to 1982, the average maturity at age for 1983 to 1996 was used. The proportion mature for most ages has been slightly increasing in recent years.

### **6.2.5 Indices of stock size**

#### **6.2.5.1 Surveys**

Two survey indices conducted in the spring and the summer time are available to the Working Group. However the survey series have not been aiming due to high CVs. In order to address this issue, a data-driven post-stratification analysis was applied in 2008. The analysis suggested that the optimal number of strata to estimate relative stock abundances should be between 5 and 7 for both surveys. The new stratification results in less variable survey estimates while improving year class consistency from one year to the next (Ridao Cruz, L. 2008, WD 5). The NWWG agreed this approach should be explored further. The survey data were not used in the 2008 SPALY (Same

Procedure as Last Year) XSA assessment but they were used in an exploratory XSA using FLR, in NFT ADAPT and in TSA (2008 assessment report). In 2009 the assessment was updated and therefore survey indices were not used. Trends in CPUEs from both surveys are presented in Figure 6.2.5.1.1.

#### **6.2.5.2 Commercial CPUE**

The CPUE series that has been used in the assessment since 2000 was introduced in 1998 (ICES C.M. 1998/ACFM:19), and consists of saithe catch at age and effort in hours, referred to as the pair trawler series. All vessels use 135mm mesh size, the catch is stored on ice on board and landed as fresh fish. The data on which the tuning series are based origin from all available logbooks from the above mentioned trawlers since 1995. The data are stored in the database at the Faroe Marine Research Institute in Torshavn where their quality is controlled and the logbooks are corrected if necessary. Effort is estimated as the number of fishing (trawling) hours, i.e. from when the trawl meets the bottom until hauling starts. It is not possible to get effort as fishing days because the logbooks do not tell when the trip ends (day and time). The series is based on data from 4-10 pair trawlers greater than 1000 HP which have specialized in fishing on saithe and account for 5 000-10 000 t of saithe each year. During 2002-2005 four pairs of these trawlers left the fleet. In 2004 and 2005 two new pairs of trawlers (>1000 HP) were introduced in the tuning series; one pair had been fishing saithe since 1986 and the other since 1995. These two new pairs showed approximately the same trends as the other pair trawlers in the series during 1999-2003. In 2009 two new pairs of trawlers were used to extend the tuning series (referred as pair 7 and 8). The observed CPUE for the new trawlers are well above that of the existing pairs but show roughly the same trend (Figure 6.2.5.2.1).

In the CPUE at age series (1995-2008) information for each haul was supplied and only those hauls where saithe contributed to more than 50% of the total catches were used. The effort distribution of the pair trawl fleet (hauls) since 1995 is presented in Figure 6.2.5.2.2.

A systematic check of the age based indices from the different pairs of the commercial series showed that there were differences between the pairs (ICES C.M. 2005/ACFM:21), especially in 2004. A GLM model was used to standardize the CPUE-data (WD 37, 2005) including year, month, pair, effort and statistical square as explanatory variables for the 1995-2007 period.

During the 2009 meeting, some of the GLM results seemed unreasonable. Hence, a simple standardization process was applied. The fishing area was standardized to four statistical squares, where the pair trawlers fished most of the time. The two new pairs were scaled down to the level of the old pair trawlers (simple regression with one parameter to be estimated). The CPUE of this year tuningseries is showed in Figure 6.2.5.2.3.

### **6.3 Information from the fishing industry**

There is no direct information from the fishing industry.

### **6.4 Methods**

The 2005 Faroe saithe assessment was a benchmark assessment, where several different settings and combinations of tuning series were run in the XSA (WD 16, 2005). The 2006-2007 assessments were not accepted because of the catchability problem discussed above (see section 6.2.2). The 2009 SPALY XSA assessment, with extended

tuning series, described below uses the assessment formulation accepted at the last benchmark assessment in 2005 and explores the implications for providing scientific advice.

The 2009 SPALY XSA is calibrated with the standardized pair trawlers with catchability independent of stock size for all ages, catchability independent of age for ages  $\geq 8$ , the shrinkage of the SE of the mean = 2.0, and no time tapered weighting. The tunings series used are shown in Table 6.4.1. The diagnostics are in Table 6.4.2 and the outputs from these are presented in Tables 6.4.3-5. Log catchability residuals are relatively random in recent years (Figure 6.4.1). In the 2009 assessment, the recruitment estimate from the XSA calibration was adjusted down to the highest previously observed (Figure 6.4.2).

The 2009 XSA assessment indicates that the point estimator of SSB in 2008 is close to 76 000 t and that fishing mortality is close to  $F=0.67$ . As indicated above, if the 2009 XSA assessment continues to underestimate stock size and overestimate fishing mortality, SSB is probably higher and  $F$  lower than indicated in the assessment results, but by an unknown amount.

Retrospective analysis of the average fishing mortality from the XSA for age groups 4-8 (Figure 6.4.3 (middle)) continues to show a tendency to overestimate  $F$  in the last years. This implies that biomass was correspondingly underestimated (Figure 6.4.3 (top)). With respect to recruitment, the analysis indicated an underestimate (Figure 6.4.3 bottom). The fishing mortalities for 1961-2008 are presented in Table 6.4.3 and in Figure 6.4.4. The average fishing mortality for age groups 4-8 was 0.67 in 2008.

## 6.5 Reference points

### 6.5.1 Biological reference points

Yield per recruit and spawning stock biomass per recruit curves are presented in Figure 6.5.1.1. Compared to the 2008 average fishing mortality of 0.67 in age groups 4-8,  $F_{max}$  is 0.43,  $F_{0.1}$  is 0.14,  $F_{med}$  is 0.37 and  $F_{high}$  is 1.28 (Figure 6.5.1.1 and Figure 6.5.1.2).

Yield and spawning biomass per Recruit  $F$ -reference points:

	Fish Mort Ages 4-8	Yield/R	SSB/R
Average last 3 years	0.58	1.47	2.39
$F_{max}$	0.43	1.47	3.02
$F_{0.1}$	0.14	1.29	7.08
$F_{med}$	0.37	1.47	3.44

The history of the stock/fishery in relation to the existing four reference points can be seen in Figure 6.5.1.3.

Biological reference points for saithe in Vb are listed in the table below.

Reference point Type	Value
$B_{lim}$	60 000 t
$B_{na}$	85 000 t
$F_{lim}$	0.40
$F_{na}$	0.28
$F_v$	~ 0.45

For Faroe saithe, the highest recruitment has been observed at or near the lowest SSB. The NWWG in 2007 therefore suggested that Bloss should be used as  $B_{pa}$ , not  $B_{lim}$ . The working group recommended that  $B_{pa}$  for saithe be set at Bloss = 60 000t and

that Blim be set at an arbitrarily lower value (45-50 000t) until more stock and recruitment data pairs are observed below Bloss. NWWG 2009 reiterates those recommendations. Fishing mortality reference points need to be further considered.

## 6.6 State of the stock – historical and compared to what is now

Recruitment in the 1980s was above or close to average (28 millions). The strongest year class since 1986 was produced in the 1990s and the average for that decade is about 29 millions (Figure 6.6.1.1). The 1998 year class (87 millions) and the 1999 year class (93 millions) are the largest in the available time series. Even though recruitment had been above average in the 1960s and 1970s, SSB declined from nearly 115 000 t in 1985 to 64 000 t in 1991 as a result of high fishing mortality yielding the highest (1990) and third highest (1991) landings of the whole 1961-2001 period. The historically low SSB persisted in 1992-1995 (Table 6.4.5 and Figure 6.6.1.2). The SSB has increased since 1996 to above 100 000t in 2004 with the maturation of the 1992, 1994, 1996, 1998 and 1999 year classes but since 2006 the SSB has decreased to 76 000 t. The relation between stock and recruitment (Figure 6.6.1.3) shows that the highest recruitment has been observed at or near the lowest SSBs. While the spawning stock biomass graph shows three cycles of decreasing magnitude, that of total biomass (Figure 6.6.1.4) shows three cycles of increasing magnitude. This could be due to higher exploitation rates since the early 1990s.

The 76 000t SSB in 2008 is below both  $B_{pa}$  and  $B_{lim}$ . Fishing mortality, however, is higher than  $F_{target}$ ,  $F_{pa}$  and  $F_{lim}$ . Bearing in mind that the 2009 XSA is likely to underestimate SSB and overestimate  $F$ , the stock has full reproductive capacity but, even considering the likely overestimation of  $F$ , the stock is likely to be harvested unsustainably.

## 6.7 Short term forecast

Although the 2009 assessment is accepted to illustrate historical trends only, it was decided by the WG to carry on with the assessment results to make a short term prediction. This may provide some information on stock development, and may be useful when/if analytical assessment of this stock is accepted again in the future.

### 6.7.1 Input data

Input data for prediction with management options are presented in Table 6.7.1.1.

Population numbers for the base short term prediction up to the 2005 year class are from the final 2009 XSA run whereas values for the 2006-2008 year classes are the geometric mean of the 1977 to 2005 year classes. The 2008 values were used for 2009-2011 weights (Table 6.7.1.1). The value of natural mortality is 0.2.

The average of 2008-2009 proportion mature values from the spring survey were used for 2009. For 2010 and 2011 the average for 2007-2009 was used. For all three years the average exploitation pattern in the final VPA for 2006-2008, unscaled to  $F_{bar}$  (ages 4-8) in 2008 in view of a retrospective problem (as suggested by ACFM, 2004), was used.

### 6.7.2 Projection of catch and biomass

Results from predictions with management option are presented in Table 6.7.2.1. Catches at status quo  $F$  would be 46 300 t in 2009 and 52 500 t in 2010. The spawning stock biomass would be about 71 000 tonnes in 2009 and about 78 000 in 2010. The

SSB is above the  $B_{pa} = 60\,000$  t suggested by NWWG in 2007, but below the ICES  $B_{pa}$  of 85 000 t.

A projection of catch in number by year classes in 2008 and weight composition in SSB by year classes in 2010 is presented in Figure 6.7.1.1. The catch in 2009 is predicted to rely on the three most recent year classes (88%). In 2010 the year classes from 2002 to 2005 are expected to contribute about 85% of the SSB.

## 6.8 Medium term forecasts and yield per recruit

No medium term projections were done in 2009.

### 6.8.1 Input data to yield per recruit

Mean weights for 1961-2008 were used. The value of natural mortality is 0.2. For proportion mature in the long term prediction the average of smoothed values for 1983-2009 was used.

The exploitation pattern was set equal to the average of exploitation patterns for 2004-2008 (as suggested from ACFM, 2004). The input data to long term prediction are shown in Table 6.8.1.1.

Results from the yield per recruit estimates are shown in Table 6.8.1.2 and Figure 6.5.1.1.

## 6.9 Uncertainties in assessment and forecast

As discussed above, XSA results, with extended pair trawler tuning series, are likely to continue to underestimate stock size and overestimate fishing mortality.

### 6.9.1 Assessment quality

The assessment is calibrated exclusively with commercial CPUE data. The WG recognises that these are high quality data, but the problems associated with the use of commercial CPUE data (e.g. increased efficiency due to technological creep etc.) may affect the assessment. The introduction of GLM standardisation could mitigate the problems of vessel replacement if sufficient overlap occurs with other vessels.

The 2006-2008 assessments have been rejected because of the retrospective pattern which is expected to continue to exist; also the 2009 assessment was therefore rejected by the WG, although it was accepted to illustrate historical trends. Given that the survey estimates are now available, a benchmark assessment should be done prior to the next NWWG to provide a firmer basis to the formulation of scientific advice.

## 6.10 Comparison with previous assessment and forecast

The 3 previous assessments have not been accepted. This assessment is consistent with previous results in the sense that stock size seem to continue to be underestimated and fishing mortality overestimated presumably because of decreased catchability related to reduced growth.

## 6.11 Management plans and evaluations

Although the 2009 XSA result is expected to continue to overestimate fishing mortality, the probability that  $F_{4-8}$  is at or less than the target is low. This implies that current management measures are probably insufficient to meet the stated fishing mortality target of  $F = 0.45$ .

A Ph.D. project is launched, that is aiming to investigate the role of climatic and oceanographic factors in the biology of Faroe saithe. Relationships between food, growth and climatic factors will be investigated by relating the stomach contents and growth to physical data available. Existing tagging data may illuminate migration of saithe in the North Atlantic; this together with data on ocean currents might reveal how the environment affects the migration. It is hoped that the output of the Ph.D. can become useful input to the assessment of the Faroese saithe stock by illuminating ecological factors.

### **6.12 Management considerations**

Management consideration for saithe is under the general section for Faroese stocks.

The spawning stock biomass is above the suggested  $B_{pa} = 60\,000$  t, and is expected to reduce to 71 000 t at status quo fishing mortality, due to poor recruitment in the short term. However, if the 2009 XSA continues to underestimate SSB and if recent year-classes are stronger than used in the base case, the 2009 assessment could indicate that the SSB had remained above  $B_{pa}$ .

The XSA suggests that the abundance of the strong year classes of the early 2000s will be considerably decreased in 2009 but there are indications in the surveys that this may be strong year classes.

### **6.13 Ecosystem considerations**

There is little information available on how the fisheries of Faroe saithe affect the ecosystem.

### **6.14 Regulations and their effects**

It seems to be no relationship between number of fishing days and fishing mortality, probably because of large fluctuations in catchability. Area restriction is an alternative to reduce fishing mortality- and this is used to protect small saithe in Faroese area.

### **6.15 Changes in fishing technology and fishing patterns**

See section 2.

### **6.16 Changes in the environment**

The shallow areas on the Faroe Plateau have been coupled to primary production for some years. A possible ecosystem driver in the deeper areas on the Faroe Plateau is the North Atlantic subpolar gyre. When comparing a gyre index (GI), described by Hatun et al., 2005, to saithe in Faroese waters there was a marked positive relationship between annual variations in GI and the total biomass of saithe lagged 4 years (Figure 6.16.1). This is further described in section 2 and in WD 20 (Steingrund, P. and Hatun, H., 2008).

There is a negative relationship between mean weight-at-age and the stock size of saithe in Faroese waters. This could be due to simple density-dependence, where there is a competition for limited food resources. Stomach content data show that the food of saithe is dominated by blue whiting, Norway pout, and krill, and the annual variations in the stomach fullness are mainly attributable to variations in the feeding on blue whiting. The way stomach fullness was related to weights-at-age of saithe, there seemed to be no relationship between them (i Homrum *et al.* WD 2009).

## 6.17 Response to technical minutes

### 2006

Technical minutes suggested that a length based assessment should be attempted. This will be further investigated with Bormicon for next year's meeting, time permitting.

The question of migration has been brought up previously. Although tagging data indicate that saithe migrates between management areas, and some indications are seen in the assessment as well, no attempts have been made to quantify the migration rate of saithe.

Bycatch has been mentioned in the latest technical minutes. The results presented in NWWG 2007 indicate that the bycatch issue is a minor problem in the saithe assessment (ICES C.M. 2007/ACFM:17). Mandatory use of sorting grids in the blue whiting fishery was introduced from April 15, 2007 in the areas west and northwest of the Faroe Islands.

### 2007

Technical minutes pointed out the problem of variability in weight-at-age and suggested the possibility of using different modelling approaches that the WG could explore in the future. It was discussed whether there was possibility for Faroe Saithe to be part of the benchmark workshop in winter 2008; but this session was already closed for additional participants. Alternatively the group discussed the possibility of working intersessionally to explore usable models for next years meeting.

### 2008

Technical minutes pointed out the problem of variability in pelagic/demersal occurrence of saithe, hence the problems in reliability of survey indices (high CV). Commercial CPUE indices were used for tuning. However, declining weight-at-age leading to declining catchabilities not accounted for in XSA.

At this point, there is no improvement in this year's assessment compared to last year. In the benchmark assessment the surveys should be closer investigated. The summer survey shows that the spatial distribution of saithe on the Faroe Plateau has become wider (Figure 6.17.1). An attempt should be made to incorporate this information into the index of stock size.

## 6.18 References

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**Table 6.2.1.1. Faroe saithe (Division Vb). Nominal catches (tonnes round weight) by countries, 1989-2008, as officially reported to ICES.**

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	-	2	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	16	-
Faroe Islands	43,624	59,821	53,321	35,979	32,719	32,406	26,918	19,267	21,721	25,995
France <sup>3</sup>	-	-	-	120	75	19	10	12	9	17
Germany	-	-	32	5	2	1	41	3	5	-
German Dem.Rep.	9	-	-	-	-	-	-	-	-	-
German Fed. Rep.	20	15	-	-	-	-	-	-	-	-
Greenland	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-
Netherlands	22	67	65	-	-	-	-	-	-	-
Norway	51	46	103	85	32	156	10	16	67	53
Portugal	-	-	-	-	-	-	-	-	-	-
UK (Eng. & W.)	-	-	5	74	279	151	21	53	-	19
UK (Scotland)	9	33	79	98	425	438	200	580	460	337
USSR/Russia <sup>2</sup>	-	30	-	12	-	-	-	18	28	-
<b>Total</b>	<b>43,735</b>	<b>60,014</b>	<b>53,605</b>	<b>36,373</b>	<b>33,532</b>	<b>33,171</b>	<b>27,200</b>	<b>19,949</b>	<b>22,306</b>	<b>26,065</b>
<b>Working Group estimate<sup>4,5</sup></b>	<b>44,477</b>	<b>61,628</b>	<b>54,858</b>	<b>36,487</b>	<b>33,543</b>	<b>33,182</b>	<b>27,209</b>	<b>20,029</b>	<b>22,306</b>	<b>26,421</b>

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008 <sup>1</sup>
Denmark	-	-	-	-	-	-	-	34	-	-
Estonia	-	-	-	-	-	-	-	-	-	-
Faroe Islands	32,439		49,676	55,165	47,933	48,222	71,496	70,696	64,552	61,137
France	-	273	934	607	370	147	123	315	108	38
Germany	100	230	667	422	281	186	1	49	3	3
Greenland	-	-		125	-			73		
Ireland	-	-	5	-	-	-	-	-	-	-
Norway	160	72	60	77	62	82	82	35	81	37
Portugal	-	-	-	-	-	5	-	-	-	-
Russia	-	20	1	10	32	71	210	104	114	38
UK (E/W/NI)	67	32	80	58	89	85	32	88	4	
UK (Scotland)	441	534	708	540	610	748	4,322	1,011	408	
<b>United Kingdom</b>										<b>358</b>
<b>Total</b>	<b>33,207</b>	<b>1,161</b>	<b>52,131</b>	<b>57,004</b>	<b>49,377</b>	<b>49,546</b>	<b>76,266</b>	<b>72,405</b>	<b>65,270</b>	<b>61,611</b>
<b>Working Group estimate<sup>4,5,6,7</sup></b>	<b>33,207</b>	<b>39,020</b>	<b>51,786</b>	<b>53,546</b>	<b>46,555</b>	<b>46,355</b>	<b>68,008</b>	<b>67,103</b>	<b>60,819</b>	<b>57,025</b>

<sup>1</sup> Preliminary.

<sup>2</sup> As from 1991.

<sup>3</sup> Quantity unknown 1989-91.

<sup>4</sup> Includes catches from Subdivision Vb2 and Division IIa in Faroese waters.

<sup>5</sup> Includes French, Greenlandic, Russian catches from Division Vb, as reported to the Faroese coastal guard service.

<sup>6</sup> Includes Faroese, French, Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service.

<sup>7</sup> The 2001-2008 catches from Faroe Islands, as stated from Faroese coastal guard service, are corrected in order to be consistent with procedures used previous years.

Table 6.2.1.2. Faroe saithe (Division Vb). Total Faroese landings (rightmost column) and the contribution (%) by each fleet category. Averages for 1985-2008 are given at the bottom.

Year	Open boats	Long-liners	Single trawl	Gill-nets	Jiggers	Single trawl	Single trawl	Pair trawl	Pair trawl	Long-liners	Industrial		Total round weight (tonnes)
		<100 GRT	<400 HP			400-1000 HP	>1000 HP	<1000 HP	>1000 HP	>100 GRT	trawlers	Others	
1985	0.2	0.1	0.1	0.0	2.6	6.6	33.7	28.2	28.2	0.1	0.2	0.2	42598
1986	0.3	0.2	0.1	0.1	3.6	2.8	27.3	27.5	36.5	0.1	0.7	0.9	40107
1987	0.7	0.1	0.3	0.4	5.6	4.1	20.4	22.8	44.2	0.1	1.1	0.0	39627
1988	0.4	0.3	0.1	0.3	6.5	6.8	20.8	19.6	43.6	0.1	1.3	0.1	43940
1989	0.9	0.1	0.3	0.2	9.3	5.4	17.7	23.5	41.1	0.1	1.3	0.0	43624
1990	0.6	0.2	0.2	0.2	7.4	3.9	19.6	24.0	42.8	0.2	0.9	0.0	59821
1991	0.6	0.1	0.1	0.6	9.8	1.3	13.9	26.5	46.2	0.1	0.8	0.0	53321
1992	0.4	0.4	0.0	0.0	10.5	0.5	7.1	24.4	55.6	0.1	1.0	0.0	35979
1993	0.6	0.2	0.1	0.0	9.3	0.6	6.5	21.4	60.6	0.1	0.7	0.0	32719
1994	0.4	0.4	0.1	0.0	12.6	1.1	6.8	18.5	59.1	0.2	0.7	0.0	32406
1995	0.2	0.1	0.4	0.0	9.6	0.9	9.9	17.7	60.9	0.3	0.0	0.0	26918
1996	0.0	0.0	0.1	0.0	9.2	1.2	6.8	23.7	58.6	0.2	0.0	0.0	19267
1997	0.0	0.1	0.1	0.0	8.9	2.5	10.7	17.8	58.9	0.4	0.4	0.0	21721
1998	0.1	0.4	0.1	0.0	8.1	2.8	13.8	16.5	57.6	0.3	0.4	0.0	25995
1999	0.0	0.1	0.1	0.0	5.7	1.2	12.6	18.5	60.0	0.2	1.6	0.0	32439
2000	0.1	0.1	0.2	0.0	3.7	0.3	15.0	17.5	62.3	0.1	0.7	0.0	37859
2001	0.1	0.1	0.1	0.0	2.8	0.3	20.2	16.5	58.8	0.2	0.8	0.1	49676
2002	0.1	0.2	0.1	0.0	1.6	0.1	26.5	10.5	60.8	0.1	0.0	0.0	51028
2003	0.0	0.0	1.9	0.0	0.9	0.4	17.4	14.7	64.7	0.1	0.0	0.0	44338
2004	0.1	0.2	3.7	0.0	1.9	0.4	15.1	14.4	63.8	0.2	0.0	0.0	44605
2005	0.2	0.1	4.4	0.0	2.4	0.2	12.7	20.6	59.2	0.2	0.0	0.0	66134
2006	0.2	0.4	0.3	0.0	3.9	0.1	19.8	20.6	54.1	0.6	0.0	0.0	65394
2007	0.2	0.2	0.2	0.0	2.0	0.1	30.4	16.0	50.6	0.3	0.0	0.0	59711
2008	0.2	0.3	1.5	0.0	3.2	0.2	20.4	16.0	57.7	0.5	0.0	0.0	56552
Average	0.3	0.2	0.6	0.1	5.9	1.8	16.9	19.9	53.6	0.2	0.5	0.1	42741

Table 6.2.2.1. Faroe saithe (Division Vb). Catch number at age by fleet categories (calculated from gutted weights).

Age	Single trawlers		Pair trawlers		Pair trawlers >1000HP	Others	Total Faroese fleet	Foreign fleet	Total Division Vb
	Jiggers	>1000 HP	<1000 HP	>1000HP					
0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0
2	0	6	0	0	0	0	6	0	6
3	81	2126	487	1751	72	4517	109	4626	4626
4	68	924	298	1678	47	3014	48	3062	3062
5	65	698	710	2084	40	3597	36	3632	3632
6	163	1650	1650	5812	118	9393	85	9478	9478
7	69	494	679	2340	44	3626	25	3652	3652
8	36	253	343	1597	30	2259	13	2272	2272
9	33	213	477	1345	21	2090	11	2101	2101
10	6	34	69	342	5	457	2	458	458
11	3	30	13	112	2	159	2	161	161
12	0	1	0	11	0	13	0	13	13
13	0	0	0	6	0	7	0	7	7
14	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0
Total No.	524	6429	4724	17080	379	29137	331	29468	29468
Catch, t.	999	10207	9655	34928	763	56552	473	57025	57025

**Table 6.2.2.2. Faroe saithe (Division Vb). Catch number at age (thousands) from the commercial fleet.**

YEAR	Age										TOTNUM	SOP%
	3	4	5	6	7	8	9	10	11	+gp		
1961	183	379	483	403	216	129	116	82	45	82	2118	108
1962	562	542	617	495	286	131	129	113	71	105	3051	93
1963	614	340	340	415	406	202	174	158	94	274	3017	96
1964	684	1908	1506	617	572	424	179	150	100	174	6314	99
1965	996	850	1708	965	510	407	306	201	156	285	6384	92
1966	488	1540	1201	1686	806	377	294	205	156	225	6978	98
1967	595	796	1364	792	1192	473	217	190	97	140	5856	104
1968	614	1689	1116	1095	548	655	254	128	89	187	6375	102
1969	1191	2086	2294	1414	1118	589	580	239	115	190	9816	97
1970	1445	6577	1558	1478	899	730	316	241	86	132	13462	96
1971	2857	3316	5585	1005	828	469	326	164	100	100	14750	109
1972	2714	1774	2588	2742	1529	1305	1017	743	330	210	14952	100
1973	2515	6253	7075	3478	1634	693	550	403	215	186	23002	120
1974	3504	4126	4011	2784	1401	640	368	340	197	265	17636	113
1975	2062	3361	3801	1939	1045	714	302	192	193	298	13907	116
1976	3178	3217	1720	1250	877	641	468	223	141	287	12002	107
1977	1609	2937	2034	1288	767	708	498	338	272	330	10781	104
1978	611	1743	1736	548	373	479	466	473	407	535	7371	100
1979	287	933	1341	1033	584	414	247	473	368	691	6371	102
1980	996	877	720	673	726	284	212	171	196	786	5641	99
1981	411	1804	769	932	908	734	343	192	92	1021	7206	96
1982	387	4076	994	1114	380	417	296	105	88	902	8759	96
1983	2483	1103	5052	1343	575	339	273	98	98	540	11904	100
1984	368	11067	2359	4093	875	273	161	52	65	253	19566	100
1985	1224	3990	5583	1182	1898	273	103	38	26	275	14592	94
1986	1167	1997	4473	3730	953	1077	245	104	67	158	13971	94
1987	1581	5793	3827	2785	990	532	333	81	43	97	16062	96
1988	866	2950	9555	2784	1300	621	363	159	27	60	18685	99
1989	451	5981	5300	7136	793	546	185	83	55	39	20569	97
1990	294	3833	10120	9219	5070	477	123	61	60	79	29336	98
1991	1030	5125	7452	5544	3487	1630	405	238	128	118	25157	99
1992	521	4067	3667	2679	1373	894	613	123	63	108	14108	105
1993	1316	2611	4689	1665	858	492	448	245	54	52	12430	102
1994	690	3961	2663	2368	746	500	307	303	150	49	11737	102
1995	398	1019	3468	1836	1177	345	241	192	104	117	8897	102
1996	297	1087	1146	1449	1156	521	132	77	64	82	6011	103
1997	344	832	2440	1767	1335	624	165	71	29	100	7707	100
1998	163	1689	1934	3475	1379	683	368	77	32	73	9873	102
1999	322	655	3096	2551	4113	915	380	147	24	69	12272	102
2000	811	2830	1484	4369	2226	2725	348	186	56	25	15060	102
2001	1125	2452	8437	2155	3680	1539	1334	293	90	56	21161	100
2002	302	8399	5962	9786	862	1280	465	362	33	45	27496	100
2003	330	2432	11152	3994	4287	417	419	304	91	43	23469	100
2004	76	2011	8544	8762	2125	1807	265	293	146	112	24141	100
2005	454	2949	9490	16613	7102	843	810	32	102	30	38425	100
2006	1479	5060	7804	7735	10327	3771	642	283	32	29	37162	100
2007	830	3316	11292	6466	3777	4289	1536	406	81	23	32016	100
2008	4626	3062	3632	9478	3652	2272	2101	458	161	20	29462	100

Table 6.2.2.3. Faroe saithe (Division Vb). Sampling intensity in 2000-2008.

Year		Jiggers	Single	Pair trawlers	Pair trawlers	Total	Amount sampled pr tonnes landed (%)
			>1000 HP	<1000 HP	>1000 HP		
2000	Lengths	2443	2429	9910	28724	43506	10.7
	Otoliths	300	301	1019	2816	4436	
	Weights	300	241	959	2816	4316	
2001	Lengths	1788	4388	5613	30341	42130	7.7
	Otoliths	180	450	480	3237	4347	
	Weights	180	420	420	3177	4197	
2002	Lengths	1197	9235	5049	30761	46242	5.8
	Otoliths	120	1291	422	3001	4834	
	Weights	120	420	240	2760	3540	
2003	Lengths		4959	6393	34812	1388	7.0
	Otoliths		719	960	3719	180	
	Weights		420	239	2999		
2004	Lengths	916	2665	3455	35609	1781	5.9
	Otoliths	180	180	240	3537	240	
	Weights	180	120	120	3357	1364	
2005	Lengths	1048	4266	6183	32046	1564	3.6
	Otoliths	120	413	690	2760	240	
	Weights	340	385	791	3533	1564	
2006	Lengths	1059	7979	8115	23082	1139	3.5
	Otoliths	180	598	1138	2096	60	
	Weights	180	60	1620	5678	812	
2007	Lengths	683	10525	10593	18045	381	4.1
	Otoliths	120	748	960	1977	0	
	Weights	120	697	5603	9884	120	
2008	Lengths	0	6892	3694	13995	234	2.6
	Otoliths	0	690	600	1500	0	
	Weights	0	0	2517	12914	234	

Table 6.2.3.1. Faroe saithe (Division Vb). Catch weights at age (kg) from the commercial fleet.

YEAR	Age										SOP
	3	4	5	6	7	8	9	10	11	+gp	
1961	1.430	2.302	3.348	4.287	5.128	6.155	7.060	7.265	7.497	9.340	1.078
1962	1.273	2.045	3.293	4.191	5.146	5.655	6.469	6.706	7.150	9.024	0.934
1963	1.280	2.197	3.212	4.568	5.056	5.932	6.259	8.000	7.265	8.859	0.959
1964	1.175	2.055	3.266	4.255	5.038	5.694	6.662	6.837	7.686	8.559	0.993
1965	1.181	2.125	2.941	4.096	4.878	5.932	6.321	7.288	8.074	8.904	0.922
1966	1.361	2.026	3.055	3.658	4.585	5.520	6.837	7.265	7.662	9.223	0.977
1967	1.273	1.780	2.534	3.572	4.368	5.313	5.812	6.554	7.806	8.149	1.036
1968	1.302	1.737	2.036	3.120	4.049	5.183	6.238	7.520	8.049	9.093	1.019
1969	1.188	1.667	2.302	2.853	3.673	5.002	5.714	6.405	6.554	8.087	0.966
1970	1.244	1.445	2.249	2.853	3.515	4.418	5.444	5.733	6.662	8.584	0.963
1971	1.101	1.316	1.818	2.978	3.702	4.271	5.388	5.972	6.490	8.005	1.094
1972	1.043	1.485	2.055	2.829	3.791	4.175	4.808	5.294	6.948	7.515	1.004
1973	1.088	1.461	1.582	2.249	3.687	4.385	5.128	5.276	6.727	8.031	1.201
1974	1.430	1.525	2.207	2.500	3.120	4.601	5.559	5.714	6.259	8.010	1.130
1975	1.114	1.658	2.260	3.120	3.557	4.096	5.128	6.094	7.196	8.598	1.161
1976	1.088	1.676	2.878	3.081	4.287	4.352	4.790	5.912	6.619	7.894	1.068
1977	1.223	1.641	2.660	3.790	4.239	5.597	5.350	5.912	6.837	7.709	1.044
1978	1.493	2.324	3.068	3.746	4.913	4.368	5.276	5.832	6.053	7.576	1.005
1979	1.220	1.880	2.620	3.400	4.180	4.950	5.690	6.380	7.020	8.626	1.025
1980	1.230	2.120	3.320	4.280	5.160	6.420	6.870	7.090	7.930	9.215	0.994
1981	1.310	2.130	3.000	3.810	4.750	5.250	5.950	6.430	7.000	8.962	0.956
1982	1.337	1.851	2.951	3.577	4.927	6.243	7.232	7.239	8.346	10.041	0.963
1983	1.208	2.029	2.965	4.143	4.724	5.901	6.811	7.051	7.248	10.055	1.000
1984	1.431	1.953	2.470	3.850	5.177	6.347	7.825	6.746	8.636	10.098	0.999
1985	1.401	2.032	2.965	3.596	5.336	7.202	6.966	9.862	10.670	11.950	0.942
1986	1.718	1.986	2.618	3.277	4.186	5.589	6.050	6.150	9.536	10.218	0.942
1987	1.609	1.835	2.395	3.182	4.067	5.149	5.501	6.626	6.343	10.244	0.962
1988	1.500	1.975	1.978	2.937	3.798	4.419	5.115	6.712	9.040	9.337	0.993
1989	1.309	1.735	1.907	2.373	3.810	4.667	5.509	5.972	6.939	9.936	0.970
1990	1.223	1.633	1.830	2.052	2.866	4.474	5.424	6.469	6.343	8.287	0.981
1991	1.240	1.568	1.864	2.211	2.648	3.380	4.816	5.516	6.407	7.729	0.994
1992	1.264	1.602	2.069	2.554	3.057	4.078	5.012	6.768	7.754	8.230	1.051
1993	1.408	1.860	2.323	3.131	3.730	4.394	5.209	6.540	8.403	8.050	1.017
1994	1.503	1.951	2.267	2.936	4.214	4.971	5.657	5.950	6.891	9.109	1.024
1995	1.456	2.177	2.420	2.895	3.651	5.064	5.440	6.167	7.080	7.539	1.021
1996	1.432	1.875	2.496	3.229	3.744	4.964	6.375	6.745	7.466	7.981	1.032
1997	1.476	1.783	2.032	2.778	3.598	4.766	5.982	7.658	7.882	9.245	0.999
1998	1.388	1.711	1.954	2.405	3.300	4.220	4.999	6.391	6.665	8.485	1.022
1999	1.374	1.712	1.905	2.396	2.845	4.124	5.256	5.526	6.956	8.524	1.018
2000	1.477	1.606	2.077	2.360	2.977	3.480	4.851	5.268	6.523	5.902	1.015
2001	1.330	1.590	1.785	2.586	3.059	3.871	4.374	5.565	6.703	6.908	1.002
2002	1.142	1.460	1.652	1.969	3.130	3.589	4.513	5.138	6.422	7.519	1.000
2003	1.123	1.304	1.614	1.977	2.532	3.970	4.834	5.499	6.099	6.915	1.001
2004	1.143	1.333	1.450	1.789	2.560	3.159	4.154	5.167	6.015	6.321	1.004
2005	1.148	1.325	1.516	1.672	2.087	2.975	3.790	6.087	6.134	6.728	1.000
2006	1.126	1.218	1.462	1.790	2.035	2.436	3.861	4.222	5.149	6.446	0.997
2007	1.058	1.391	1.413	1.824	2.361	2.682	3.278	4.104	4.998	7.137	0.998
2008	1.146	1.312	1.672	1.816	2.395	2.902	3.100	3.728	4.769	6.205	1.000

**Table 6.2.4.1. Faroe saithe (Division Vb). Proportion mature at age from the spring survey (three years running average).**

YEAR	Age									
	3	4	5	6	7	8	9	10	11	+gp
1961	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1962	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1963	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1964	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1965	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1966	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1967	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1968	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1969	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1970	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1971	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1972	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1973	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1974	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1975	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1976	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1977	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1978	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1979	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1980	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1981	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1982	0.04	0.26	0.57	0.82	0.91	0.98	1.00	1.00	1.00	1.00
1983	0.00	0.28	0.63	0.99	1.00	1.00	1.00	1.00	1.00	1.00
1984	0.03	0.25	0.56	0.94	0.98	1.00	1.00	1.00	1.00	1.00
1985	0.04	0.37	0.71	0.92	0.98	1.00	1.00	1.00	1.00	1.00
1986	0.11	0.31	0.55	0.86	0.98	1.00	1.00	1.00	1.00	1.00
1987	0.11	0.32	0.59	0.83	0.97	0.97	1.00	1.00	1.00	1.00
1988	0.10	0.22	0.52	0.75	0.91	0.92	1.00	1.00	1.00	1.00
1989	0.03	0.20	0.57	0.67	0.83	0.92	1.00	1.00	1.00	1.00
1990	0.00	0.20	0.55	0.68	0.80	0.94	1.00	1.00	1.00	1.00
1991	0.00	0.16	0.44	0.70	0.83	1.00	1.00	1.00	1.00	1.00
1992	0.00	0.17	0.47	0.78	0.89	1.00	1.00	1.00	1.00	1.00
1993	0.01	0.15	0.51	0.83	0.94	1.00	1.00	1.00	1.00	1.00
1994	0.04	0.18	0.66	0.86	0.96	1.00	1.00	1.00	1.00	1.00
1995	0.04	0.14	0.65	0.86	0.95	1.00	1.00	1.00	1.00	1.00
1996	0.02	0.13	0.59	0.80	0.94	1.00	1.00	1.00	1.00	1.00
1997	0.00	0.13	0.43	0.64	0.87	0.99	1.00	1.00	1.00	1.00
1998	0.01	0.16	0.37	0.54	0.79	0.97	0.97	1.00	1.00	1.00
1999	0.03	0.20	0.35	0.52	0.74	0.92	0.97	1.00	1.00	1.00
2000	0.03	0.21	0.36	0.62	0.76	0.93	0.96	1.00	1.00	1.00
2001	0.02	0.20	0.36	0.60	0.75	0.91	0.97	1.00	1.00	1.00
2002	0.00	0.18	0.41	0.60	0.73	0.94	0.97	1.00	1.00	1.00
2003	0.00	0.15	0.37	0.51	0.67	0.87	0.99	1.00	1.00	1.00
2004	0.00	0.13	0.38	0.55	0.71	0.87	0.99	1.00	1.00	1.00
2005	0.00	0.17	0.35	0.56	0.71	0.85	0.97	1.00	1.00	1.00
2006	0.00	0.22	0.40	0.62	0.78	0.88	0.96	1.00	1.00	1.00
2007	0.00	0.25	0.43	0.65	0.84	0.91	0.97	1.00	1.00	1.00
2008	0.00	0.20	0.38	0.66	0.87	0.92	0.99	1.00	1.00	1.00

**Table 6.4.1. Faroe saithe (Division Vb). Effort (hours) and catch in number at age for commercial pair trawlers.**

Faroe Saithe (ICES Div. Vb) Allpair3-11sq4.dat

101

All pair (GLM) >1000 HP

1995 2008

1 1 0 1

3 1 1

6564	58	224	717	293	181	61	30	24	17
4543	68	211	180	246	111	62	29	28	15
6282	50	133	372	254	192	83	18	8	3
7185	33	199	349	451	222	99	52	12	4
10012	69	192	612	795	798	322	75	33	5
8712	144	519	303	895	442	532	64	35	10
9053	229	538	1851	436	694	280	231	48	11
9013	41	1241	1237	2150	162	213	77	55	8
10574	63	664	2917	1055	1006	88	94	55	16
6686	13	378	1604	1613	326	240	36	37	17
10482	85	537	1824	3281	1413	145	131	3	19
10085	72	609	1250	1340	1918	714	139	44	7
11701	110	475	1574	981	558	656	235	59	10
14652	543	520	646	1801	725	495	417	106	35



**Table 6.4.2. Faroe saithe (Division Vb). Diagnostics from XSA with commercial pair trawler tuning series.**

Lowestoft VPA Version 3.1  
1/05/2009 11:38

Extended Survivors Analysis

FAROE SAITHE (ICES Division Vb) SAI\_IND

CPUE data from file D:\Stovnsmeting\Ices2009\XSA\allpair3-11sq4.DAT

Catch data for 48 years. 1961 to 2008. Ages 3 to 12.

Fleet	First year	Last year	First age	Last age	Alpha	Beta
All pair (GLM) >10001995		2008	3	11	0	1

Time series weights :

Tapered time weighting not applied

Catchability analysis :

Catchability independent of stock size for all ages

Catchability independent of age for ages  $\geq 8$

Terminal population estimation :

Survivor estimates shrunk towards the mean F of the final 5 years or the 3 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 26 iterations

Regression weights

1 1 1 1 1 1 1 1 1 1 1

Fishing mortalities

Age	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
3	0.006	0.026	0.014	0.003	0.007	0.002	0.008	0.058	0.027	0.025
4	0.073	0.068	0.101	0.143	0.033	0.052	0.094	0.122	0.180	0.133
5	0.182	0.236	0.295	0.379	0.286	0.157	0.370	0.385	0.437	0.305
6	0.303	0.422	0.641	0.665	0.473	0.382	0.517	0.590	0.644	0.827
7	0.499	0.474	0.776	0.578	0.705	0.500	0.616	0.722	0.653	0.978
8	0.643	0.743	0.719	0.691	0.620	0.749	0.377	0.804	0.770	1.128
9	0.629	0.544	1.075	0.492	0.507	1.098	0.942	0.556	0.952	1.186
10	0.722	0.741	1.357	1.021	0.707	0.830	0.349	1.103	0.854	0.865
11	0.638	0.679	1.045	0.505	0.788	0.924	0.799	0.715	1.216	1.060

XSA population numbers (Thousands)

YEAR	AGE								
	3	4	5	6	7	8	9	10	11
1999	58600	10200	20600	10800	11600	2130	900	316	56
2000	35400	47700	7790	14000	6510	5750	917	393	126
2001	86600	28200	36500	5030	7530	3320	2240	436	153
2002	101000	69900	20900	22300	2170	2840	1320	625	92
2003	53700	82000	49600	11700	9370	998	1160	663	184
2004	44300	43700	65000	30500	5970	3790	439	574	268
2005	59900	36200	33900	45500	17100	2960	1470	120	205
2006	28900	48600	27000	19200	22200	7550	1660	468	69
2007	34100	22300	35200	15000	8710	8820	2770	781	127
2008	204000	27200	15300	18600	6470	3710	3340	874	272

Estimated population abundance at 1st Jan 2009

0	163000	19500	9200	6670	1990	984	836	301
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Taper weighted geometric mean of the VPA populations:

27600	20200	13600	8100	4340	2300	1210	621	320
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Standard error of the weighted Log(VPA populations) :

0.6376	0.6024	0.6391	0.6395	0.611	0.6006	0.6575	0.7987	0.9688
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Log catchability residuals.

Fleet : All pair (GLM) >1000

Age	1995	1996	1997	1998						
3	0.19	1.18	0.23	0.65						
4	0.59	0	-0.31	-0.35						
5	0.86	-0.13	-0.66	-0.36						
6	0	0.13	-0.28	-0.82						
7	0.33	-0.15	-0.04	-0.15						
8	0.22	0.44	-0.19	-0.26						
9	0.15	0.64	-0.16	0.03						
10	-0.41	1.45	-0.2	0.24						
11	0.01	0.09	-0.18	-0.19						
Age	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
3	-0.48	0.91	0.44	-1.43	-0.53	-1.47	-0.33	0.29	0.38	-0.04
4	0.25	-0.16	0.38	0.34	-0.66	-0.13	-0.02	-0.14	0.27	-0.08
5	-0.41	0.02	0.27	0.47	0.26	-0.21	0.22	0.11	-0.05	-0.39
6	-0.04	0	0.37	0.49	0.18	0.06	-0.02	0.02	-0.17	0.07
7	-0.21	-0.1	0.3	0.01	0.26	-0.04	-0.02	0.1	-0.38	0.09
8	0.5	0.19	0.05	-0.08	-0.11	0.08	-0.79	0.09	-0.31	0.19
9	-0.11	-0.18	0.39	-0.42	-0.24	0.48	0.05	-0.14	-0.11	0.15
10	0.16	0.15	0.57	0.22	-0.13	0.13	-1.48	0.2	-0.26	-0.01
11	-0.04	0.01	0.02	-0.01	-0.05	0.15	0.03	0.12	-0.08	0.13

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

Age	3	4	5	6	7	8	9	10	11
Mean Log q	-15.3774	-13.3068	-12.1261	-11.5328	-11.3433	-11.2053	-11.2053	-11.2053	-11.2053
S.E(Log q)	0.7847	0.336	0.4034	0.3055	0.2015	0.3318	0.2997	0.6276	0.1042

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
3	2.26	-1.902	21.21	0.16	14	1.62	-15.38
4	1.39	-1.953	14.47	0.67	14	0.42	-13.31
5	1.01	-0.07	12.15	0.7	14	0.43	-12.13
6	1.05	-0.331	11.63	0.81	14	0.33	-11.53
7	1.02	-0.215	11.39	0.92	14	0.21	-11.34
8	1.1	-0.701	11.53	0.81	14	0.37	-11.21
9	1.13	-1.057	11.73	0.84	14	0.34	-11.17
10	0.96	0.168	10.93	0.55	14	0.62	-11.16
11	0.91	2.537	10.61	0.98	14	0.08	-11.21

Terminal year survivor and F summaries :

Age 3 Catchability constant w.r.t. time and dependent on age  
Year class = 2005

Fleet	Estimated Survivors	Int s.e	Ext s.e	Var Ratio	N	Scaled Weights	Estimated F
All pair (GLM) >1000157539		0.812	0	0	1	0.855	0.026
F shrinkage mean 201354		2				0.145	0.021

Weighted prediction :

Survivors at end of year	Int s.e	Ext s.e	N	Var Ratio	F
163233	0.75	0.09	2	0.124	0.025

Age 4 Catchability constant w.r.t. time and dependent on age  
Year class = 2004

Fleet	Estimated Survivors	Int s.e	Ext s.e	Var Ratio	N	Scaled Weights	Estimated F
All pair (GLM) >100019293		0.32	0.167	0.52	2	0.972	0.134
F shrinkage mean 27313		2				0.028	0.097

Weighted prediction :

Survivors at end of year	Int s.e	Ext s.e	N	Var Ratio	F
19485	0.32	0.12	3	0.39	0.133

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
All pair (GLM) >10009222		0.255	0.231	0.91	3	0.976	0.305
F shrinkage mean 8438		2				0.024	0.329

Weighted prediction :

Survivors at end of year	Int s.e	Ext s.e	N	Var Ratio	F
9203	0.25	0.19	4	0.736	0.305

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
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All pair (GLM) >10006545	0.205	0.064	0.31	4	0.971	0.837
F shrinkage mean 12407	2				0.029	0.525

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
6667	0.21	0.08	5	0.373	0.827

Age 7 Catchability constant w.r.t. time and dependent on age  
Year class = 2001

Fleet	Estimated	Int	Ext	Var	N	Scaled	Estimated
	Survivors	s.e	s.e	Ratio		Weights	F
All pair (GLM) >10001955	0.183	0.124	0.68	5	0.97	0.99	
F shrinkage mean 3648	2				0.03	0.645	

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
1992	0.19	0.12	6	0.638	0.978

Age 8 Catchability constant w.r.t. time and dependent on age  
Year class = 2000

Fleet	Estimated	Int	Ext	Var	N	Scaled	Estimated
	Survivors	s.e	s.e	Ratio		Weights	F
All pair (GLM) >1000955	0.178	0.112	0.63	6	0.963	1.148	
F shrinkage mean 2153	2				0.037	0.67	

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
984	0.19	0.12	7	0.636	1.128

Age 9 Catchability constant w.r.t. time and age (fixed at the value for age) 8  
Year class = 1999

Fleet	Estimated	Int	Ext	Var	N	Scaled	Estimated
	Survivors	s.e	s.e	Ratio		Weights	F
All pair (GLM) >1000817	0.182	0.108	0.59	7	0.96	1.202	
F shrinkage mean 1498	2				0.04	0.819	

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
836	0.19	0.11	8	0.564	1.186

Age 10 Catchability constant w.r.t. time and age (fixed at the value for age) 8  
Year class = 1998

Fleet	Estimated	Int	Ext	Var	N	Scaled	Estimated
	Survivors	s.e	s.e	Ratio		Weights	F
All pair (GLM) >1000298	0.204	0.042	0.21	8	0.945	0.871	
F shrinkage mean 353	2				0.055	0.776	

Weighted prediction :

Survivors	Int	Ext	N	Var	F
at end of year	s.e	s.e		Ratio	
301	0.22	0.04	9	0.185	0.865

Age 11 Catchability constant w.r.t. time and age (fixed at the value for age) 8  
 Year class = 1997

Fleet	Estimated Survivors	Int s.e	Ext s.e	Var Ratio	N	Scaled Weights	Estimated F
All pair (GLM) >100077		0.192	0.096	0.5	9	0.962	1.06
F shrinkage mean 76		2				0.038	1.072

Weighted prediction :

Survivors at end of year	Int s.e	Ext s.e	N	Var Ratio	F
77	0.2	0.09	10	0.446	1.06

Table 6.4.3. Faroe saithe (Division Vb). Fishing mortality (F) at age.

YEAR	Age										
	3	4	5	6	7	8	9	10	11	+gp	FBAR 4-8
1961	0.023	0.056	0.099	0.121	0.093	0.085	0.096	0.091	0.091	0.091	0.091
1962	0.047	0.086	0.121	0.140	0.119	0.075	0.114	0.128	0.106	0.106	0.108
1963	0.031	0.036	0.072	0.111	0.163	0.115	0.135	0.199	0.150	0.150	0.099
1964	0.048	0.126	0.219	0.179	0.220	0.255	0.141	0.164	0.187	0.187	0.200
1965	0.050	0.077	0.159	0.213	0.221	0.241	0.296	0.233	0.257	0.257	0.182
1966	0.025	0.101	0.149	0.232	0.277	0.252	0.275	0.331	0.286	0.286	0.202
1967	0.025	0.052	0.122	0.138	0.255	0.260	0.225	0.287	0.257	0.257	0.165
1968	0.032	0.091	0.095	0.135	0.134	0.217	0.217	0.201	0.212	0.212	0.135
1969	0.033	0.145	0.172	0.168	0.199	0.208	0.304	0.325	0.279	0.279	0.178
1970	0.048	0.254	0.154	0.159	0.153	0.194	0.164	0.199	0.186	0.186	0.183
1971	0.089	0.148	0.357	0.140	0.126	0.112	0.124	0.120	0.119	0.119	0.176
1972	0.094	0.073	0.165	0.297	0.327	0.298	0.373	0.455	0.375	0.375	0.232
1973	0.128	0.322	0.456	0.347	0.290	0.241	0.197	0.247	0.228	0.228	0.331
1974	0.230	0.317	0.354	0.326	0.229	0.176	0.195	0.180	0.183	0.183	0.280
1975	0.151	0.359	0.543	0.289	0.195	0.175	0.118	0.148	0.147	0.147	0.312
1976	0.206	0.370	0.315	0.343	0.205	0.176	0.166	0.120	0.154	0.154	0.282
1977	0.148	0.298	0.424	0.413	0.366	0.253	0.202	0.173	0.209	0.209	0.351
1978	0.084	0.237	0.289	0.192	0.200	0.411	0.263	0.300	0.325	0.325	0.266
1979	0.038	0.178	0.290	0.279	0.321	0.357	0.386	0.466	0.403	0.403	0.285
1980	0.093	0.154	0.203	0.231	0.322	0.255	0.312	0.507	0.358	0.358	0.233
1981	0.014	0.242	0.197	0.438	0.555	0.630	0.556	0.517	0.568	0.568	0.412
1982	0.029	0.184	0.204	0.482	0.320	0.538	0.566	0.327	0.477	0.477	0.346
1983	0.070	0.107	0.364	0.466	0.495	0.527	0.838	0.370	0.578	0.578	0.392
1984	0.016	0.496	0.346	0.567	0.636	0.464	0.515	0.368	0.449	0.449	0.502
1985	0.063	0.238	0.504	0.293	0.567	0.415	0.319	0.217	0.317	0.317	0.403
1986	0.021	0.140	0.456	0.760	0.406	0.748	0.823	0.617	0.729	0.729	0.502
1987	0.037	0.140	0.429	0.578	0.463	0.418	0.548	0.727	0.564	0.564	0.406
1988	0.022	0.090	0.358	0.644	0.590	0.599	0.565	0.554	0.573	0.573	0.456
1989	0.018	0.207	0.231	0.497	0.380	0.533	0.356	0.240	0.376	0.376	0.370
1990	0.016	0.206	0.639	0.793	0.813	0.414	0.216	0.190	0.273	0.273	0.573
1991	0.047	0.417	0.770	0.905	0.817	0.681	0.753	0.833	0.756	0.756	0.718
1992	0.030	0.265	0.599	0.713	0.593	0.507	0.595	0.542	0.548	0.548	0.535
1993	0.064	0.207	0.555	0.606	0.524	0.439	0.518	0.507	0.488	0.488	0.466
1994	0.047	0.275	0.336	0.611	0.609	0.672	0.544	0.817	0.677	0.677	0.500
1995	0.012	0.091	0.412	0.409	0.714	0.641	0.826	0.798	0.755	0.755	0.453
1996	0.014	0.039	0.140	0.302	0.491	0.825	0.545	0.697	0.689	0.689	0.360
1997	0.012	0.048	0.116	0.332	0.504	0.540	0.687	0.646	0.624	0.624	0.308
1998	0.015	0.072	0.151	0.241	0.469	0.526	0.721	0.826	0.691	0.691	0.292
1999	0.006	0.074	0.181	0.303	0.496	0.660	0.635	0.725	0.673	0.673	0.343
2000	0.026	0.068	0.238	0.417	0.473	0.730	0.570	0.753	0.685	0.685	0.385
2001	0.015	0.102	0.296	0.643	0.754	0.710	1.022	1.510	1.081	1.081	0.501
2002	0.003	0.143	0.380	0.663	0.582	0.653	0.483	0.894	0.677	0.677	0.484
2003	0.007	0.034	0.287	0.474	0.699	0.629	0.461	0.682	0.590	0.590	0.425
2004	0.002	0.053	0.158	0.384	0.501	0.736	1.120	0.689	0.848	0.848	0.366
2005	0.009	0.095	0.372	0.519	0.618	0.379	0.900	0.369	0.550	0.550	0.397
2006	0.059	0.123	0.387	0.592	0.724	0.805	0.559	0.974	0.779	0.779	0.526
2007	0.027	0.180	0.440	0.647	0.656	0.774	0.951	0.856	0.860	0.860	0.539
2008	0.052	0.133	0.305	0.827	0.978	1.128	1.186	0.865	1.060	1.060	0.674
FBAR	0.046	0.145	0.377	0.689	0.786	0.902	0.898	0.898	0.900		

Table 6.4.4. Faroe saithe (Division Vb). Stock number at age (start of year) (Thousands).

YEAR	Age										TOTAL
	3	4	5	6	7	8	9	10	11	+gp	
1961	9032	7722	5631	3884	2685	1750	1391	1042	572	1043	34753
1962	13619	7230	5980	4175	2816	2004	1316	1034	779	1153	40106
1963	22363	10643	5430	4340	2972	2048	1522	961	745	2170	53195
1964	16181	17755	8407	4139	3179	2067	1495	1090	645	1122	56080
1965	22750	12630	12816	5528	2833	2088	1311	1062	757	1383	63158
1966	21787	17727	9574	8954	3657	1861	1343	798	689	994	67384
1967	26822	17397	13125	6756	5814	2269	1184	835	470	678	75350
1968	21451	21423	13525	9516	4818	3688	1433	774	513	1078	78219
1969	40612	17008	16016	10067	6804	3451	2430	944	519	857	98707
1970	34010	32175	12045	11047	6968	4564	2295	1468	558	857	105988
1971	37084	26541	20426	8458	7713	4895	3079	1594	985	985	111760
1972	33414	27785	18742	11708	6019	5568	3585	2227	1157	737	110942
1973	23106	24909	21148	13013	7121	3554	3386	2022	1157	1001	100418
1974	18771	16650	14775	10971	7530	4361	2287	2277	1293	1739	80655
1975	16196	12215	9925	8495	6481	4905	2994	1541	1558	2405	66714
1976	18780	11402	6983	4723	5212	4365	3372	2179	1088	2216	60321
1977	12842	12515	6447	4171	2744	3478	2997	2340	1583	1921	51037
1978	8357	9064	7607	3454	2260	1558	2210	2005	1611	2118	40243
1979	8568	6291	5853	4667	2334	1514	846	1391	1217	2284	34964
1980	12346	6755	4310	3586	2892	1386	868	471	715	2865	36195
1981	33021	9210	4741	2881	2331	1716	880	520	232	2577	58107
1982	15097	26664	5918	3189	1523	1095	748	413	254	2602	57503
1983	40553	12011	18160	3950	1613	905	523	348	244	1344	79650
1984	25707	30961	8839	10332	2030	805	438	185	197	766	80260
1985	21951	20715	15434	5118	4796	880	414	214	105	1111	70738
1986	61015	16867	13370	7635	3128	2228	476	247	141	333	105439
1987	47828	48901	12010	6936	2923	1706	863	171	109	246	121694
1988	43912	37731	34816	6401	3187	1506	919	409	68	150	129099
1989	28201	35170	28231	19925	2752	1446	677	428	192	136	117159
1990	20451	22682	23411	18344	9920	1541	695	388	276	363	98071
1991	24553	16478	15120	10121	6799	3602	834	458	263	243	78471
1992	19369	19172	8894	5732	3352	2458	1493	321	163	280	61236
1993	23544	15388	12039	4002	2301	1516	1212	674	153	147	60977
1994	16526	18089	10248	5660	1787	1116	800	591	333	109	55259
1995	38468	12908	11248	5998	2516	796	467	380	214	241	73236
1996	24122	31136	9649	6098	3263	1009	343	167	140	180	76108
1997	33305	19481	24510	6867	3690	1636	362	163	68	235	90319
1998	12530	26957	15199	17868	4035	1825	781	149	70	160	79573
1999	58131	10111	20547	10701	11502	2067	883	311	53	154	114461
2000	35043	47303	7688	14034	6469	5732	875	383	123	55	117705
2001	85757	27959	36175	4959	7571	3301	2261	405	148	92	168626
2002	99379	69196	20679	22033	2134	2915	1328	666	73	100	218504
2003	53062	81092	49084	11579	9295	976	1243	671	223	105	207330
2004	43822	43145	64197	30160	5900	3782	426	642	278	213	192566
2005	59167	35810	33509	44862	16828	2927	1484	114	264	78	195043
2006	28687	48032	26659	18915	21851	7428	1640	494	64	58	153828
2007	34000	22152	34764	14822	8567	8672	2719	768	153	43	126660
2008	100078	27087	15150	18336	6356	3639	3275	860	267	33	175082
2009	0	77762	19417	9139	6566	1957	964	819	297	85	117007
GMST 61-**	26053	19835	13222	7779	4192	2183	1146	604	321		
AMST 61-**	30680	23891	16286	9695	5138	2572	1400	825	501		

**Table 6.4.5. Faroe saithe (Division Vb). Summary table.**

	R (Age 3)	TOTALBIO	TOTSPBIO	LANDINGS	YIELD/SSB	FBAR 4- 8
1961	9032	122159	84047	9592	0.1141	0.0907
1962	13619	126558	85825	10454	0.1218	0.1080
1963	22363	158306	100859	12693	0.1258	0.0993
1964	16181	160324	98419	21893	0.2224	0.2000
1965	22750	174701	107272	22181	0.2068	0.1821
1966	21787	184036	108806	25563	0.2349	0.2020
1967	26822	181502	104636	21319	0.2037	0.1653
1968	21451	189683	116011	20387	0.1757	0.1345
1969	40612	214702	123787	27437	0.2216	0.1783
1970	34010	224052	129102	29110	0.2255	0.1828
1971	37084	227929	139397	32706	0.2346	0.1764
1972	33414	236417	147387	42663	0.2895	0.2318
1973	23106	209953	136561	57431	0.4206	0.3314
1974	18771	203579	137545	47188	0.3431	0.2804
1975	16196	187008	137809	41576	0.3017	0.3120
1976	18780	169263	121855	33065	0.2713	0.2818
1977	12842	155790	113860	34835	0.3059	0.3509
1978	8357	136872	95807	28138	0.2937	0.2658
1979	8568	112662	83398	27246	0.3267	0.2848
1980	12346	124362	88748	25230	0.2843	0.2331
1981	33021	141447	76135	30103	0.3954	0.4122
1982	15097	149398	83124	30964	0.3725	0.3457
1983	40553	177824	91204	39176	0.4295	0.3916
1984	25707	188594	95357	54665	0.5733	0.5020
1985	21951	188335	117039	44605	0.3811	0.4032
1986	61015	233029	97106	41716	0.4296	0.5021
1987	47828	247287	101612	40020	0.3939	0.4057
1988	43912	256271	99488	45285	0.4552	0.4562
1989	28201	225264	99565	44477	0.4467	0.3696
1990	20451	188897	96830	61628	0.6365	0.5728
1991	24553	147129	69423	54858	0.7902	0.7179
1992	19369	121739	57663	36487	0.6328	0.5354
1993	23544	130709	57214	33543	0.5863	0.4661
1994	16526	124382	61071	33182	0.5433	0.5003
1995	38468	150125	59772	27209	0.4552	0.4532
1996	24122	159722	60535	20029	0.3309	0.3595
1997	33305	179976	63538	22306	0.3511	0.3079
1998	12530	163880	66297	26421	0.3985	0.2916
1999	58131	211253	72850	33207	0.4558	0.3430
2000	35043	223411	84198	39020	0.4634	0.3854
2001	85757	285611	84580	51786	0.6123	0.5010
2002	99379	319842	83390	53546	0.6421	0.4843
2003	53062	306641	87713	46555	0.5308	0.4245
2004	43822	289801	101731	46355	0.4557	0.3662
2005	59167	293468	108477	68008	0.6269	0.3967
2006	28687	235323	108931	67103	0.6160	0.5263
2007	34000	199566	97426	60819	0.6243	0.5393
2008	100078	249479	76407	57025	0.7463	0.6743
2009	33537	218909	71131	46304	0.6510	0.5799
2010	33537	206098	77960	52493	0.6733	0.5799
2011	33537	179479	74917			
Arith.						
Mean	32195	193506	96246	37100	0.4021	0.3526
Units	(Thousands)	(Tonnes)	(Tonnes)	(Tonnes)		



**Table 6.7.1.1. Faroe saithe (Division Vb). Input data for prediction with management options (recruitment for year classes 2006 to 2008 is geometric mean of year 1980 to 2008)**

MFDP version 1a

Run: man5

Time and date: 19:21 02/05/2009

Fbar age range: 4-8

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
3	33537	0.2	0.00	0	0	1.146	0.05	1.146
4	77762	0.2	0.19	0	0	1.312	0.15	1.312
5	19417	0.2	0.43	0	0	1.672	0.38	1.672
6	9139	0.2	0.68	0	0	1.816	0.69	1.816
7	6566	0.2	0.88	0	0	2.395	0.79	2.395
8	1957	0.2	0.95	0	0	2.902	0.90	2.902
9	964	0.2	1.00	0	0	3.100	0.90	3.100
10	819	0.2	1.00	0	0	3.728	0.90	3.728
11	297	0.2	1.00	0	0	4.769	0.90	4.769
12	85	0.2	1.00	0	0	6.205	0.90	6.205

**2010**

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
3	33537	0.2	0.00	0	0	1.146	0.05	1.146
4	.	0.2	0.21	0	0	1.312	0.15	1.312
5	.	0.2	0.41	0	0	1.672	0.38	1.672
6	.	0.2	0.66	0	0	1.816	0.69	1.816
7	.	0.2	0.86	0	0	2.395	0.79	2.395
8	.	0.2	0.93	0	0	2.902	0.90	2.902
9	.	0.2	0.99	0	0	3.100	0.90	3.100
10	.	0.2	1.00	0	0	3.728	0.90	3.728
11	.	0.2	1.00	0	0	4.769	0.90	4.769
12	.	0.2	1.00	0	0	6.205	0.90	6.205

**2011**

Age	N	M	Mat	PF	PM	SWt	Sel	CWt
3	33537	0.2	0.00	0	0	1.146	0.05	1.146
4	.	0.2	0.21	0	0	1.312	0.15	1.312
5	.	0.2	0.41	0	0	1.672	0.38	1.672
6	.	0.2	0.66	0	0	1.816	0.69	1.816
7	.	0.2	0.86	0	0	2.395	0.79	2.395
8	.	0.2	0.93	0	0	2.902	0.90	2.902
9	.	0.2	0.99	0	0	3.100	0.90	3.100
10	.	0.2	1.00	0	0	3.728	0.90	3.728
11	.	0.2	1.00	0	0	4.769	0.90	4.769
12	.	0.2	1.00	0	0	6.205	0.90	6.205

Input units are thousands and kg - output in tonnes

**Table 6.7.2.1. Faroe saithe (Division Vb). Prediction with management option, recruitment for year classe 2006 to 2008 is geometric mean of year 1980 to 2008.**

MFDP version 1a

Run: man5

Index file 2/5/2009

Time and date: 19:21 02/05/2009

Fbar age range: 4-8

**2009**

<b>Biomass</b>	<b>SSB</b>	<b>FMult</b>	<b>FBar</b>	<b>Landings</b>
218909	71131	1.0000	0.5799	46304

**2010**

<b>Biomass</b>	<b>SSB</b>	<b>FMult</b>	<b>FBar</b>	<b>Landings</b>
206098	77960	0.0000	0.0000	0
.	77960	0.1000	0.0580	6485
.	77960	0.2000	0.1160	12649
.	77960	0.3000	0.1740	18512
.	77960	0.4000	0.2320	24092
.	77960	0.5000	0.2900	29406
.	77960	0.6000	0.3480	34469
.	77960	0.7000	0.4060	39296
.	77960	0.8000	0.4639	43900
.	77960	0.9000	0.5219	48296
.	77960	1.0000	0.5799	52493
.	77960	1.1000	0.6379	56504
.	77960	1.2000	0.6959	60339
.	77960	1.3000	0.7539	64008
.	77960	1.4000	0.8119	67519
.	77960	1.5000	0.8699	70882
.	77960	1.6000	0.9279	74105
.	77960	1.7000	0.9859	77194
.	77960	1.8000	1.0439	80157
.	77960	1.9000	1.1019	83001
.	77960	2.0000	1.1599	85732

**2011**

<b>Biomass</b>	<b>SSB</b>
234003	114759
227202	109667
220752	104867
214631	100338
208820	96064
203300	92028
198052	88215
193061	84610
188311	81200
183788	77972
179479	74917
175370	72021
171452	69277
167712	66674
164141	64204
160728	61859
157466	59631
154346	57514
151360	55500
148501	53584
145762	51761

Input units are thousands and kg - output in tonnes

**Table 6.8.1.1. Faroe saithe (Division Vb). Yield per recruit input data.**

MFYPR version 2a

Run: man5

Index file 2/5/2009

Time and date: 19:35 02/05/2009

Fbar age range: 3-12

<b>Age</b>	<b>M</b>	<b>Mat</b>	<b>PF</b>	<b>PM</b>	<b>SWt</b>	<b>Sel</b>	<b>CWt</b>
3	0.2	0.023	0	0	1.292	0.03	1.292
4	0.2	0.202	0	0	1.758	0.12	1.758
5	0.2	0.482	0	0	2.328	0.33	2.328
6	0.2	0.712	0	0	3.011	0.59	3.011
7	0.2	0.854	0	0	3.826	0.70	3.826
8	0.2	0.950	0	0	4.714	0.76	4.714
9	0.2	0.989	0	0	5.514	0.94	5.514
10	0.2	1.000	0	0	6.257	0.75	6.257
11	0.2	1.000	0	0	7.102	0.82	7.102
12	0.2	1.000	0	0	8.398	0.82	8.398

Weights in kilograms

Table 6.8.1.2. Faroe saithe (Division Vb). Yield per recruit, summary table.

MFYPR version 2a

Run: man5

Time and date: 19:35 02/05/2009

Yield per results

FMult	Fbar	CatchNos	Yield	StockNos	Biomass	SpwnNosJan	SSBJan	SpwnNosSpwn	SSBSpwn
0.0000	0.0000	0.0000	0.0000	5.5167	21.6940	3.2941	17.6438	3.2941	17.6438
0.1000	0.0587	0.1724	0.8253	4.6584	15.5683	2.4606	11.5990	2.4606	11.5990
0.2000	0.1173	0.2702	1.1650	4.1731	12.3905	1.9984	8.4952	1.9984	8.4952
0.3000	0.1760	0.3342	1.3222	3.8562	10.4837	1.7028	6.6563	1.7028	6.6563
0.4000	0.2346	0.3801	1.3999	3.6298	9.2266	1.4965	5.4616	1.4965	5.4616
0.5000	0.2933	0.4150	1.4394	3.4580	8.3399	1.3436	4.6328	1.3436	4.6328
0.6000	0.3519	0.4427	1.4595	3.3218	7.6820	1.2252	4.0285	1.2252	4.0285
0.7000	0.4106	0.4655	1.4691	3.2102	7.1738	1.1304	3.5702	1.1304	3.5702
0.8000	0.4692	0.4847	1.4728	3.1165	6.7685	1.0526	3.2116	1.0526	3.2116
0.9000	0.5279	0.5012	1.4732	3.0362	6.4368	0.9873	2.9236	0.9873	2.9236
1.0000	0.5865	0.5156	1.4717	2.9662	6.1594	0.9317	2.6874	0.9317	2.6874
1.1000	0.6452	0.5284	1.4691	2.9044	5.9233	0.8835	2.4900	0.8835	2.4900
1.2000	0.7038	0.5398	1.4658	2.8492	5.7194	0.8414	2.3226	0.8414	2.3226
1.3000	0.7625	0.5501	1.4622	2.7994	5.5409	0.8042	2.1787	0.8042	2.1787
1.4000	0.8211	0.5594	1.4584	2.7542	5.3830	0.7709	2.0537	0.7709	2.0537
1.5000	0.8798	0.5680	1.4546	2.7128	5.2421	0.7411	1.9440	0.7411	1.9440
1.6000	0.9384	0.5759	1.4508	2.6748	5.1153	0.7141	1.8469	0.7141	1.8469
1.7000	0.9971	0.5833	1.4470	2.6395	5.0003	0.6895	1.7603	0.6895	1.7603
1.8000	1.0557	0.5901	1.4434	2.6067	4.8954	0.6670	1.6826	0.6670	1.6826
1.9000	1.1144	0.5965	1.4399	2.5761	4.7991	0.6463	1.6123	0.6463	1.6123
2.0000	1.1730	0.6025	1.4365	2.5474	4.7104	0.6272	1.5485	0.6272	1.5485

Reference point	F multiplier	Absolute F
Fbar(3-12)	1.0000	0.5865
FMax	0.8649	0.5073
F0.1	0.2724	0.1598
F35%SPR	0.3356	0.1969
Flow	0.2028	0.1189
Fmed	0.7327	0.4298
Fhigh	2.187	1.2827

Weights in kilograms

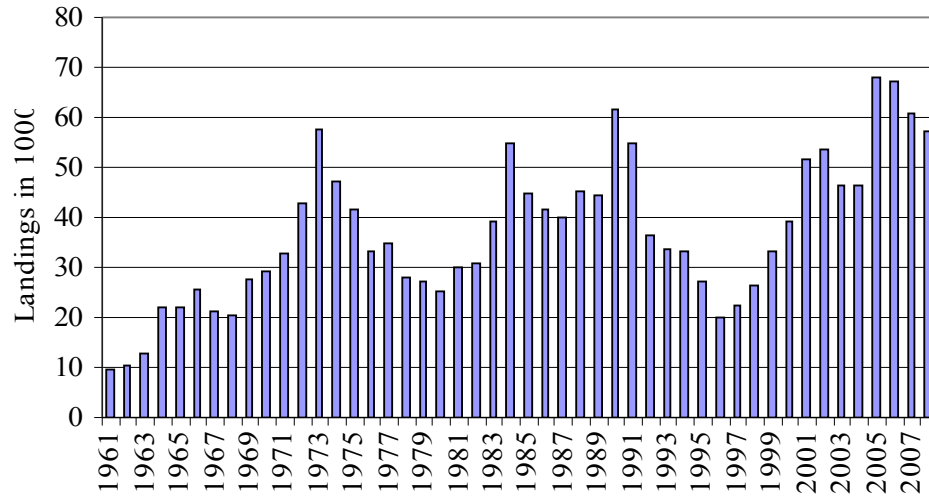


Figure 6.2.1.1. Faroe saithe (Division Vb). Landings in 1000 tonnes.

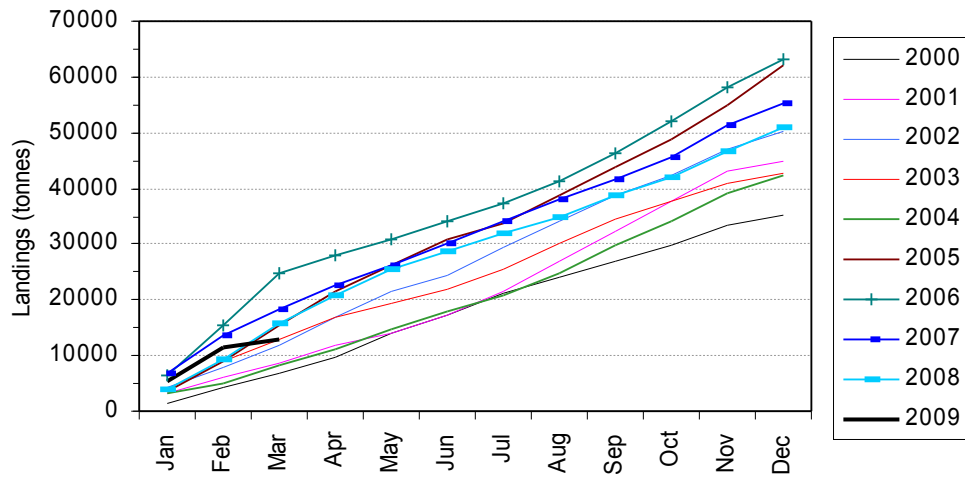
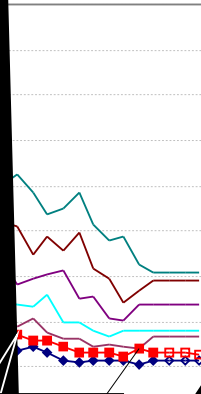


Figure 6.2.1.2. Saithe in the Faroes (Division Vb). Cumulative Faroese landings.



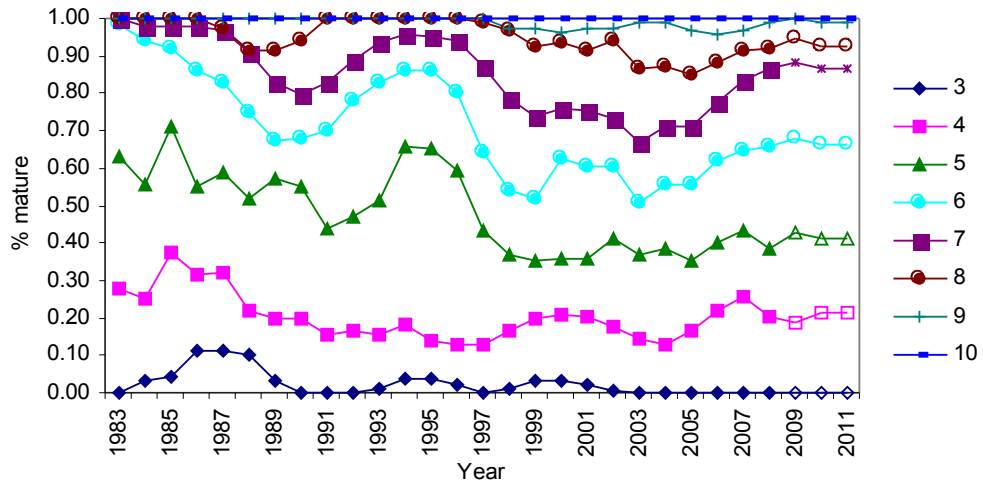


Figure 6.2.4.1. Faroe saithe (Division Vb). Three years running average of proportion mature at age from the spring survey for the period 1983-2008. 2009-2011 values are predicted.

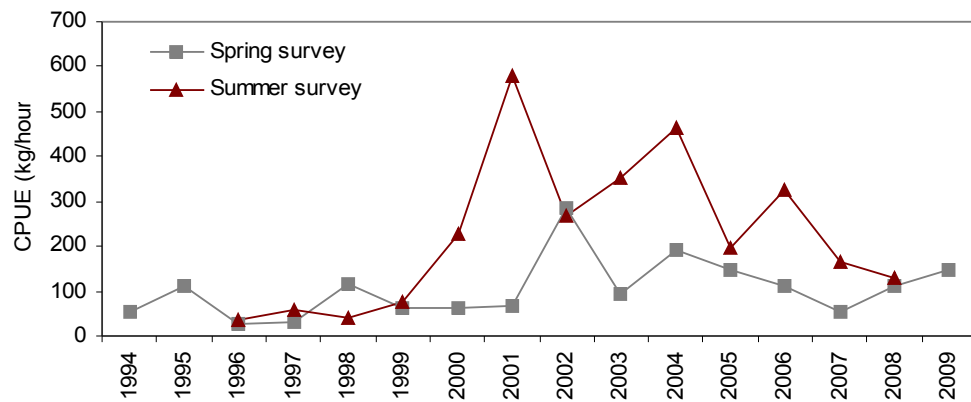


Figure 6.2.5.1.1. Faroe saithe (Division Vb). CPUE (kg/hour) from the spring- and summer surveys.





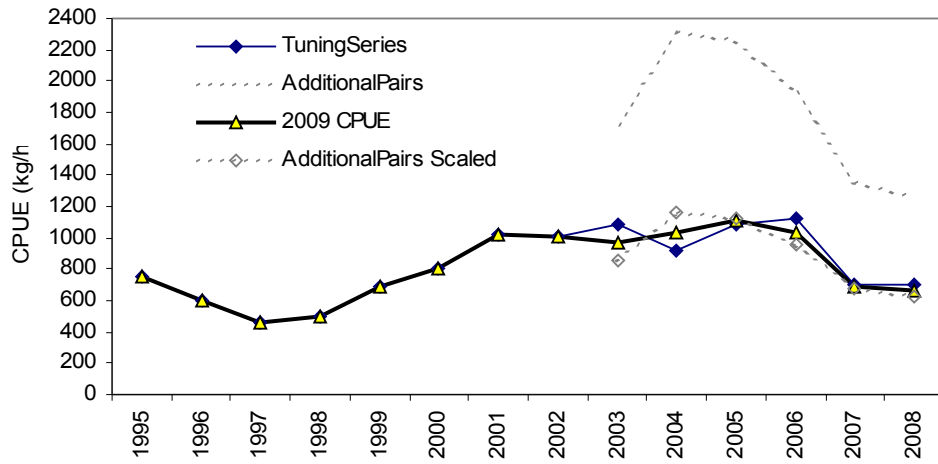


Figure 6.2.5.2.3. Faroe saithe (Division Vb). CPUE (kg/hour) from the commercial pair trawlers. Pair trawlers CPUE scaled (used in this years XSA).

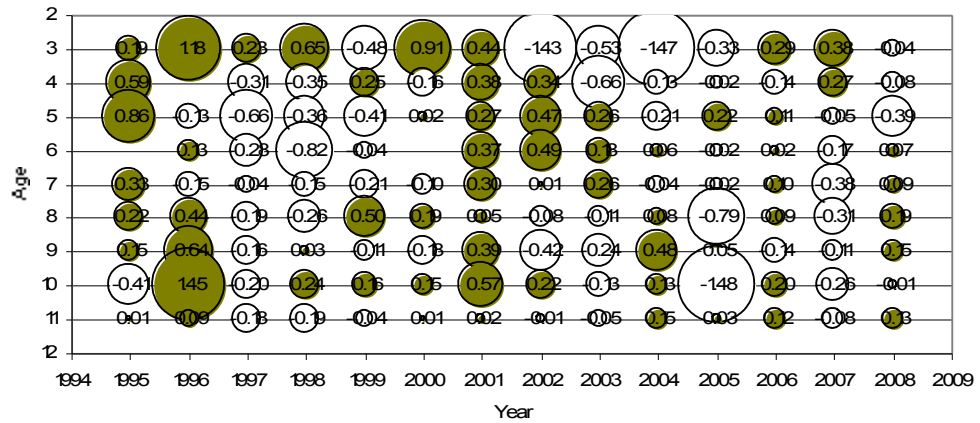


Figure 6.4.1. Faroe saithe (Division Vb). Log catchability residuals for age groups 3 –11 from XSA.

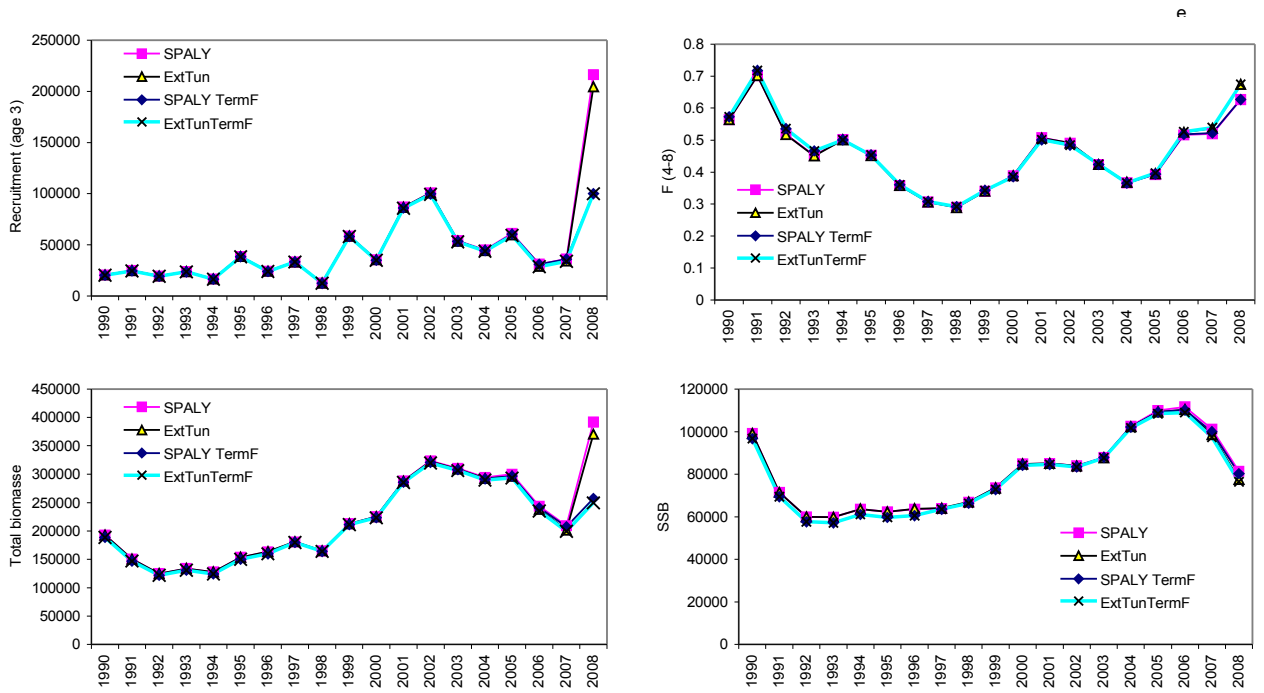


Figure 6.4.2. Faroe saithe (Division Vb). Comparison of output values from XSA before and after recruitment 2008 age 3 was adjusted down to the highest previously observed.

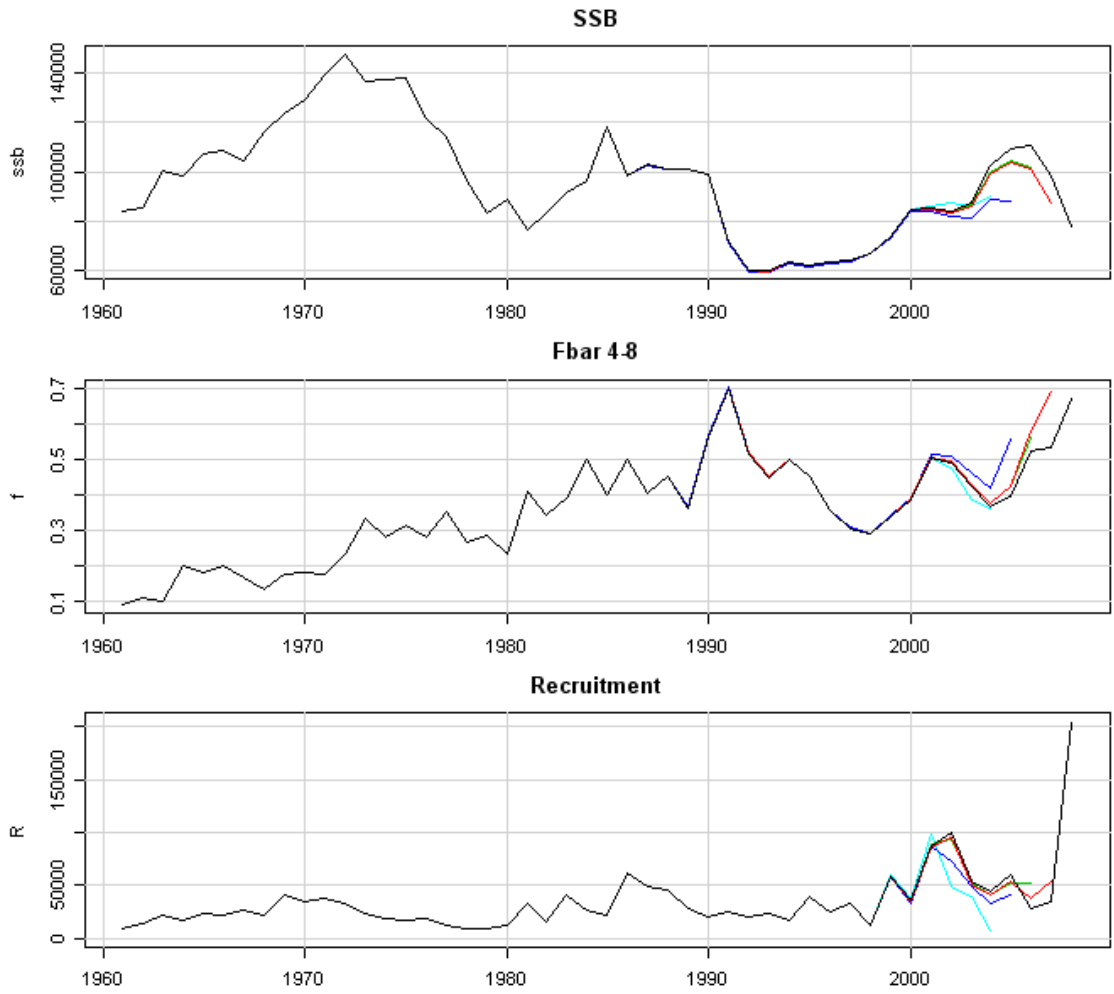


Figure 6.4.3. Faroe saithe (Division Vb). Retrospective analysis of average spawning stock biomass, fishing mortality of age groups 4-8 and recruitment for age 3 from XSA for the years 2003-2008.

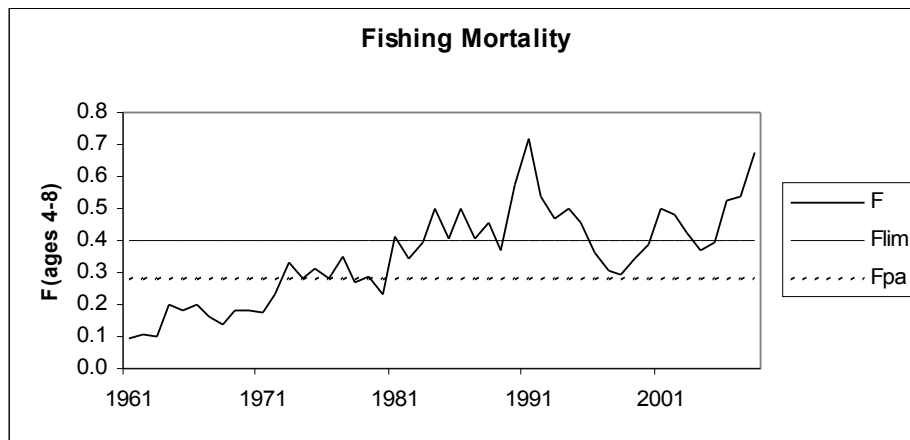


Figure 6.4.4. Faroe saithe (Division Vb). Fishing mortality (average F ages 4-8).

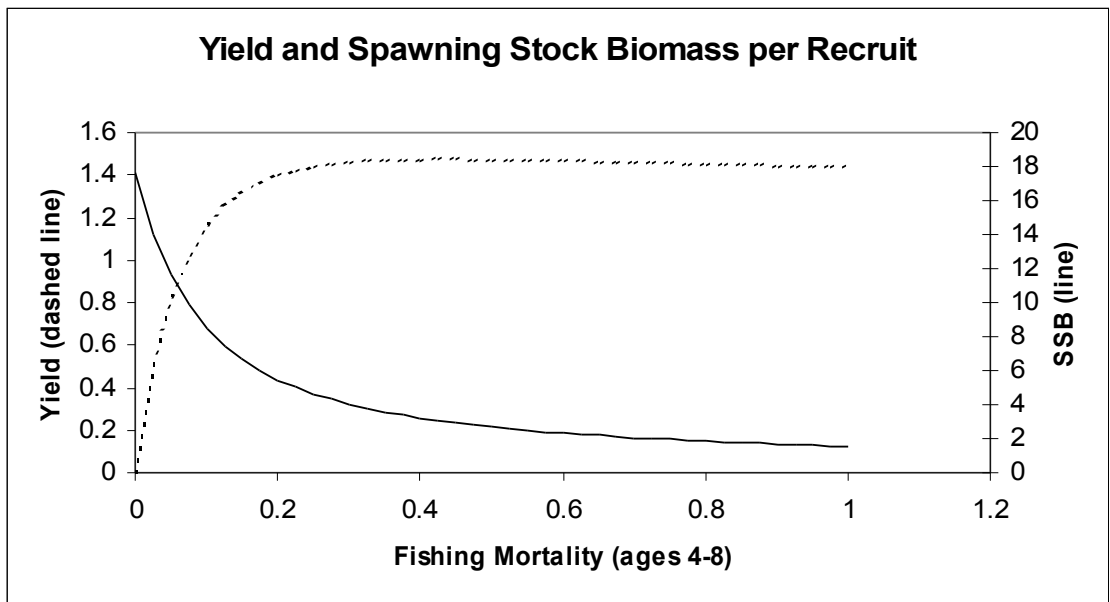


Figure 6.5.1.1. Faroe saithe (Division Vb). Fish stock summary.

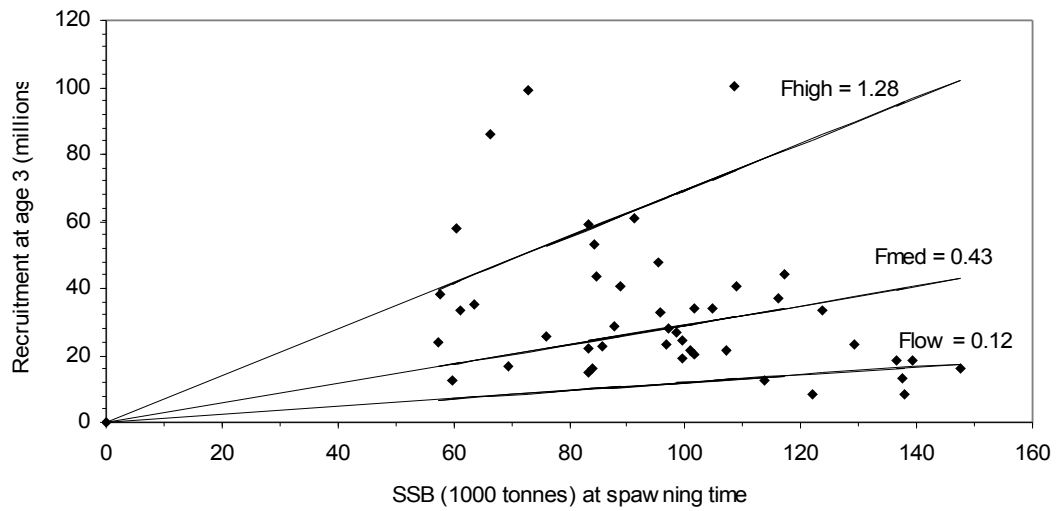


Figure 6.5.1.2. Faroe saithe(Division Vb). Stock-Recruitment plot.

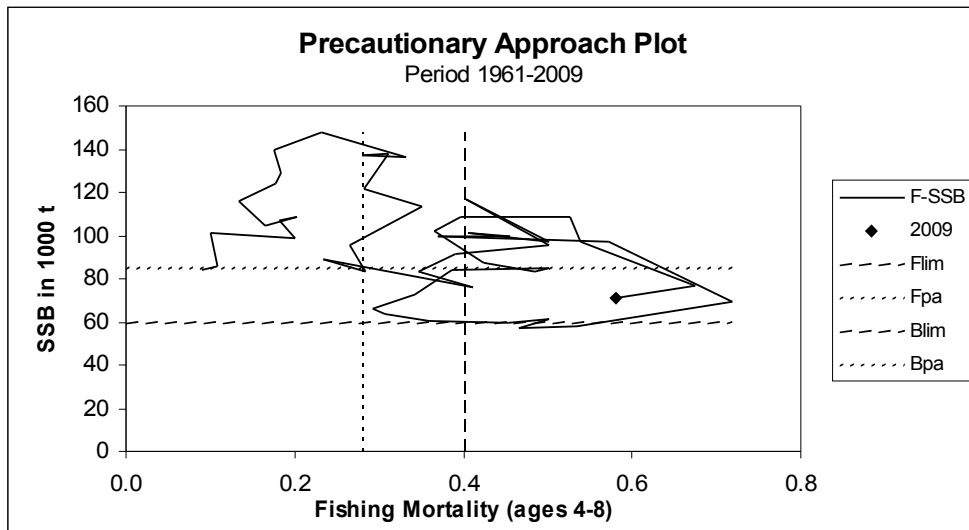


Figure 6.5.1.3. Faroe saithe(Division Vb). Precautionary approach plot, period 1961-2008. The history of the stock/fishery in relation to the four reference points.

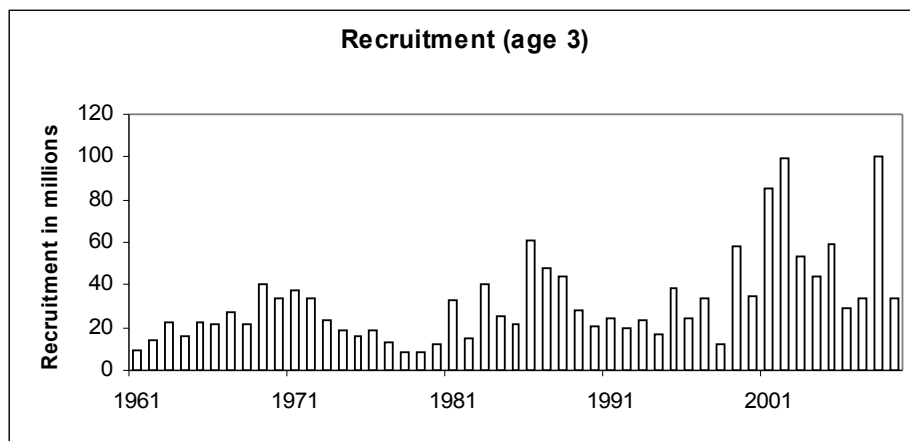


Figure 6.6.1.1. Faroe saithe (Division Vb). Recruitment at age 3 (millions).

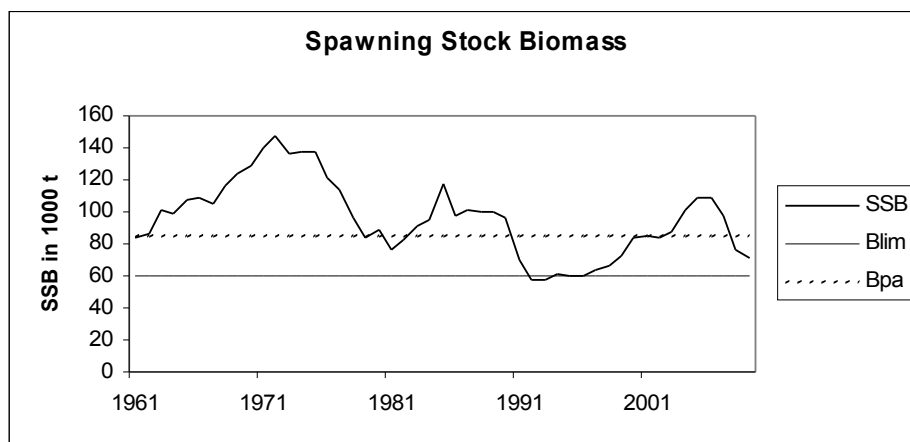


Figure 6.6.1.2. Faroe saithe (Division Vb). Spawning stock biomass (1000 tonnes).

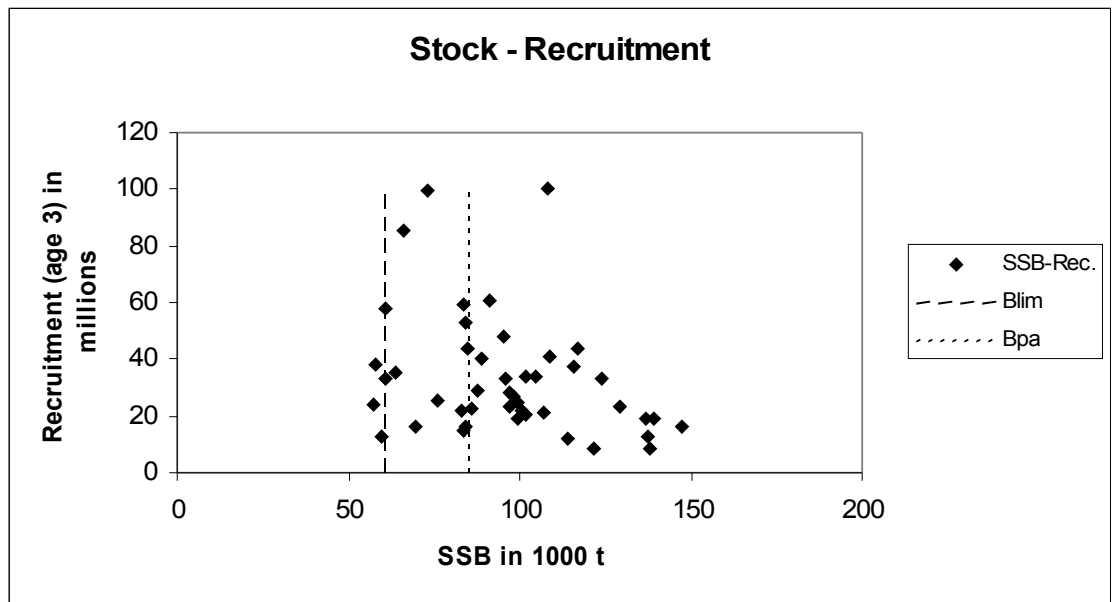


Figure 6.6.1.3. Faroe saithe (Division Vb). Stock-Recruitment plot.

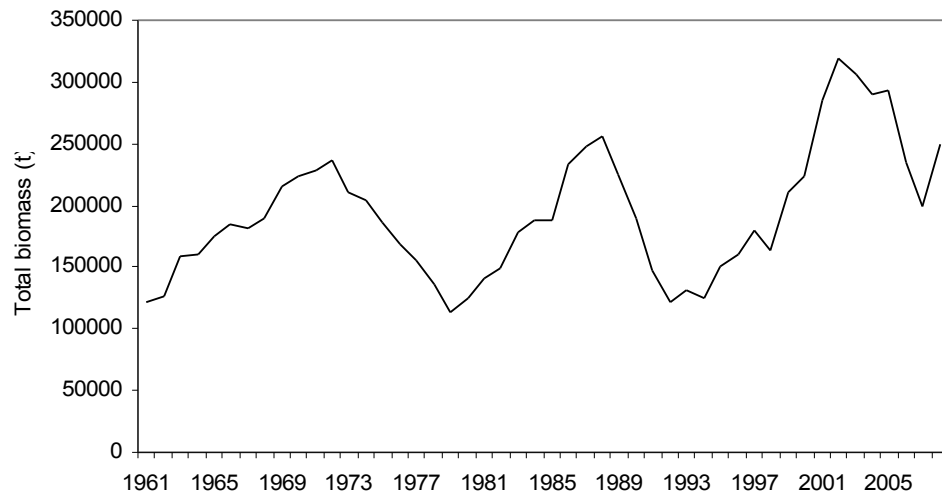
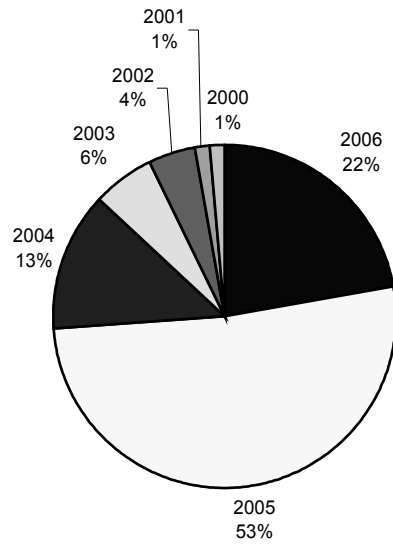


Figure 6.6.1.4. Faroe saithe (Division Vb). Total biomass (1000 tonnes).

**Stock in number composition in 2009**



**SSB composition in 2010**

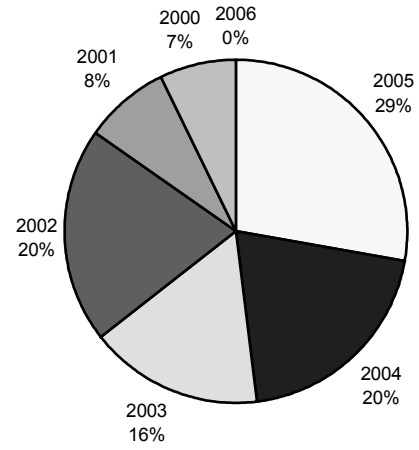


Figure 6.7.1.1. Faroe saithe (Division Vb). Projected composition in number by year classes in the catch in 2009 (left figure) and the composition in SSB in 2010 by year classes (right figure).

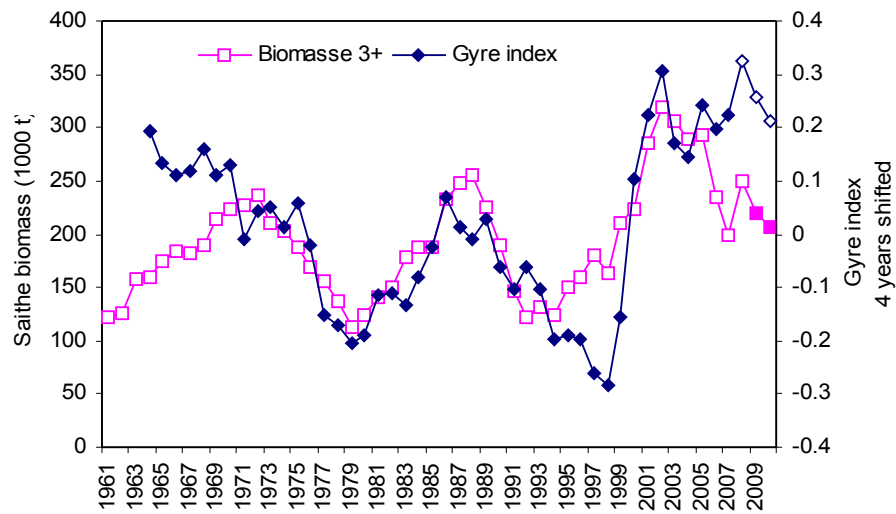


Figure 6.16.1. Faroe saithe (Division Vb). Relationship between the Gyre index (4 years shifted) and saithe biomass (age 3+) in Faroese waters. Biomasse is from XSA tuned with pair trawler serie, and value for 2009-2010 is from short term prediction.

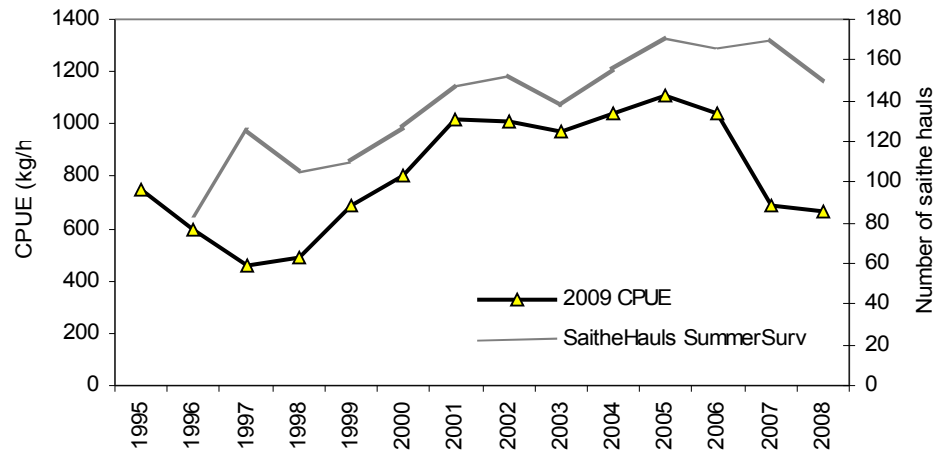


Figure 6.17.1. Faroe saithe (Division Vb). CPUE (kg/hour) from the commercial pair trawlers used in this years XSA and number of saithe hauls from the summer survey.