2 Demersal Stocks in the Faroe Area (Division Vb and Subdivision IIA4)

2.1 Overview

2.1.1 Fisheries

The main fisheries in Faroese waters are mixed-species, demersal fisheries and single-species, pelagic fisheries. The demersal fisheries are mainly conducted by Faroese fishermen, whereas the major part of the pelagic fisheries are conducted by foreign fishermen licensed through bilateral and multilateral fisheries agreements.

Pelagic Fisheries. Three main species of pelagic fish are fished in Faroese waters: blue whiting, herring and mackerel; several nations participate. The Faroese pelagic fisheries are almost exclusively conducted by purse seiners and larger purse seiners also equipped for pelagic trawling. The pelagic fishery by Russian vessels is conducted by large factory trawlers. Other countries use purse seiners and factory trawlers.

Demersal Fisheries. Although they are conducted by a variety of different vessels, the demersal fisheries can be grouped into fleets of vessels operating in a similar manner. Some vessels change between longlining, jigging and trawling, and they therefore can appear in different fleets. In the following there is first a description of the Faroese fleets followed by the fleets of foreign nations.

Open boats. These vessels are below 5 GRT. They use longline and to some extent automatic, jigging engines and operate mainly on a day-to-day basis, targeting cod, haddock and to a lesser degree saithe. The large number of open boats participating in the fisheries (above 1400 licenses) are often operated by non-professional fishermen.

Smaller vessels using hook and line. This category includes all the smaller vessels, between 5 and 110 GRT operating mainly on a day-to-day basis, although the larger vessels behave almost like the larger longliners above 110 GRT with automatic baiting systems and longer trips. The area fished is mainly nearshore, using longline and to some extent automatic, jigging engines. The target species are cod and haddock. The number of licenses is about 90.

Longliners > 110 GRT. This group refers to vessels with automatic baiting systems. The main species fished are cod, haddock, ling and tusk. The target species at any one time is dependent on season, availability and market price. In general, they fish mainly for cod and haddock from autumn to spring and for ling and tusk during the summer. During summer they also make a few trips to Icelandic waters. There are 19 vessels in this fleet.

Otter board trawlers < 500 HP. This refers to smaller fishing vessels with engine powers up to 500 Hp. The main areas fished are on the banks outside the areas closed for trawling. They mainly target cod and haddock. Some of the vessels are licensed during the summer to fish within the twelve nautical mile territorial fishing limit, targeting lemon sole and plaice.

Otter board trawlers 500-1000 HP. These vessels fish mainly for cod and haddock. They fish primarily in the deeper parts of the Faroe Plateau and the banks to the southwest of the islands.

Otter board trawlers >1000 HP. These vessels, also called the deep-water trawlers, consist of 13 vessels. They target several deep-water fish species, especially redfish, blue ling, Greenland halibut, grenadier and black scabbard fish. Saithe is also a target species and in recent years they have been allocated individual quotas for cod and haddock on the Faroe Plateau.

Pair trawlers <1000 HP. These vessels fish mainly for saithe, however, they also have a significant by-catch of cod and haddock. The main areas fished are the deeper parts of the Faroe Plateau and the banks to the southwest of the islands.

Pair trawlers >1000 HP. This category targets mainly saithe, but their by-catch of cod and haddock is important to their profit margin. In addition, some of these vessels during the summers have special licenses to fish in deep water for greater silver smelt. The areas fished by these vessels are the deeper parts of the Faroe Plateau and the banks to the southwest of the islands . Number of vessels in the two pair trawlers fleets is 31.

Gill netting vessels. This category refers to vessels fishing mainly Greenland halibut and monkfish. They operate in deep waters off the Faroe Plateau, Faroe Bank, Bill Bailey's Bank, Lousy Bank and the Faroe-Iceland Ridge. This fishery is regulated by the number of licensed vessels (8) and technical measures like depth and gear specifications.

Jiggers. Consist of a mixed group of smaller and larger vessels using automatic jigging equipment. The target species are saithe and cod. Depending on availability, weather and season, these vessels operate throughout the entire Faroese region. Most of them can change to longlines and in recent years jigging effort has decreased as compared to longlines.

Foreign longliners. These are mainly Norwegian vessels of the same type as the Faroese longliners larger than 110 GRT. They target mainly ling and tusk with by-catches of cod, haddock and blue ling. Norway has in the bilateral fishery agreement with the Faroes achieved a total quota of these species; numbers of vessels can vary from year to year.

Foreign trawlers. These are mainly otter board trawlers of the same type as the Faroese otter board trawlers larger than 1 000 HP. Participating nations are United Kingdom, France, Germany and Greenland. The smaller vessels, mainly from the United Kingdom and Greenland, target cod, haddock and saithe, whereas the larger vessels, mainly French and German trawlers, target saithe and deep-see species like redfish, blue ling, grenadier and black scabbardfish. As for the longliners, the different nations have in their bilateral fishery agreement with the Faroes achieved a total quota of these species; numbers of vessels can vary from year to year

2.1.2 Fisheries and management measures

The fishery around the Faroe Islands has for centuries been an almost free international fishery involving several countries. Apart from a local fishery with small wooden boats, the Faroese offshore fishery started in the late 19th century. The Faroese fleet had to compete with other fleets, especially from the United Kingdom with the result that a large part of the Faroese fishing fleet became specialised in fishing in other areas. So except for a small local fleet most of the Faroese fleet were fishing around Iceland, at Rockall, in the North Sea and in more distant waters like the Grand Bank, Flemish Cap, Greenland, the Barents Sea and Svalbard.

Up to 1959, all vessels were allowed to fish around the Faroes outside the 3 nm zone. During the 1960s, the fisheries zone was gradually expanded, and in 1977 an EEZ of 200 nm was introduced in the Faroe area. The demersal fishery by foreign nations has since decreased and Faroese vessels now take most of the catches. The fishery may be considered a multi-fleet and multi-species fishery as described below.

During the 1980s and 1990s the Faroese authorities have regulated the fishery and the investment in fishing vessels. In 1987 a system of fishing licences was introduced. The demersal fishery at the Faroe Islands has been regulated by technical measures (minimum mesh sizes and closed areas). In order to protect juveniles and young fish, fishing is temporarily prohibited in areas where the number of small cod, haddock and saithe exceeds 30% in the catches; after 1–2 weeks the areas are again opened for fishing. A reduction of effort has been attempted through banning of new licences and buy-back of old licences.

A new quota system, based on individual quotas, was introduced in 1994. The fishing year started on 1 September and ended on 31 August the following year. The aim of the quota system was, through restrictive TACs for the period 1994–1998, to increase the SSBs of Faroe Plateau cod and haddock to 52 000 t and 40 000 t, respectively. The TAC for saithe was set higher than recommended scientifically. It should be noted that cod, haddock and saithe are caught in a mixed fishery and any management measure should account for this. Species under the quota system were Faroe Plateau cod, haddock, saithe, redfish and Faroe Bank cod.

The catch quota management system introduced in the Faroese fisheries in 1994 was met with considerable criticism and resulted in discarding and in misreportings of substantial portions of the catches. Reorganisation of enforcement and control did not solve the problems. As a result of the dissatisfaction with the catch quota management system, the Faroese Parliament discontinued the system as from 31 May 1996. In close cooperation with the fishing industry, the Faroese government has developed a new system based on individual transferable effort quotas in days within fleet categories. The new system entered into force on 1 June 1996. The fishing year from 1 September to 31 August, as introduced under the catch quota system, has been maintained.

The individual transferable effort quotas apply to 1) the longliners less than 100 GRT, the jiggers, and the single trawlers less than 400 HP, 2) the pair trawlers and 3) the longliners greater than 100 GRT. The single trawlers greater than 400 HP do not have effort limitations, but they are not allowed to fish within the 12 nautical mile limit and the areas closed to them, as well as to the pair trawlers, have increased in area and time. Their catch of cod and haddock is limited by maximum by-catch allocation. The single trawlers less than 400 HP are given special licences to fish inside 12 nautical miles with a by-catch allocation of 30% cod and 10% haddock. In addition, they are obliged to use sorting devices in their trawls. One fishing day by longliners less than 100 GRT is considered equivalent to two fishing days for jiggers in the same gear category. Longliners less than 100 GRT could therefore double their allocation by converting to jigging. Table 2.1.1 shows the number of fishing days used by fleet category for 1985–1995 and 1998–2003 and Table 2.1.2 shows the number of allocated days inside the outer thick line in Figure 2.1.1. Holders of individual transferable effort quotas who fish outside this line can fish for 3 days for each day allocated inside the line. Trawlers are generally not allowed to fish inside the 12 nautical mile limit. Inside the innermost thick line only longliners less than 100 GRT and jiggers less than 100 GRT are allowed to fish. The Faroe Bank shallower than 200 m is closed to trawling.

The effort quotas are transferable within gear categories. The allocations of number of fishing days by fleet categories was made such that together with other regulations of the fishery they should result in average fishing mortalities on each of the 3 stocks of 0.45, corresponding to average annual catches of 33% of the exploitable stocks in numbers. Built into the system is also an assumption that the day system is self-regulatory, because the fishery will move between stocks according to the relative availability of each of them and no stock will be overexploited. These target fishing mortalities have been evaluated during the 2005 NWWG meeting (2.1.6).

In addition to the number of days allocated in the law, it is also stated in the law what percentage of total catches of cod, haddock, saithe and redfish, each fleet category on average is allowed to fish. These percentages are as follows:

Fleet category	Cod	Haddock
Saithe Redfish		
Longliners < 110GRT, jiggers, single trawl. < 400HP	51 %	58 %
17.5 % 1 %		
Longliners > 110GRT	23 %	28 %
Pairtrawlers	21 %	10.25 %
69 % 8.5 %		
Single trawlers > 400 HP	4 %	1.75 %
13 % 90.5 %		
Others	1 %	2 %
0.5 % 0.5 %		

Technical measures such as area closures during the spawning periods, to protect juveniles and young fish and mesh size regulations as mentioned above are still in effect.

2.1.3 The marine environment

The waters around the Faroe Islands are in the upper 500 m dominated by the North Atlantic current, which to the north of the islands meets the East Icelandic current. Clockwise current systems create retention areas on the Faroe Plateau (Faroe shelf) and on the Faroe Bank. In deeper waters to the north and east is deep Norwegian Sea water, and to the south and west is Atlantic water. From the late 1980s the intensity of the North Atlantic current passing the Faroe area decreased, but it has increased again in the most recent years. The productivity of the Faroese waters was very low in the late 1980s and early 1990s. This applies also to the recruitment of many fish stocks, and the growth of the fish was poor as well. From 1992 onwards the conditions have returned to more normal values which also is reflected in the fish landings. There has been observed a very clear relationship, from primary production to the higher trophic levels (including fish and seabirds), in the Faroe shelf ecosystem, and all trophic levels seem to respond quickly to variability in primary production in the ecosystem (Gaard, E. et al. 2001). In the section below on catchability analysis this is further discussed.

2.1.4 Catchability analysis

In an effort management regime with a limited numbers of fishing days, it is expected that vessels will try to increase their efficiency (catchability) as much as possible in order to optimise the catch and its value within the number of days allocated. “Technological creeping” should therefore be monitored closely in such a system. However, catchability of the fleets can change for other reasons, e.g. availability of the fish to the gears. If such effects are known or believed to exist, catchability changes may need to be incorporated in the advice on fisheries.

The primary production of the Faroe Shelf ecosystem may vary by as much as a factor of five and given the link between primary production and recruitment and growth (production) of cod as demonstrated by Steingrund & Gaard (2005), this could have pronounced effects on catchability and stock assessment as a whole. Below are the results from an analysis regarding Faroe Plateau cod, Faroe haddock and Faroe saithe.

For cod there seems to be a link between the primary production and growth of cod (Fig. 2.1.2). The growth of cod seems to be negatively correlated with the catchability of longlines (Fig. 2.1.3), suggesting that cod prefer long line baits when natural food abundance is low. Since longliners usually take a large proportion of the cod catch, the total fishing mortality fluctuates in the same way as the long line catchability and thus there is a negative relationship between cod growth and fishing mortality (Fig. 2.1.4).

For haddock there seems to be a similar mechanism as for cod. Although the catchability for longliners (which take the majority of the catch) as estimated from the longliner logbooks does not follow the expected pattern for the first part of the series (1986-1995), it may be a

result of very small catches in this period when stock biomass was low. The fact that we observe a negative relationship between growth and fishing mortality (Fig. 2.1.5) suggests, that the same mechanism is valid for haddock as for cod.

It is, however, important to note that the relationship between the productivity of the ecosystem and the catchability of long lines depends on the age of the fish. The relationship is most clear for fish age 5; for cod age 3 and 4, the relationship is less clear, and for young haddock there apparently is no such relationship between productivity and catchability.

For saithe no clear relationship was observed between the catchability for the Cuba pair trawlers (pair trawlers take the majority of the catch) and other variables such as primary production, growth and stock size.

The analysis reported above suggests that natural factors may have a larger influence than technological ones, at least for Faroe Plateau cod and haddock on changes of catchability. In addition, the available data indicate that there has not been sufficient time since the implementation of the effort management system in 1996 to detect convincing changes in catchability. However, from a management perspective, if the hypothesis that catchability is related to productivity is true, and if productivity in 2004 and 2005 is low, there is the potential for very high fishing mortality to be exerted on cod. It could therefore be prudent to consider substantial reductions in fishing effort for the next fishing season.

2.1.5 Summary of the 2005 assessment of Faroe Plateau cod, haddock and saithe

A summary of selected parameters from the 2005 assessment of Faroe Plateau cod, haddock and saithe is shown in Figure 2.1.6. Landings of cod, haddock and saithe on the Faroes appear to be closely linked with the total biomass of the stocks. For cod, the peaks and valleys are generally of the same height, suggesting that the exploitation ratio has remained relatively stable over time. For haddock, the difference at the beginning of the series suggest that the exploitation rate was decreasing during that period, while it would have been relatively steady since the mid 1970s. For saithe, there is a suggestion that the exploitation rate was increasing at the beginning of the period with reasonable stability since the mid to late 1970s.

Fishing mortality estimates from the assessment do not confirm this perception, but that is partly due to unstable estimates of fishing mortality 1)at the oldest, poorly sampled ages and 2)for very small poorly sampled year classes. The ratio of landings to biomass could therefore provide a more stable indication of the exploitation status of the resource

The plot of exploitation ratio over time does support the above hypothesised trends in fishing. The overall ratio (sum of cod, haddock and saithe landings over the sum of their biomass) is remarkably stable between 0.20 and 0.25 over the period 1961 to 1985, with possibly a slight increasing trend. The ratio has been more variable since for both individual species and for the aggregate. Although variable, there appears to be an increasing trend from 0.14 in 1995 to 0.24 in 2004. The most recent biomass estimates, however, are most likely to change in future assessments, and the trend could therefore change as a result of future stock assessments.

The same data can be shown differently with area graphs. This suggests that the landings of saithe have taken an increasing part of the total biomass in the area.

2.1.6 Medium term projections and reference points for Faroe Stocks

2.1.6.1 Data and methodology

One hundred years projections using the results of the 2004 assessments were made for the Faroese demersal stocks of cod, haddock and saithe under similar assumptions. Natural mortality was assumed fixed at M = 0.20 for all ages and all years. The average of the values for 1996 to 2003 were used for the exploitation pattern, average weights at age and maturity at age. Weights at age in the stock were assumed equal to weights at age in the catch. Future recruitment was modelled from a Ricker stock – recruitment relationship fitted using the USA National Marine Fisheries Service NFT SRFIT software. The form used by SRFIT is R = S*exp(alpha + beta *S). The residuals from the fit were randomly added to the predicted recruitment in order to introduce stochasticity. If the residual added to the recruitment calculated from the equation was negative and larger than the predicted recruitment, the resulting negative value was replaced with zero. Four scenarios of fishing mortality were investigated: F status quo, F target = 0.45 corresponding to 33% exploitation rate in numbers, increasing F at 3% per year, and decreasing F at 3% per year until F had been reduced by 50%. The increasing F scenario is considered plausible in the effort management system extant on the Faroes. Each scenario was run 250 times in an excel spreadsheet using the FishLab software. The yearly SSB and Catches were recorded. The median catch, the coefficient of variation of the catch, the median SSB, and the probability that the SSB will be lower than reference points were examined.

2.1.6.2 Stock and recruitment

Results of the stock and recruitment fits are provided in the text table below:

	MSY	FMSY	BMSY	ALPHA	BETA
Cod	29283	1.03	56721	0.0660415	-2.03431e-5
Haddock	20630	1.42	44885	0.790725	-2.28351e-5
Saithe	44116	1.47	58046	0.554204	-1.80126e-5

The derived estimates of MSY and BMSY are consistent with the history of the fishery and with the stock and recruitment scatter plot. FMSY is estimated to be very high for the three stocks. This is presumably linked to the maturity at age being higher than the exploitation pattern at age for the three stocks.

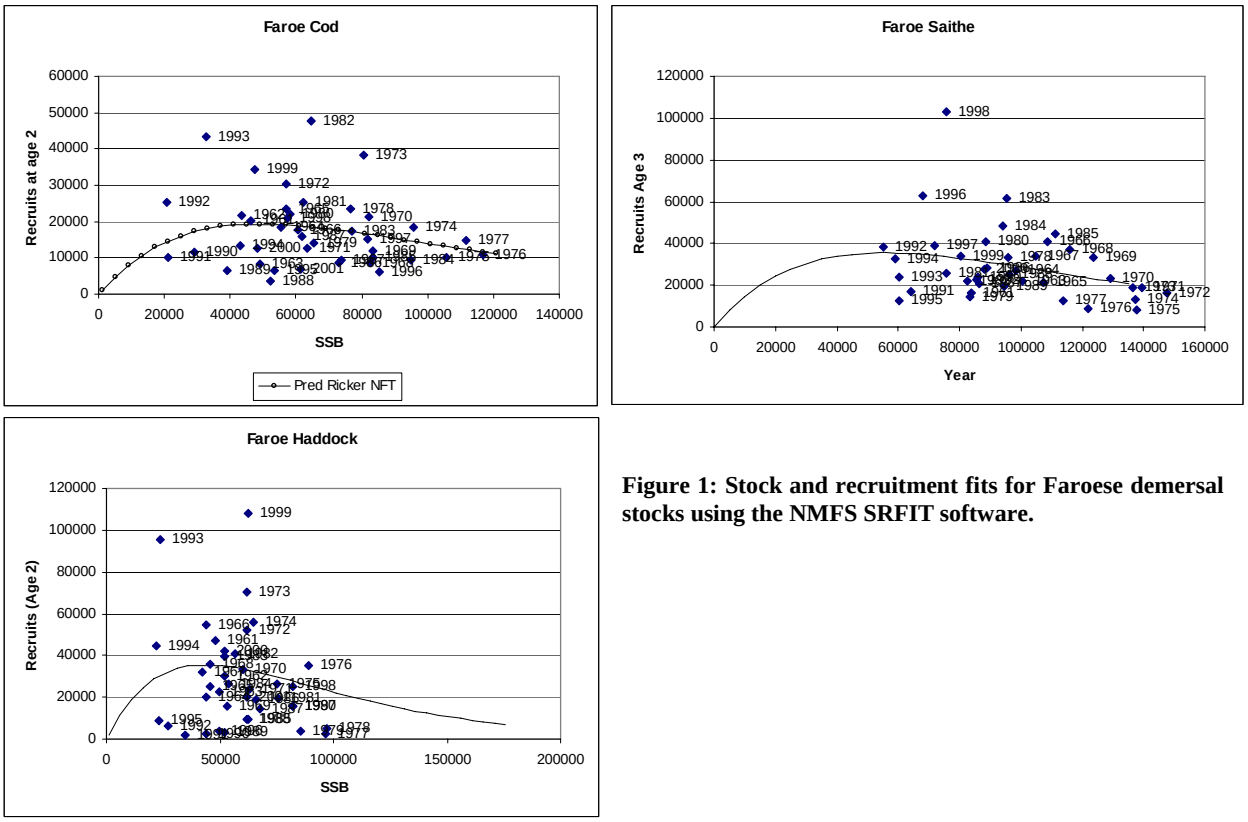


Figure 1: Stock and recruitment fits for Faroese demersal stocks using the NMFS SRFIT software.

For cod and haddock, there are stock and recruitment pairs to the left of the inflection point, but not for saithe. This is consistent with the inverse form of the data which suggest that recruitment increases as SSB decreases.

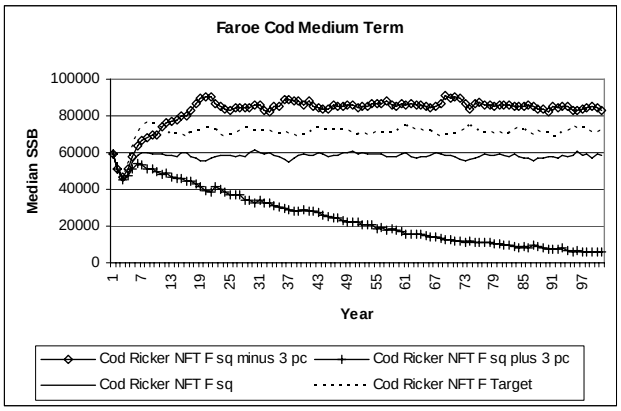
Blim

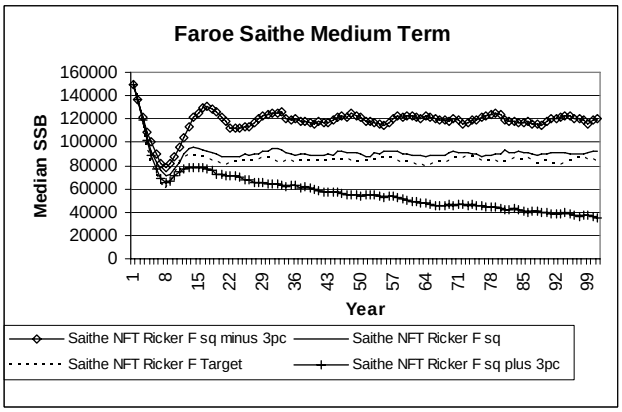
The Blim used by ICES are 21 000t for cod, 40 000t for haddock and 60 000t for saithe. The existing Blim for cod is consistent with the stock and recruitment observations and also with the results of a segmented regression analysis done for the Study Group on Precautionary Reference points for Advice on Fishery Management (SGPRP) 2003 but those for haddock and saithe are not. For haddock, the addition of new stock and recruitment pairs since the original analysis in 1998 clearly indicates that Blim is likely to be lower than the existing value. Segmented regressions done for the SGPRP 2003 indicate a breaking point in the order of 23 000t. The NWWG suggest that the new Blim for Faroe haddock be set at 23 000t. The saithe stock and recruitment pairs are of the inverse form where recruitment increases as SSB decreases. The SGPRP 2003 suggests that in such situations Bloss be used as an estimate of Bpa. The NWWG recommends that the existing Blim of 60 000t for Faroe saithe be considered as an estimate of Bpa.

There was insufficient time during the WG meeting to calculate Bpa for cod and haddock according to the methodology recommended in SGPRP 2003.

2.1.6.3 Medium term projections

Three of the effort scenarios are considered sustainable: the F status quo, the F target and the decreasing F at 3% per year. Not surprisingly, the scenario where the fishing mortality is assumed to increase at 3% per year is not sustainable.





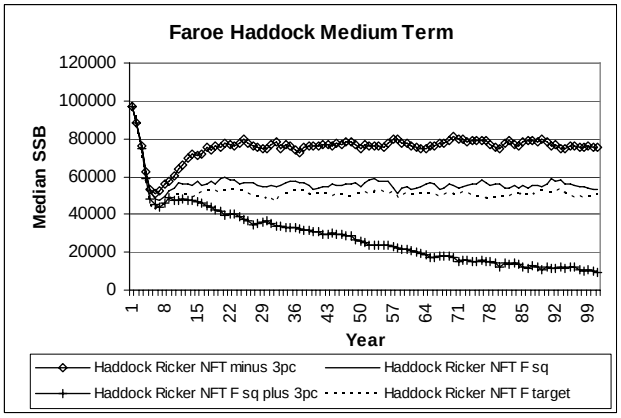
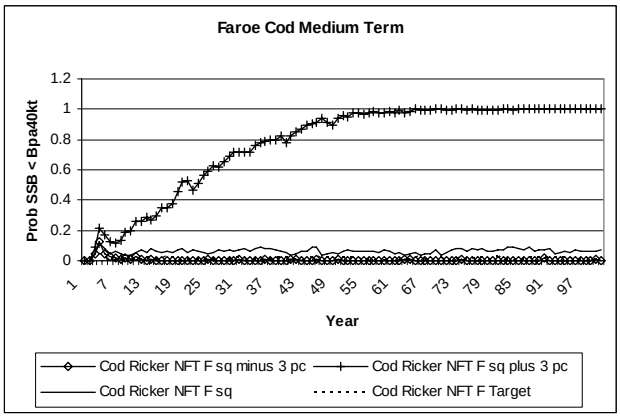


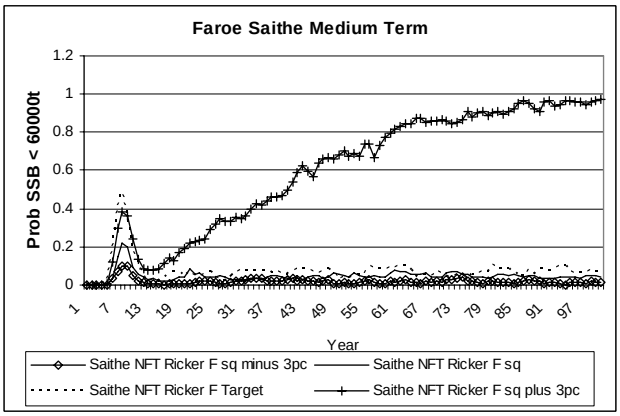
Figure 2: Medium term median SSB for Faroese demersal stocks. The medians are deceptively stable. Individual trajectories of the 250 simulations done are considerably more variable.

Under the unsustainable scenario of increasing F at 3% per year, the median SSB decreases steadily and relatively quickly towards extinction for cod and haddock.

For saithe, the decline rate is smaller because the stock and recruitment relationship used assumes that maximum recruitment occurs at biomasses lower than those that have been observed since the early 1960s. For cod, F status quo is higher than F target, and therefore the median SSB at F target are higher than at Fsq. For haddock and saithe, the reverse is observed because Fsq is lower than F target. The reverse situation occurs with catches: for cod, median catches vary between 24 000t and 28 000t with those at F target slightly smaller than at Fsq. For haddock (15 000t to 19 000t) and saithe (30 000t to 41 000t), median catches are higher at Ftarget than at Fsq. For cod, decreasing the fishing mortality to 50% of status quo would result in an increase of 1 kg (from 2.5 to 3.5) in the average weight in the catch.

The NWWG considers that it could be confusing and misguided to evaluate the medium term scenarios with respect to the existing biomass reference points for haddock and saithe. The following figure therefore illustrates the probability that the various scenarios would cause the stock to go below the recommended Blim = 23000 for haddock and below the recommended Bpa = 60 000t for saithe. For cod, because there is a negligible probability that the stock will go below Blim = 21 000t and the graph is uninformative for the three sustainable scenarios, the graph shows instead the probability that the SSB will go below Bpa = 40 000t.





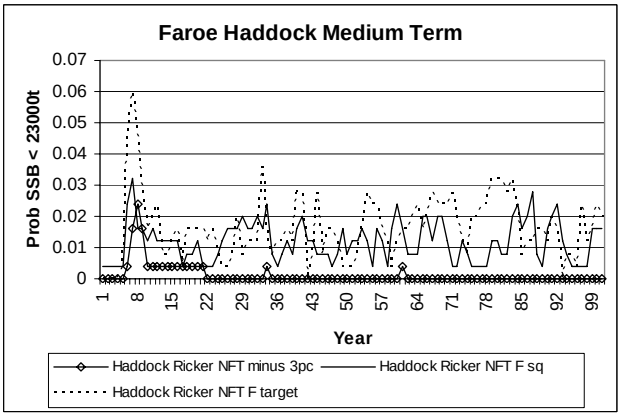


Figure 3: Probability that the SSB will be below Bpa for cod and saithe and below the recommended Blim for haddock.

For all stocks there is a higher probability of breaching reference points for the three sustainable scenarios in the short term than in the medium to long term. For the three sustainable scenarios, the probability of breaching Bpa is generally less than 10% for cod and saithe, and the probability of breaching Blim is generally less than 3% for haddock.

2.1.6.4 Flim

The 2003 SGPRP suggested that Flim be derived from the Blim through finding the F corresponding to the SSB per recruit at Blim. For cod, the SGPRP calculated that the Flim corresponding to the segmented regression would be F = 1.44. The SGPRP did not calculate an Flim for the changing point of the segmented regression. However, the recruitment at 23000t from the Ricker relationship is 30000 giving an SSB per recruit of 0.767 corresponding to an Flim of 1.677. For saithe, given that Blim is not defined, Flim cannot be defined this way. The NWWG recommends that Flim for cod be set at 1.4 and that Flim for haddock be set arbitrarily at F= 1.4.

2.1.6.5 Conclusion

Based on the above, the NWWG concludes that the F-targets set by the Faroese authorities are sustainable and consistent with the precautionary approach under current management and environmental conditions. This conclusion must be qualified however:

- The effort management system is expected to result in increased fishing mortality over time because of technological improvements etc. This means that to be sustainable, the status quo needs a mechanism to reduce fishing mortality as fishing efficiency increases.
- The ability of Faroese stocks to sustain high fishing mortality is in good part a result of the exploitation pattern being less than the maturity for ages that are not fully ma-

ture. There are indications that fishing mortality may have been increasing in recent years at least for cod. Should higher fishing mortality continue to be exerted on younger ages in the future, the status quo F may not be sustainable.

- In the 1970's and 1980's there were strings of years of poor recruitment for haddock. The possibility of having strings of poor recruitment was not taken into account in the simulations reported above. Their effect would be to lower the resilience of the stocks.
- Regime shifts resulting in changes in recruitment, changes in weights at age, or changes in maturity at ages would invalidate the results of the simulations reported above.
- The current management set up is not successful at achieving the target fishing mortality for cod.

2.1.7 References:

Gaard. E., Hansen, B., Olsen, B and Reinert, J. 2001. Ecological features and recent trends in physical environment, plankton, fish stocks and sea birds in the Faroe plateau ecosystem. In: K- Sherman and H-R Skjoldal (eds). Changing states of the Large Marine Ecosystems of the North Atlantic.

Steingrund, P., and Gaard, E. 2005. Relationship between phytoplankton production and cod production on the Faroe Shelf. ICES Journal of Marine Science, 62: 163-176.

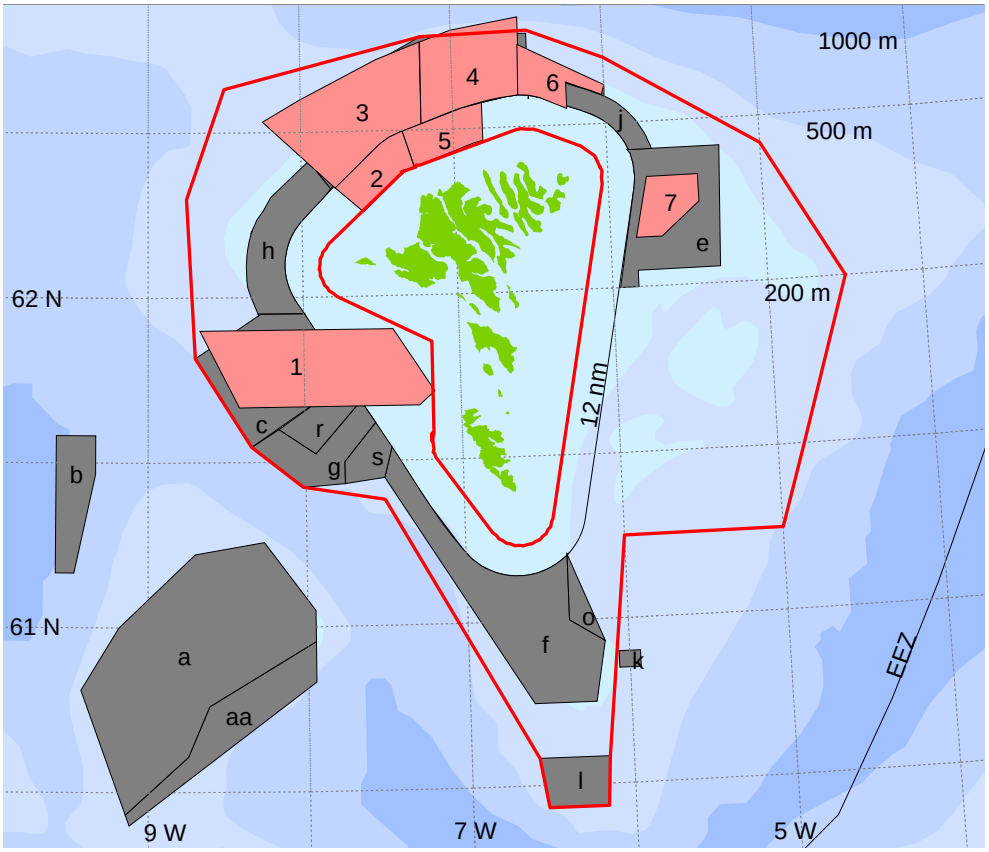
Table 2.1.1 Number of fishing days used by various fleet groups in Vb1 1985-95 and 1998-02. For other fleets there are no effort limitations. Catches of cod, haddock saithe and redfish are regulated by the by-catch percentages given in section 2.1.1. In addition there are special fisheries regulated by licenses and gear restrictions. (This is the real number of days fishing not affected by doubling or tripling of days by changing areas/gears)

Year	Longliner 0-110 GRT, jiggers, trawlers < 400 HP	Longliners > 110 GRT	Pairtrawlers > 400 HP
1985	13449	2973	8582
1986	11399	2176	11006
1987	11554	2915	11860
1988	20736	3203	12060
1989	28750	3369	10302
1990	28373	3521	12935
1991	29420	3573	13703
1992	23762	2892	11228
1993	19170	2046	9186
1994	25291	2925	8347
1995	33760	3659	9346
Average(85-95)	22333	3023	10778
1998	23971	2519	6209
1999	21040	2428	7135
2000	24820	2414	7167
2001	29560	2512	6771
2002	30333	2680	6749
2003*	27642	2196	6624
2004*	22211	2728	7059
Average(98-01)	25945	2497	6816

* Preliminary, not all days included

Table 2.1.1 Number of allocated days for each fleet group since the new management scheme was adopted and number of licenses per fleet.

	Fleets	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
Group 1	Single trawlers > 400 HP				Regulated by area and by-catch limitations			
Group 2	Pair trawlers > 400 HP	8225	7199	6839	6839	6839	6839	6771
Group 3	Longliners > 110 GRT	3040	2660	2527	2527	2527	2527	2502
Group 4	Longliners and jiggers 15-110 GRT, single trawlers < 400 HP	9320	9328	8861	8861	8861	8861	8772
Group 5	Longliners and jiggers < 15 GRT	22000	23625	22444	22444	22444	22444	22220



Closed areas to trawlings

Areas inside the 12 nm zone closed year round

Area	Period
a	1 jan- 31 des
aa	1 jun – 31 aug
b	20 jan- 1 mar
c	1 jan- 31 des
d	1 jan- 31 des
e	1 apr- 31 jan
f	1 jan- 31 des
g	1 jan- 31 des
h	1 jan- 31 des
i	1 jan- 31 des
j	1 jan- 31 des
k	1 jan- 31 des
l	1 jan- 31 des
m	1 feb- 1 jun
n	31 jan- 1 apr
o	1 jan- 31 des
p	1 jan- 31 des
r	1 jan- 31 des
s	1 jan- 31 des

Spawning area closures

Area	Period
1	15 feb-31 mar
2	15 feb- 15 apr
3	1 feb- 1 apr
4	15 jan- 15 mai
5	15 feb- 15 apr
6	15 feb- 15 apr
7	15 jan- 1 apr

Figure 2.1.1 Fishing area regulations in Division Vb. Allocation of fishing days applies to the area inside the outer thick line on the Faroe Plateau. Holders of effort quotas who fish outside this line can triple their numbers of days. Longliners larger than 110 GRT are not allowed to fish inside the inner thick line on the Faroe Plateau. If longliners change from longline to jigging, they can double their number of days. The Faroe Bank shallower than 200 m depths (a, aa) is regulated separate from the Faroe Plateau. It is closed to trawling and the longline fishery is regulated by individual day quotas.

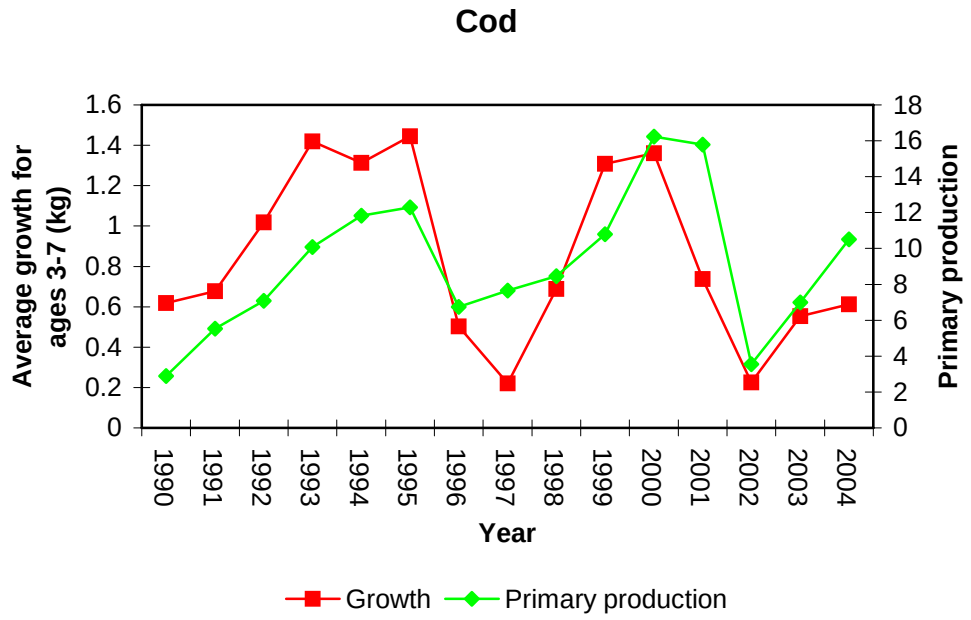


Figure 2.1.2. Faroe Plateau Cod. Relationship between primary production and growth of cod during the last 12 months.

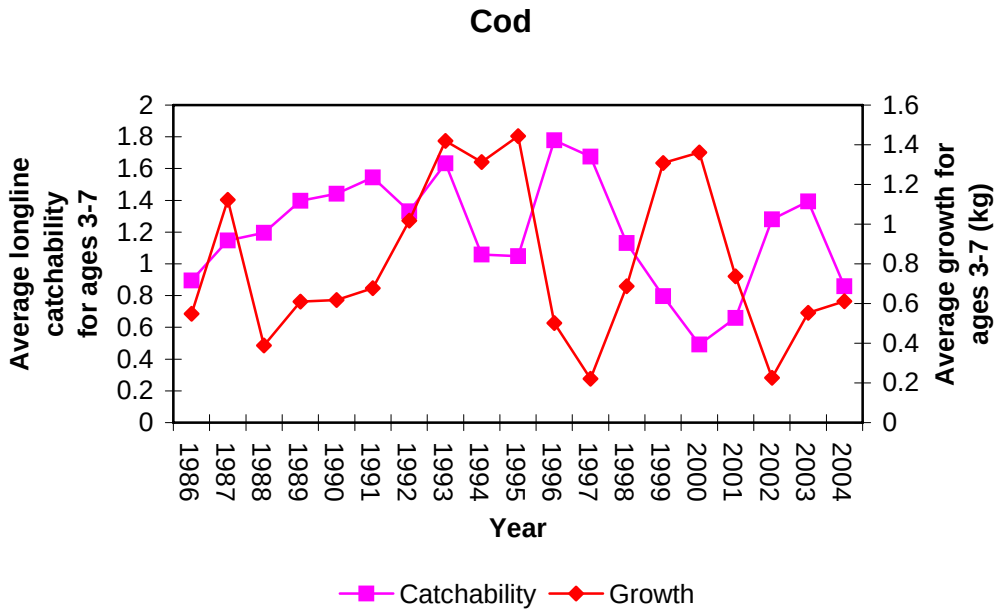


Figure 2.1.3. Faroe Plateau Cod. Relationship between long line catchability and growth of cod during the last 12 months.

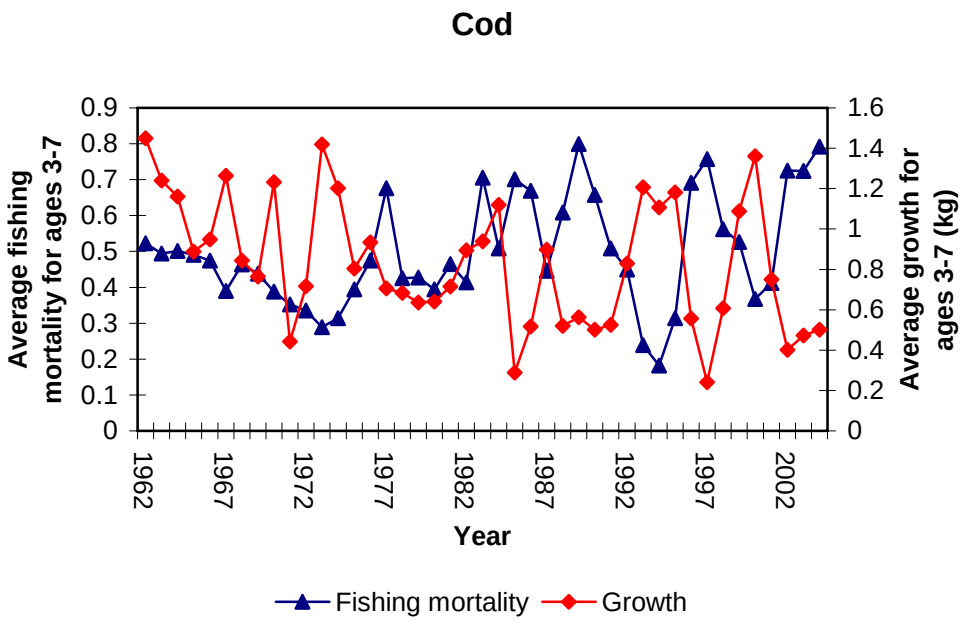


Figure 2.1.4. Faroe Plateau Cod. Relationship between fishing mortality and growth of cod during the last 12 months.

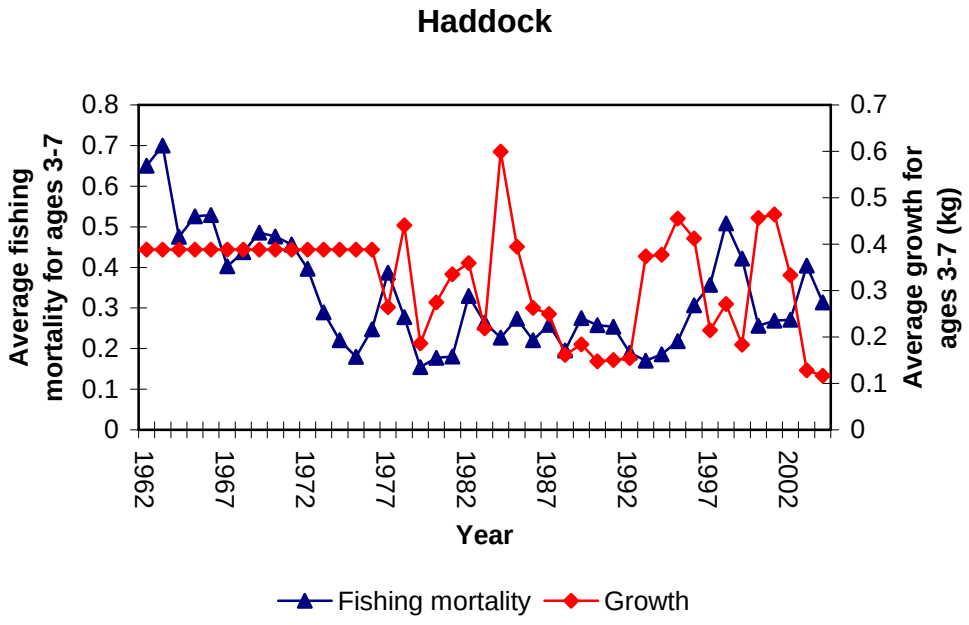


Figure 2.1.5. Faroe Haddock. Relationship between fishing mortality and growth of haddock during the last 12 months.

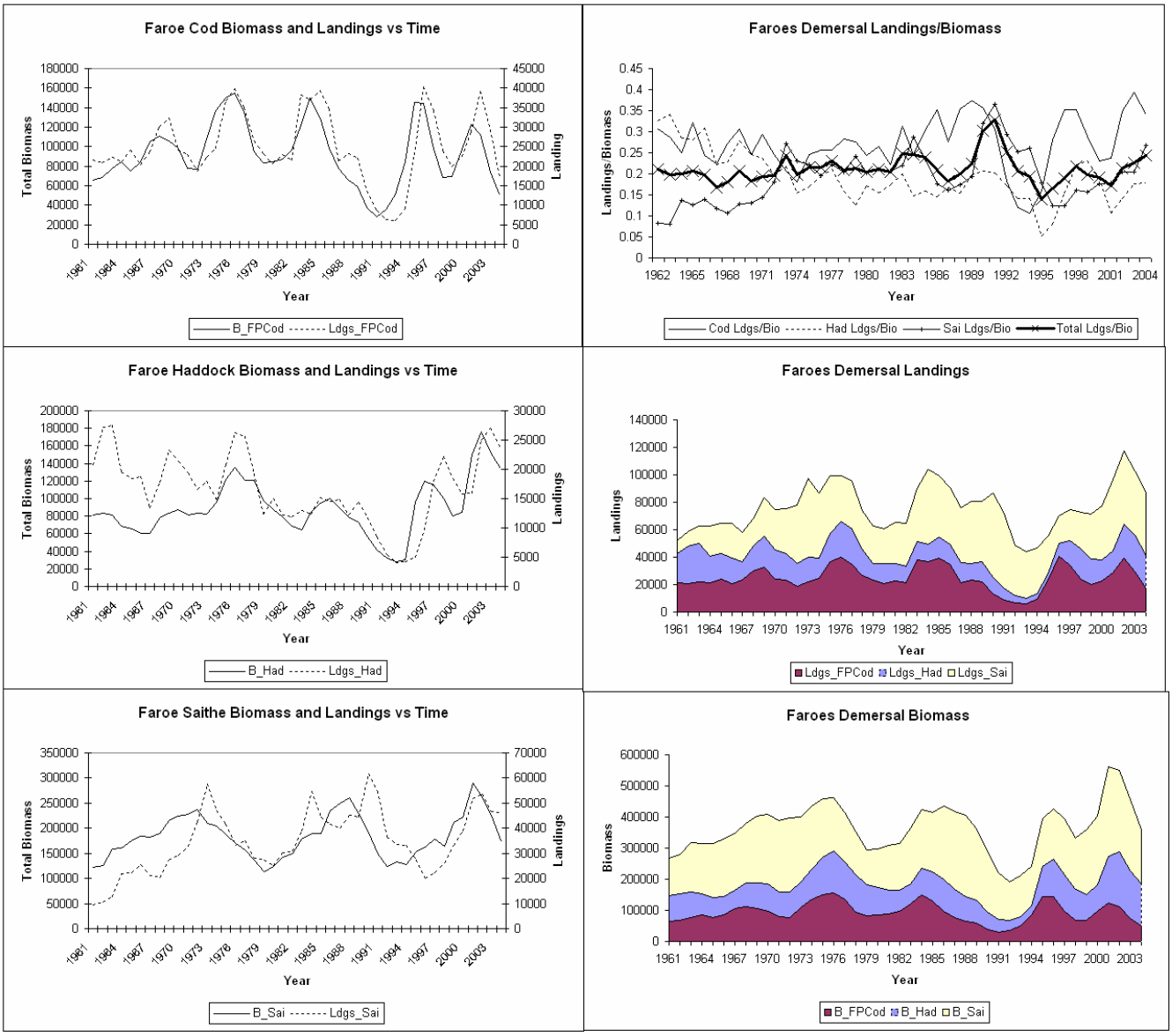


Figure 2.1.6. Faroe Plateau cod, Faroe haddock and Faroe saithe. 2005 stock summary.

2.2 Faroe Plateau Cod

2.2.1 Stock definition

Faroe Plateau cod is distributed on the entire plateau down to approximately the 500 m depth contour. Tagging experiments show that immigration to other areas is very rare (about 0.1% of recaptured cod; Strubberg, 1916, 1933; Tåning, 1940, 1943; unpublished data). Cod spawn in February-March at two main spawning grounds north and west of the islands at depths around 90-120 m. The larvae hatch in April and are carried by the Faroe Shelf residual current (Hansen, 1992) that flows clockwise around the Faroe plateau within the 100-130 m isobath (Gaard *et al*. 1998; Larsen *et al.*, 2002). The fry settle in July-August and occupy the near shore areas, which normally are covered by dense algae vegetation. In autumn the following year (i.e. as 1 group), the juvenile cod begin to migrate to deeper waters (usually within the 200 m contour), thus entering the feeding areas of adult cod. They seem to be fully recruited to the fishing grounds as 3 year olds. Faroe plateau cod mature as 3-4 year old. The spawning migration seems to start in December-January and ends in May. Cod move gradually to deeper waters when they are growing older. The diet in shallow water (< 200 m) is dominated by sandeels and benthic crustaceans, whereas the diet in deeper water mainly consists of Norway pout, blue whiting and a few species of benthic crustaceans.

2.2.2 Trends in landings

The annual landings of Faroe cod (ICES Division Vb) normally varied between 20 and 40 thousand tonnes during the last century. English and Scottish vessels took the majority of the catches up to the 1950s. Thereafter their part of the catches declined gradually, and when Faroe Islands established the 200 nm EEZ in 1977, the vast majority of the catch was taken by Faroese vessels. From 1965 there have been separate catch figures for Faroe Plateau (ICES Division Vb1) and Faroe Bank (ICES Division Vb2).

The relatively high recruitment in 1980-1983 allowed a good fishery for cod in the period 1983 to 1986 when landings some years reached almost 40 000 t. Landings decreased afterwards to only 6 000 tonnes in 1993, the lowest on record (Table 2.2.2.1). In 1995 the officially reported landings increased to slightly above 19 000 t. Information from the fishing industry indicated misreporting in the order of 3 330 t (3 000t. gutted weight) for 1995 which were added to the officially reported landings in Table 2.2.2.2. Misreporting is not suspected to have been a problem afterwards. Landings increased spectacularly in 1996, to above 40 000 t, the highest value during the 1961 to 2004 time period. This increase is believed to be due to a combination of increased stock size and increased availability.

In recent years, statistics for the Faroese fishery in that part of Subdivision IIa which is within the Faroese EEZ, have become available. It is expected that these are taken from the Faroe Plateau area so they are included in the total used in the assessment in Table 2.2.2.2 under the row labelled "Used in the assessment". No information on the Faroese landings from IIa were available for 1993-1996. The French landings of Faroe Plateau cod in 1989 and 1990 as reported to the Faroese authorities are also included. Scottish catches 1991-1999 reported from the Faroe Bank (Vb2) were in the 2001 assessment moved to the Faroe Plateau (Vb1), by advice from the Faroese Coastal Guard.

Since the introduction of the EEZ, the Faroe Plateau cod has almost entirely been exploited by the Faroese fishing fleets. In recent years, the longliners and the pair trawlers have usually taken most of the catches. Since autumn 1999 single trawlers > 1000 HP have increased their share of the total catches considerably as a result of a special quota (in tonnes, not fishing days) allocated to them in shallow water (< 200 m) on a half year basis (September 1 and March 1).

The nominal landings of cod (1986-2004) from the Faroe Plateau by nations as officially reported to ICES, are given in Table 2.2.2.1. Table 2.2.2.2 shows the figures used in the assessment. In 2004, the catches were about 17 thousand tonnes, which is far below the long term average and also below the normal "downs" in the catches (20 thousand tonnes). Table 2.2.2.3 shows the landings for the most important fleet categories.

2.2.3 Catch-at-age

The sampling strategy is to have length, length-age, and length-weight samples from all major gears during three periods: January-April, May-August and September-December. In the period 1985-1995, the year was split into four periods: January-March, April-June, July-September, and October-December. When sampling was insufficient, length-age and length-weight samples were borrowed from similar fleets in the same time period. Length measurements were, if possible, not borrowed.

Landings-at-age were updated to account for a change in the nominal landings for 2001-2003. Landings-at-age for 2004 are provided for the Faroese fishery in Table 2.2.3.1. Faroese landings from most of the fleet categories were sampled (see text table below). Landings-at-age for the fleets covered by the sampling scheme were calculated from the age composition in each fleet category and raised by their respective landings. The age composition of the combined Faroese landings was used to raise the foreign landings prior to 1998 when, the age composition of the corresponding Faroese fleets were used. Landings-at-age from 1961 to 2003 are shown in Table 2.2.3.2. Catch curves are shown in Fig. 2.2.3.1. They show atypical patterns in 1996 and to some extent in 2001-2002 when there appears to be an increase over the previous year for ages where a decrease would normally have been expected. This could be due to catchability for longliners depending on fish growth, causing atypical catch curves for longliners.

Samples from commercial fleets in 2004.

Fleet	Size	Samples	Length	Otoliths	Weights
Open boats		15	1,799	60	450
Longliners	<100 GRT	50	4,666	1,318	5,957
Longliners	>100 GRT	63	9,726	1,429	3,388
Jiggers		6	721	150	244
Sing. trawlers	<400 HP	5	738	120	320
Sing. trawlers	400-1000 HP	22	1,331	538	3,223
Sing. trawlers	>1000 HP	5	801	180	60
Pair trawlers	<1000 HP	4	693	119	119
Pair trawlers	>1000 HP	65	12,887	1,237	1,237
Total		220	31,563	5,091	14,548

2.2.4 Mean weight-at-age

Mean weight-at-age data for 1961-2004 are provided for the Faroese fishery in Table 2.2.4.1. 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 2004 showed a discrepancy of 3 %.

Figure 2.2.4.1 shows the mean weight-at-age for 1961 to 2005. The weights increased from 1998 to 2000, but have decreased since.

2.2.5 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 2.2.5.1 (1961 - 2004) and shown in Figure

2.2.5.1 (1983 - 2005). The average maturity at age for 1983 to 1996 was used in years prior to 1983. Some of the 1983-1996 values were revised in 2003 but not the maturities for the 1961-1982 period. 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.

2.2.6 Groundfish surveys

The spring groundfish surveys in Faroese waters with the research vessel *Magnus Heinason* were initiated in 1983. Up to 1991 three cruises per year were conducted between February and the end of March, with 50 stations per cruise selected each year based on random stratified sampling (by depth) and on general knowledge of the distribution of fish in the area. In 1992 the period was shortened by dropping the first cruise and one third of the 1991-stations were used as fixed stations. Since 1993 all stations are fixed stations. The standard abundance estimates is the stratified mean catch per hour in numbers at age calculated using smoothed age/length keys. In last year's assessment, the same strata were used as in the summer survey and calculated in the same way (see below). All cod less than 25 cm were set to 1 year old.

In the 2004 assessment a new stratification was adopted where five new strata were added on the spawning grounds (Figure 2.2.6.1 in ICES, 2004). The catch curves showed a normal pattern (Figure 2.2.6.1).

The overall mean catch of cod per unit effort 1983-2005 is given in Figure 2.2.6.2. The CPUE increased substantially in 1995 and remained high up to 1998. The CPUE decreased from 2002 to 2004 but increased slightly in 2005. Normally the stratified mean catch per trawl hour increases for the first 3-4 years of life of a year class, and decreases afterwards (Figure 2.2.6.1). From 1994 to 1995, however, there was an increase for all year classes, possibly because of increased availability. A more normal pattern was observed from 1996-2004.

In 1996, a summer (August-September) groundfish survey was initiated, having 200 fixed stations distributed within the 500 m contour of the Faroe Plateau. Half of the stations were the same as in the spring survey. The overall mean catch of cod per unit effort (kg/trawl hour) 1996-2004 is shown in Figure 2.2.6.2, and catch curves in Figure 2.2.6.3. The catch curves show that the fish are fully recruited to the survey gear at an age of 3 or 4 years.

The abundance index was calculated as the stratified mean number of cod at age. The age length key was based on otolith samples pooled for all stations since there seemed to be a homogeneous size at age by strata and depth. Due to incomplete otolith samples for the youngest age groups, all cod less than 15 cm were considered being 0 years and between 15-34 cm 1 year. Since the age length key was the same for all strata, a mean length distribution was calculated by stratum and the overall length distribution was calculated as the mean length distribution for all strata weighted by stratum area. Having this length distribution and the age length key, the number of fish at age per station was calculated, and scaled up to 200 stations.

2.2.7 Stock assessment

2.2.7.1 Tuning and estimates of fishing mortality

Two commercial cpue series (longliners and Cuba trawlers) are updated every year, but the WG decided last year not to use them in the tuning of the VPA. The cpue for the longliners was shown to be highly dependent upon environmental conditions whereas the cpue for the Cuba trawlers could be influenced by other factors than stock size, for example the high landing price of cod compared to the price of saithe.

Since the current assessment is an update assessment, the same procedure is followed as in the benchmark assessment in 2004: to use the two surveys for tuning and not the commercial series. The commercial series showed the same overall tendency as the surveys (Figure 2.2.6.2 and Figure 2.2.7.1.1). A minor change was made in the settings in the XSA run. This year the

catchability was set to be independent of all ages (no power function used) instead of having the catchability of ages 1-2 dependent on year class size. As in the 2004 assessment, the ADAPT assessment package was used for comparison with the XSA.

The log catchability residuals from the adopted XSA run are shown in Figure 2.2.7.1.2. The spring survey shows no overall trends although there seems to be a year effect for the years 1993 (actually 1994 because the survey was shifted back to the previous year) and 2003 (actually 2004). For the summer survey there was a clear year effect in 2003. In addition there seemingly is an effect of year class. The year classes 1990-1993 all have positive residuals (more commonly observed in the survey compared to the model predictions) whereas the 1994-1995 year classes have negative residuals. No year class effect is observed for younger year classes.

The results from the retrospective analysis of the XSA (Figure 2.2.7.1.3) show that there has been a tendency to overestimate fishing mortality, but the estimates of recruitment, stock biomass and spawning stock biomass have been fairly close. The overestimation of the fishing mortality (average 3-7) is mainly caused by overestimation of the fishing mortality for ages 6-7 years.

Figure 2.2.7.1.4 shows the retrospective pattern from the ADAPT calibrated with the summer and the spring surveys ages 2 to 8. There is a tendency to overestimate the fishing mortality while the estimates of SSB are surprisingly close given the absence of any shrinkage. The recruitment is sometimes overestimated and sometimes underestimated.

The estimated fishing mortalities are shown in Tables 2.2.7.1.3 and 2.2.7.1.5 and Figure 2.2.7.1.5. The average F for age groups 3 to 7 in 2004 (F3-7) is estimated at 0.79, considerably higher than Fmax = 0.46.

The F3-7 seems to be a problematic measure of fishing mortality for two reasons. Firstly, the fishing mortalities for ages 6-7 are generally overestimated in the terminal year leading to an overestimation of F3-7 for the terminal year. Secondly, the proportion of 6-7 year old cod in the stock or catch is small (normally less than 20%) and therefore get a disproportionate influence on the F3-7.

The yield over exploitable biomass (3 years and older) was introduced in the 2004 assessment, but has the drawback not being proportional to fishing effort. Another approach is to weight the fishing mortalities and three weighting procedures are presented in Figure 2.2.7.1.6: weighting by stock numbers, stock biomasses or catch weights. All measures of fishing mortality show high values for 2002-2004. The weighted fishing mortalities show (unlike F3-7), that the fishing mortality in 2002-2004 was less than in 1989 which was the last year with normal catches prior to the collapse in 1990-1993. The fishing mortality in 2002-2004 was, on the other hand, higher than in 1997-1998 and on the same level, or higher, than the fishing mortality in 1983-1988.

2.2.7.2 Stock estimates and recruitment

The stock size in numbers is given in Tables 2.2.7.1.4. A summary of the VPA, with recruitment, biomass and fishing mortality estimates is given in Table 2.2.7.1.5 and in Figure 2.2.7.1.5. The stock-recruitment relationship is presented in Figure 2.2.7.2.1.

Figure 2.2.7.2.2 shows the F and SSB's from a 1000 bootstraps of the ADAPT with the two surveys. The figure also shows the F and SSB from the XSA assessment. The XSA results fall in the cloud of the bootstrapped F and SSB pairs with the SSB and F close to the median of the bootstrapped values.

The assessment shows the poor recruitment for the 1984 to 1991 year classes, and the strong 1992 and 1993 year classes. Due to the continuous poor recruitment from 1984 to 1991 and

the high fishing mortalities, the spawning stock biomass declined steadily from 1983 to 1992 when it was the lowest on record at 21 000 t. It increased sharply to above 80 000 t in 1996 and 1997 before declining to about 48 000 t in 1999. The 1998 year class is above average strength and the 1999 year class well above. The 2000-2002 year classes are estimated to be below average strength, and the 2003 year class seems also to be below average strength.

2.2.8 Predictions of catch and biomass

2.2.8.1 Short-term prediction

The input data for the short term prediction are given in Table 2.2.8.1.1. The XSA retrospective pattern of the recruitment looked consistent so the recruitment of 2 year old cod in 2005 (2003 year class) was obtained from the XSA. The 2004-2005 year classes were estimated as the geometric mean for the period 1961-2004. Estimates of stock size (ages 2+) were taken directly from the VPA stock numbers. The exploitation pattern was estimated as the average fishing mortality for 2002-2004 (not rescaled). The weights at age in the catches in 2005 were estimated from the weights during January-February 2005 having all fleets pooled. Ages 2 and 4 were estimated from the spring survey (March). Regression analyses were made between weights in January-February (or March), and the weights during the whole year 1996-2004. The weights in the catches in 2005 were predicted from the regressions. The weights in the catches in 2006-2007 were set to the values in 2004. The proportion mature in 2005 was set to the 2005 values from the spring groundfish survey, and for 2006-2007 to the average values for 2003-2005.

Table 2.2.8.1.2 shows that the landings in 2005 are expected to be 17 000 tonnes. The spawning stock biomass is expected to be 32 000 tonnes in 2005, 26 000 tonnes in 2006 and eventually 26 000 tonnes in 2007. The current short term prediction is therefore quite pessimistic.

2.2.8.2 Biological reference points

The stock trajectory with respect to existing reference points is illustrated in Figure 2.2.8.2.1.

The reference points are dealt with in the general section of Faroese stocks.

2.2.8.3 Medium-term prediction

Medium term projections are dealt with in the general section of Faroese stocks.

2.2.8.4 Long-term prediction

The input data for the yield-per-recruit calculations (long-term predictions) are given in Table 2.2.8.4.1. The exploitation pattern was taken as an average for the years 1999-2004. The weights at age were set to the average values for 1978-2004, since no long term trend was present. The proportion mature was set to the average for 1983-2005.

The output from the yield-per-recruit calculations is shown in Table 2.2.8.4.2. and in Figure 2.2.8.4.1. $F_{0.1}$ was calculated as 0.25 and F_{max} as 0.46. The present average fishing mortality (F3-7) in 2004 of 0.79 is substantially above F_{max} = 0.46 and F_{med} = 0.38 (Figure 2.2.8.2.1).

2.2.9 Management considerations

The current assessment confirms the high fishing mortalities on cod in the recent years. If the hypothesis that catchability is related to productivity is true, and if productivity in 2005 is as high as in 2004, it is expected that the fishing mortality of cod will decrease in 2005-2006. In addition the recruitment in 2005 and 2006 (year classes 2003-2004) could be higher than estimated (2003) and assumed (2004) in the current assessment. Thus the situation in 2005 seems more positive than in 1989-1990 when the cod stock was on a similarly low. In order to avoid

the situation in 1991-1994 (when the fishery collapsed), great care should be taken to ensure that the fishing mortality in 2005-2006 is reduced substantially.

It should also been kept in mind that a low stock size of cod may constrain the production of cod, *i.e.* the weight increase of the cod stock. In a situation with few cod and large numbers of other fish (*e.g.* haddock and saithe), a high productivity of the ecosystem will not be as beneficial for cod as for the other fish species. There will simply be too few cod present to utilize the high abundance of food organisms compared to other fish species.

2.2.10 Comment on the assessment

New or changed things compared to last years report: the assessment is done in nearly the same way as last year. The only change is that the catchability was set to be independent of year class size for all ages (in response of the technical minutes in 2004). Last year the catchability was set to be dependent of year class strength for ages 1-2 years. The method used to estimate the weights in the catches in 2005 was slightly changed: instead of using the weights in January-February 2005 for the longliners (or the survey weights in March 2005) as a basis to estimate the weights in the catches for the whole year 2005, the weights in January-February 2005 for all Faroese fleets pooled were used in the regressions. The justification was that there were more samples.

Last year there were some concerns about the year class strength of the 1999-2002 year classes because there were indications that the distribution of cod in 2003 was abnormal (high abundance in shallow waters 0-50 m depth). This issue is death with in working document #27: Incomplete area coverage of the Faroese summer groundfish survey and the effect upon stock assessment of Faroe Plateau cod. It was found that between 3 and 53 % of tagged cod were recaptured outside the area of the summer survey (mainly in areas close to land) and the value was especially high in 2003 (53 %). It was, however, also found that the summer survey was partially able to detect this signal and it proved difficult to adjust the summer survey indicies adequately according to these findings. It was also shown that the problem was much less for the spring survey, which also generally got higher weights in the assessment than the summer survey. Thus the abnormal distribution of cod in 2003 is not considered as an issue in the current assessment.

The short term prediction is quite pessimistic because the stock is on a low level and the future recruitment is considered to be low or average. Even though the 2003 year class may be underestimated (the phytoplankton bloom in 2005 may be on a high level) it is not considered to change the stock development in 2005 markedly.

The perception of the stock in the current assessment is in line with the perception in the 2004 assessment. It shows that the cod stock in 2004 was below the size in 1989, which was the last year with normal catch prior to the collapse in the fishery (1990-1994). The productivity of the Faroe Shelf ecosystem has been shown to be of ultimate importance to the cod stock (Steingrund and Gaard, 2005). The index of primary production was considerably higher in 2004 than in 1990-1992, which may prevent a collapse in the fishery in the near future. The fishing mortality in 2004 was, however, very high when the low stock size is taken into account. Under the present fishing mortality, normal catches in the near future can only achieved if the environmental conditions are favourable.

2.2.10.1 References

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Table 2.2.2.1. Faroe Plateau (Sub-division Vb1) COD. Nominal catches (tonnes) by countries, 1986-2004, as officially reported to ICES.

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

	1999	2000	2001	2002	2003	2004 [*]
Denmark	-					
Faroe Islands	19,156		29,762	40,602	30,259	17,619
France	- [*]	1	9 [2]	20	14	
Germany	39	2	9	6	7	3 [2]
Iceland	-	-	-	5	-	
Norway	450	374	531 [*]	573	527	414
Greenland	-	-	-	29 [2]	-	
Portugal						0
UK (E/W/NI)[2]	51	18	50	42	15	
UK (Scotland)[1]	-	-	-	-	-	-
United Kingdom						[1]
Total	19,696	395	30,361	41,277	30,822	18,036

[*] Preliminary

[1)] Included in Vb2.

[2)] Reported as Vb.

Table 2.2.2.2. Nominal catch (tonnes) of COD in sub-division Vb1 (Faroe Plateau) 1986-2004, as used in the assessment.

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

	1999	2000	2001	2002	2003	2004 *
Officially reported	19,696	395	30,361	41,277	30,822	18,036
Faroese catches in Vb1		21,793 *				
Correction of Faroese catches in Vb1 [1]			-1,766	-2,409	-1,795	-1,045
Greenland[2]						35
France[2]						2
Catches reported as Vb2:						
UK (E/W/NI)	-	-	-	-	-	-
UK (Scotland)	210	245	288	218	254	-
United Kingdom				-	-	259
Used in the assessment	19,906	22,433	28,883	39,086	29,281	17,287

*) Preliminary

1) In order to be consistent with procedures used previous years.

2) Reported to Faroese Coastal Guard.

Table 2.2.2.3. Faroe Plateau (sub-division Vb1) COD. The landings of Faroese fleets (in percents) of total catch.

Year	Open boats	Longliners <100 GRT	Singletrawl <400 HP	Gill net	Jiggers	Singletrawl 400-1000 HP	Singletrawl >1000 HP	Pairtrawl <1000 HP	Pairtrawl >1000 HP	Longliners >100 GRT	Industrial trawlers	Others	Faroe catch Round.weig
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
Average	**4.1**	**24.0**	**6.3**	**1.0**	**10.0**	**4.9**	**6.8**	**9.9**	**13.6**	**18.6**	**0.6**	**0.2**	

Table 2.2.3.1. Faroe Plateau COD. Catch in numbers at age per fleet in 2004. Numbers are in thousands and the catch is in tonnes, round weight.

Age\Fleet	Open boats longline	Open boats jiggers	Longliners < 100 GRT	Jiggers	Single trwl 0-399HP	Single trwl 400-1000H	Single trwl > 1000 HP	Pair trwl 700-999 HI	Pair trwl > 1000 HP	Longliners > 100 GRT	Gillnetters	Others	Catch-at-age
2	8	4	81	10	2	0	0	0	0	21	0	6	132
3	43	11	596	50	16	5	22	5	19	110	0	29	906
4	44	32	740	117	42	30	78	22	101	400	0	50	1656
5	111	43	1026	232	77	57	212	41	238	640	1	84	2762
6	35	8	223	48	22	13	162	25	145	251	5	28	965
7	8	2	72	9	3	5	65	10	47	83	4	7	315
8	0	1	6	0	0	0	26	2	9	36	2	3	85
9	0	0	18	0	0	0	7	1	2	24	1	2	55
10+	1	0	6	2	1	1	6	1	5	24	1	1	49
Sum	250	101	2768	468	163	111	578	107	566	1589	14	210	6925
G.weight	468	195	4705	996	319	248	1949	324	1769	4047	83	471	15574

Others include industrial bottom trawlers, longlining for halibut, small gillnetters, foreign fleets, **and scaling to correct catch.**
Gutted total catch is calculated as round weight divided by 1.11.

Table 2.2.3.2. Faroe Plateau COD. Catch in numbers at age 1961-2004.

Table 1	Catch numbers at age									Numbers*10**-3
YEAR,	1961,	1962,	1963,	1964,						
AGE										
1,	0,	0,	0,	0,						
2,	3093,	4424,	4110,	2033,						
3,	2686,	2500,	3958,	3021,						
4,	1331,	1255,	1280,	2300,						
5,	1066,	855,	662,	630,						
6,	232,	481,	284,	350,						
7,	372,	93,	204,	158,						
8,	78,	94,	48,	79,						
9,	29,	22,	30,	41,						
TOTALNUM,	8887,	9724,	10576,	8612,						
TONSLAND,	21598,	20967,	22215,	21078,						
SOPCOF %,	91,	94,	96,	98,						

YEAR,	1965,	1966,	1967,	1968,	1969,	1970,	1971,	1972,	1973,	1974,
AGE										
1,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
2,	852,	1337,	1609,	1529,	878,	402,	328,	875,	723,	2161,
3,	3230,	970,	2690,	3322,	3106,	1163,	757,	1176,	3124,	1266,
4,	2564,	2080,	860,	2663,	3300,	2172,	821,	810,	1590,	1811,
5,	1416,	1339,	1706,	945,	1538,	1685,	1287,	596,	707,	934,
6,	363,	606,	847,	1226,	477,	752,	1451,	1021,	384,	563,
7,	155,	197,	309,	452,	713,	244,	510,	596,	312,	452,
8,	48,	104,	64,	105,	203,	300,	114,	154,	227,	149,
9,	63,	33,	27,	11,	92,	44,	179,	25,	120,	141,
TOTALNUM,	8691,	6666,	8112,	10253,	10307,	6762,	5447,	5253,	7187,	7477,
TONSLAND,	24212,	20418,	23562,	29930,	32371,	24183,	23010,	18727,	22228,	24581,
SOPCOF %,	113,	109,	102,	106,	109,	99,	123,	125,	105,	104,

YEAR,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,
AGE										
1,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
2,	2584,	1497,	425,	555,	575,	1129,	646,	1139,	2149,	4396,
3,	5689,	4158,	3282,	1219,	1732,	2263,	4137,	1965,	5771,	5234,
4,	2157,	3799,	6844,	2643,	1673,	1461,	1981,	3073,	2760,	3487,
5,	2211,	1380,	3718,	3216,	1601,	895,	947,	1286,	2746,	1461,
6,	813,	1427,	788,	1041,	1906,	807,	582,	471,	1204,	912,
7,	295,	617,	1160,	268,	493,	832,	487,	314,	510,	314,
8,	190,	273,	239,	201,	134,	339,	527,	169,	157,	82,
9,	118,	120,	134,	66,	87,	42,	123,	254,	104,	34,
TOTALNUM,	14057,	13271,	16590,	9209,	8201,	7768,	9430,	8671,	15401,	15920,
TONSLAND,	36775,	39799,	34927,	26585,	23112,	20513,	22963,	21489,	38133,	36979,
SOPCOF %,	100,	103,	70,	102,	101,	107,	107,	104,	99,	99,

YEAR,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,	1993,	1994,
AGE										
1,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
2,	998,	210,	257,	509,	2237,	243,	192,	205,	120,	573,
3,	9484,	3586,	1362,	2122,	2151,	2849,	451,	455,	802,	788,
4,	3795,	8462,	2611,	1945,	2187,	1481,	2152,	466,	603,	1062,
5,	1669,	2373,	3083,	1484,	1121,	852,	622,	911,	222,	532,
6,	770,	907,	812,	2178,	1026,	404,	303,	293,	329,	125,
7,	872,	236,	224,	492,	997,	294,	142,	132,	96,	176,
8,	309,	147,	68,	168,	220,	291,	93,	53,	33,	39,
9,	65,	47,	69,	33,	61,	50,	53,	30,	22,	23,
TOTALNUM,	17962,	15968,	8486,	8931,	10000,	6464,	4008,	2545,	2227,	3318,
TONSLAND,	39484,	34595,	21391,	23182,	22068,	13487,	8750,	6396,	6107,	9046,
SOPCOF %,	97,	97,	98,	102,	98,	101,	109,	108,	107,	103,

YEAR,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,	2003,	2004,
AGE										
1,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
2,	2615,	351,	200,	455,	1288,	2230,	4009,	2113,	811,	132,
3,	2716,	5164,	1278,	745,	1080,	2812,	3853,	7402,	2543,	906,
4,	2008,	4608,	6710,	1558,	869,	834,	2153,	3427,	5464,	1656,
5,	1012,	1542,	3731,	5140,	1204,	455,	377,	1699,	2303,	2762,
6,	465,	1526,	657,	1529,	2420,	719,	376,	477,	765,	965,
7,	118,	596,	639,	159,	477,	863,	736,	541,	211,	315,
8,	175,	147,	170,	118,	65,	111,	447,	420,	109,	85,
9,	44,	347,	51,	28,	19,	8,	37,	295,	137,	55,
TOTALNUM,	9153,	14281,	13436,	9732,	7422,	8032,	11988,	16374,	12343,	6876,
TONSLAND,	23045,	40422,	34304,	24005,	19906,	22433,	28883,	39086,	29281,	17287,
SOPCOF %,	103,	100,	104,	104,	102,	104,	101,	100,	101,	103,

Table 2.2.4.1. Faroe Plateau COD. Catch weight at age 1961-2004.

YEAR,	1961,	1962,	1963,	1964,
AGE				
1,	.0000,	.0000,	.0000,	.0000,
2,	1.0800,	1.0000,	1.0400,	.9700,
3,	2.2200,	2.2700,	1.9400,	1.8300,
4,	3.4500,	3.3500,	3.5100,	3.1500,
5,	4.6900,	4.5800,	4.6000,	4.3300,
6,	5.5200,	4.9300,	5.5000,	6.0800,
7,	7.0900,	9.0800,	6.7800,	7.0000,
8,	9.9100,	6.5900,	8.7100,	6.2500,
9,	8.0300,	6.6600,	11.7200,	6.1900,
SOPCOFAC,	.9068,	.9444,	.9573,	.9824,

YEAR,	1965,	1966,	1967,	1968,	1969,	1970,	1971,	1972,	1973,	1974,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.9200,	.9800,	.9600,	.8800,	1.0900,	.9600,	.8100,	.6600,	1.1100,	1.0800,
3,	1.4500,	1.7700,	1.9300,	1.7200,	1.8000,	2.2300,	1.8000,	1.6100,	2.0000,	2.2200,
4,	2.5700,	2.7500,	3.1300,	3.0700,	2.8500,	2.6900,	2.9800,	2.5800,	3.4100,	3.4400,
5,	3.7800,	3.5100,	4.0400,	4.1200,	3.6700,	3.9400,	3.5800,	3.2600,	3.8900,	4.8000,
6,	5.6900,	4.8000,	4.7800,	4.6500,	4.8900,	5.1400,	3.9400,	4.2900,	5.1000,	5.1800,
7,	7.3100,	6.3200,	6.2500,	5.5000,	5.0500,	6.4600,	4.8700,	4.9500,	5.1000,	5.8800,
8,	7.9300,	7.5100,	7.0000,	7.6700,	7.4100,	10.3100,	6.4800,	6.4800,	6.1200,	6.1400,
9,	8.0900,	10.3400,	11.0100,	10.9500,	8.6600,	7.3900,	6.3700,	6.9000,	8.6600,	8.6300,
SOPCOFAC,	1.1262,	1.0905,	1.0224,	1.0598,	1.0851,	.9943,	1.2264,	1.2481,	1.0485,	1.0432,

YEAR,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.7900,	.9400,	.8700,	1.1120,	.8970,	.9270,	1.0800,	1.2300,	1.3380,	1.1950,
3,	1.7900,	1.7200,	1.7900,	1.3850,	1.6820,	1.4320,	1.4700,	1.4130,	1.9500,	1.8880,
4,	2.9800,	2.8400,	2.5300,	2.1400,	2.2110,	2.2200,	2.1800,	2.1380,	2.4030,	2.9800,
5,	4.2600,	3.7000,	3.6800,	3.1250,	3.0520,	3.1050,	3.2100,	3.1070,	3.1070,	3.6790,
6,	5.4600,	5.2600,	4.6500,	4.3630,	3.6420,	3.5390,	3.7000,	4.0120,	4.1100,	4.4700,
7,	6.2500,	6.4300,	5.3400,	5.9270,	4.7190,	4.3920,	4.2400,	5.4420,	5.0200,	5.4880,
8,	7.5100,	6.3900,	6.2300,	6.3480,	7.2720,	6.1000,	4.4300,	5.5630,	5.6010,	6.4660,
9,	7.3900,	8.5500,	8.3800,	8.7150,	8.3680,	7.6030,	6.6900,	5.2160,	8.0130,	6.6280,
SOPCOFAC,	1.0033,	1.0285,	.7026,	1.0228,	1.0055,	1.0680,	1.0674,	1.0428,	.9901,	.9872,

YEAR,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,	1993,	1994,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.9050,	1.0990,	1.0930,	1.0610,	1.0100,	.9450,	.7790,	.9890,	1.1550,	1.1940,
3,	1.6580,	1.4590,	1.5170,	1.7490,	1.5970,	1.3000,	1.2710,	1.3640,	1.7040,	1.8430,
4,	2.6260,	2.0460,	2.1600,	2.3000,	2.2000,	1.9590,	1.5700,	1.7790,	2.4210,	2.6130,
5,	3.4000,	2.9360,	2.7660,	2.9140,	2.9340,	2.5310,	2.5240,	2.3120,	3.1320,	3.6540,
6,	3.7520,	3.7860,	3.9080,	3.1090,	3.4680,	3.2730,	3.1850,	3.4770,	3.7230,	4.5840,
7,	4.2200,	4.6990,	5.4610,	3.9760,	3.7500,	4.6520,	4.0860,	4.5450,	4.9710,	4.9760,
8,	4.7390,	5.8930,	6.3410,	4.8960,	4.6820,	4.7580,	5.6560,	6.2750,	6.1590,	7.1460,
9,	6.5110,	9.7000,	8.5090,	7.0870,	6.1400,	6.7040,	5.9730,	7.6190,	7.6140,	8.5640,
SOPCOFAC,	.9695,	.9715,	.9755,	1.0153,	.9810,	1.0064,	1.0857,	1.0770,	1.0652,	1.0303,

YEAR,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,	2003,	2004,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	1.2180,	1.0160,	.9010,	1.0040,	1.0500,	1.4160,	1.1640,	1.0170,	.8200,	1.0370,
3,	1.9860,	1.7370,	1.3410,	1.4170,	1.5860,	2.1700,	2.0760,	1.7680,	1.3620,	1.1540,
4,	2.6220,	2.7450,	1.9580,	1.8020,	2.3500,	3.1870,	3.0530,	2.8050,	2.1270,	1.6930,
5,	3.9250,	3.8000,	3.0120,	2.2800,	2.7740,	3.7950,	3.9760,	3.5290,	3.3290,	2.3630,
6,	5.1800,	4.4550,	4.1580,	3.4780,	3.2140,	4.0480,	4.3940,	4.0950,	4.0920,	3.8300,
7,	6.0790,	4.9780,	4.4910,	5.4330,	5.4960,	4.5770,	4.8710,	4.4750,	4.6700,	5.1910,
8,	6.2410,	5.2700,	5.3120,	5.8510,	8.2760,	8.1820,	5.5630,	4.6500,	6.0000,	6.3260,
9,	7.7820,	5.5930,	6.1720,	7.9700,	9.1290,	11.8950,	7.2770,	6.2440,	6.7270,	7.6560,
SOPCOFAC,	1.0299,	1.0026,	1.0367,	1.0376,	1.0178,	1.0430,	1.0053,	1.0019,	1.0059,	1.0288,

Table 2.2.5.1. Faroe Plateau (sub-division Vb1) COD. Proportion mature at age 1983-2004. From 1961-1982 the average from 1983-1996 is used.

YEAR,	1961,	1962,	1963,	1964,
AGE				
1,	.0000,	.0000,	.0000,	.0000,
2,	.1700,	.1700,	.1700,	.1700,
3,	.6400,	.6400,	.6400,	.6400,
4,	.8700,	.8700,	.8700,	.8700,
5,	.9500,	.9500,	.9500,	.9500,
6,	1.0000,	1.0000,	1.0000,	1.0000,
7,	1.0000,	1.0000,	1.0000,	1.0000,
8,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,

YEAR,	1965,	1966,	1967,	1968,	1969,	1970,	1971,	1972,	1973,	1974,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.1700,	.1700,	.1700,	.1700,	.1700,	.1700,	.1700,	.1700,	.1700,	.1700,
3,	.6400,	.6400,	.6400,	.6400,	.6400,	.6400,	.6400,	.6400,	.6400,	.6400,
4,	.8700,	.8700,	.8700,	.8700,	.8700,	.8700,	.8700,	.8700,	.8700,	.8700,
5,	.9500,	.9500,	.9500,	.9500,	.9500,	.9500,	.9500,	.9500,	.9500,	.9500,
6,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
7,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
8,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,

YEAR,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.1700,	.1700,	.1700,	.1700,	.1700,	.1700,	.1700,	.1700,	.0300,	.0700,
3,	.6400,	.6400,	.6400,	.6400,	.6400,	.6400,	.6400,	.6400,	.7100,	.9600,
4,	.8700,	.8700,	.8700,	.8700,	.8700,	.8700,	.8700,	.8700,	.9300,	.9800,
5,	.9500,	.9500,	.9500,	.9500,	.9500,	.9500,	.9500,	.9500,	.9400,	.9700,
6,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
7,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
8,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,

YEAR,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,	1993,	1994,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0000,	.0000,	.0000,	.0600,	.0500,	.0000,	.0000,	.0600,	.0300,	.0500,
3,	.5000,	.3800,	.6700,	.7200,	.5400,	.6800,	.7200,	.5000,	.7300,	.3300,
4,	.9600,	.9300,	.9100,	.9000,	.9800,	.9000,	.8600,	.8200,	.7800,	.8800,
5,	.9600,	1.0000,	1.0000,	.9700,	1.0000,	.9900,	1.0000,	.9800,	.9100,	.9600,
6,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	.9600,	1.0000,	1.0000,	.9900,	1.0000,
7,	1.0000,	.9600,	1.0000,	1.0000,	1.0000,	.9800,	1.0000,	1.0000,	1.0000,	.9600,
8,	1.0000,	.9400,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,

YEAR,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,	2003,	2004,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0900,	.0400,	.0000,	.0000,	.0200,	.0200,	.0700,	.0400,	.0000,	.0000,
3,	.3500,	.4300,	.6400,	.6200,	.4300,	.3900,	.4700,	.3700,	.2900,	.5100,
4,	.3300,	.7400,	.9100,	.9000,	.8800,	.6900,	.8600,	.7600,	.7900,	.7800,
5,	.6600,	.8500,	.9700,	.9900,	.9800,	.9200,	.9400,	.9700,	.8800,	.9200,
6,	.9700,	.9400,	1.0000,	.9900,	1.0000,	.9900,	1.0000,	.9300,	.9800,	.8900,
7,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	.9700,	1.0000,	.8700,
8,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,

Table 2.2.7.1.1. Faroe Plateau (sub-division Vb1) COD. Summer survey tuning series (number of individuals per 200 stations) and spring survey tuning series (number of individuals per 100 stations).

```
FAROE PLATEAU COD (ICES SUBDIVISION VB1)        Surveys.TXT
102
SUMMER SURVEY
1996 2004
1 1 0.6 0.7
2 8
 200  707.3   6614.6   3763     1322.2   714    236.2   49
 200  513.1   1502.1   6771     1479.9   180.8  139.5   30.4
 200  527      509.1    989.1   3723.7   915.6   50.5   37.2
 200  373.4   1257.4    753.8    676.1  1424.8  239.1   40.5
 200 1364.1   1153.3    673.8    309.6   436.9  600.8   35.4
 200 3422.1   2458.7   1537.8    415.9   234.8  283    242
 200 2326     5562.9   1816.5    810.8   147.7   83.3   69.5
 200  354     1038.8   2209.2    565.9   123.4   17.6   11.9
 200  437      839.9   1080.2   1550.2   344.2   80.2   25.7
SPRING SURVEY (shifted back to December)
1993 2004
1 1 0.9 1.0
1 8
 100   565.8    328.1     888.5     493.1     125.3    180.9    28       0.1
 100   707.7    778.5    1438      1490.8    1211.2    287.3   353.1    48.7
 100   395.8   3988.4    3612.4    1769.3    1315.5    403.8    79.8   160.7
 100    91.1    933.8    5492.1    2331.6     332.8    226.7    58.2     5.2
 100    75.9    428.7    1572.1    4927.7    1127.9     80.2    39.6    33.9
 100   528      636.9     956.4    1181.7    2005.5    243.5    24.2    12.9
 100   291.5   1413.4     730.2     430       494      815.2    61.2     3
 100   873.5   2266      1917.8     439.6     314.6    562.8   126.8     3.8
 100   343.9   4154.7    2708.1    1486.3     311.9    217.9   168.3   124.1
 100    79.4    703.7    4250.5    1326.7     541.8     63.4    48.1    36.8
 100   427.1    451       784.7    1197.6     299.5     66.5    22.2    11.9
 100   294.7    390.1    1046.6    1328.1     791.1    133.6    13.4     3.6
```

Table 2.2.7.1.2. Faroe Plateau (sub-division Vb1) COD. Final XSA run.

```
Lowestoft VPA Version 3.1

   29/04/2005   9:10

 Extended Survivors Analysis

 COD FAROE PLATEAU (ICES SUBDIVISION Vb1)                COD_ind_Surveys.txt

 CPUE data from file Surveys.TXT

 Catch data for  44 years. 1961 to 2004. Ages  1 to   9.

      Fleet,            First, Last, First, Last, Alpha,  Beta
                     ,    year, year,  age ,  age
 SUMMER SURVEY       ,    1996, 2004,   2,     8,   .600,   .700
 SPRING SURVEY (shift,    1993, 2004,   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   52 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,  1995,  1996,  1997,  1998,  1999,  2000,  2001,  2002,  2003,  2004

      1,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000
      2,  .069,  .029,  .033,  .083,  .098,  .121,  .132,  .188,  .133,  .016
      3,  .160,  .189,  .142,  .166,  .289,  .322,  .315,  .383,  .362,  .216
      4,  .464,  .447,  .401,  .259,  .297,  .380,  .438,  .515,  .546,  .425
      5,  .280,  .807,  .814,  .620,  .327,  .250,  .295,  .755,  .804,  .595
      6,  .357,  .903, 1.038,  .992,  .681,  .331,  .337,  .756,  .968, 1.001
      7,  .308, 1.111, 1.388,  .775, 1.039,  .553,  .675, 1.219,  .942, 1.724
      8,  .221,  .795, 1.237, 1.134,  .878,  .732,  .629, 1.115,  .883, 1.473
      9,  .904,  .917,  .723,  .677,  .536,  .237,  .579, 1.225, 1.694, 2.066


1
```

XSA population numbers (Thousands)

YEAR	AGE 1	2	3	4	5	6	7	8	9
1995	1.63E+04	4.33E+04	2.03E+04	5.98E+03	4.58E+03	1.71E+03	4.92E+02	9.74E+02	8.17E+01
1996	8.32E+03	1.34E+04	3.31E+04	1.41E+04	3.08E+03	2.84E+03	9.82E+02	2.96E+02	6.39E+02
1997	7.70E+03	6.81E+03	1.06E+04	2.24E+04	7.40E+03	1.12E+03	9.41E+02	2.65E+02	1.09E+02
1998	1.86E+04	6.31E+03	5.39E+03	7.55E+03	1.23E+04	2.69E+03	3.26E+02	1.92E+02	6.29E+01
1999	2.65E+04	1.52E+04	4.75E+03	3.74E+03	4.77E+03	5.42E+03	8.16E+02	1.23E+02	5.06E+01
2000	4.38E+04	2.17E+04	1.13E+04	2.91E+03	2.28E+03	2.82E+03	2.25E+03	2.36E+02	4.18E+01
2001	1.67E+04	3.58E+04	1.58E+04	6.71E+03	1.63E+03	1.45E+03	1.66E+03	1.06E+03	9.30E+01
2002	8.79E+03	1.36E+04	2.57E+04	9.41E+03	3.54E+03	9.94E+02	8.49E+02	6.91E+02	4.62E+02
2003	1.16E+04	7.19E+03	9.26E+03	1.44E+04	4.61E+03	1.36E+03	3.82E+02	2.05E+02	1.85E+02
2004	1.77E+04	9.48E+03	5.16E+03	5.28E+03	6.81E+03	1.69E+03	4.24E+02	1.22E+02	6.96E+01

Estimated population abundance at 1st Jan 2005

,	0.00E+00	1.45E+04	7.64E+03	3.40E+03	2.83E+03	3.08E+03	5.08E+02	6.18E+01	2.29E+01,

Taper weighted geometric mean of the VPA populations:

,	1.81E+04	1.47E+04	1.10E+04	6.93E+03	3.75E+03	1.79E+03	8.08E+02	3.28E+02	1.37E+02,

Standard error of the weighted Log(VPA populations) :

,	.5568,	.5577,	.5503,	.5384,	.5397,	.5666,	.6187,	.6915,	.7945,

1

Log catchability residuals.

Fleet : SUMMER SURVEY

Age	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	No data for this fleet at this age									
2	99.99	-.24	.12	.26	-.96	-.01	.42	1.04	-.24	-.38
3	99.99	.22	-.16	-.54	.57	-.36	.06	.43	-.24	.03
4	99.99	.28	.37	-.55	-.10	.09	.12	.00	-.21	.00
5	99.99	.86	.10	.39	-.56	-.66	.00	.19	-.40	.08
6	99.99	.39	.03	.75	.29	-.47	-.42	-.23	-.59	.24
7	99.99	.48	.18	-.18	.63	.22	-.15	-.35	-1.28	.64
8	99.99	-.10	-.18	.28	.64	-.24	.12	-.39	-1.09	.58

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	-7.8515,	-6.8774,	-6.4782,	-6.3456,	-6.3519,	-6.3519,	-6.3519,
S.E(Log q)	.5606,	.3656,	.2737,	.4799,	.4550,	.6056,	.5346,

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,	.89,	.326,	8.02,	.58,	9,	.53,	-7.85,
3,	.88,	.740,	7.18,	.84,	9,	.33,	-6.88,
4,	.90,	.780,	6.74,	.89,	9,	.25,	-6.48,
5,	.86,	.563,	6.63,	.70,	9,	.43,	-6.35,
6,	.72,	1.429,	6.70,	.79,	9,	.31,	-6.35,
7,	.78,	.829,	6.41,	.68,	9,	.48,	-6.33,
8,	1.29,	-.847,	6.62,	.55,	9,	.70,	-6.39,

1

Fleet : SPRING SURVEY (shift

Age	1993	1994
1	.09	-.22
2	-.76	-.81
3	-.58	.03
4	-.48	.09
5	-.56	.87
6	-.68	.81
7	-.29	.34
8	-4.79	.82

Age	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	.37	-.42	-.52	.53	-.42	.18	.21	-.61	.80	.00
2	.33	.02	-.08	.44	.37	.51	.62	-.13	.01	-.52
3	.08	.04	-.12	.08	.06	.19	.20	.22	-.47	.27
4	.64	.04	.29	-.19	-.46	-.11	.33	-.05	-.54	.44
5	.44	-.03	.32	.20	-.53	-.32	.05	.27	-.54	-.16
6	.45	-.11	-.09	.10	.31	.26	-.02	-.47	-.54	-.03
7	.03	-.21	-.29	-.30	-.04	-.79	-.09	-.15	-.39	-.26
8	-.03	-1.73	.68	-.06	-1.32	-1.87	.01	-.31	-.45	-.56

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	-8.5103	-7.0687	-6.0721	-5.8359	-5.8412	-5.9755	-5.9755	-5.9755
S.E(Log q)	.4461	.4880	.2668	.3818	.4454	.4315	.3433	1.7296

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	.88	.657	8.67	.73	12	.40	-8.51
2	.84	.843	7.48	.73	12	.41	-7.07
3	.95	.394	6.23	.86	12	.26	-6.07
4	.92	.452	6.09	.75	12	.36	-5.84
5	.88	.680	6.14	.75	12	.40	-5.84
6	.97	.122	6.02	.63	12	.44	-5.98
7	1.00	.016	6.18	.86	12	.28	-6.18
8	.56	1.455	6.25	.53	12	.81	-6.78

Terminal year survivor and F summaries :

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

Year class = 2003

Fleet	Estimated Survivors	Int s.e	Ext s.e	Var Ratio	N	Scaled Weights	Estimated F
SUMMER SURVEY	1.	.000	.000	.00	0	.000	.000
SPRING SURVEY (shift	14488.	.464	.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
14488.	.46	.00	1	.000	.000

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

Year class = 2002

Fleet,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, Weights,	Estimated F
SUMMER SURVEY ,	5207.,	.591,	.000,	.00,	1, .246,	.023
SPRING SURVEY (shift,	9291.,	.343,	.656,	1.91,	2, .732,	.013
F shrinkage mean ,	828.,	2.00,,,,			.022,	.135

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
7642.,	.29,	.40,	4,	1.378,	.016

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

Year class = 2001

Fleet,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, Weights,	Estimated F
SUMMER SURVEY ,	3267.,	.323,	.123,	.38,	2, .329,	.224
SPRING SURVEY (shift,	3499.,	.226,	.249,	1.10,	3, .660,	.211
F shrinkage mean ,	2052.,	2.00,,,,			.011,	.336

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
3401.,	.18,	.13,	6,	.729,	.216

1
Age 4 Catchability constant w.r.t. time and dependent on age

Year class = 2000

Fleet,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, Weights,	Estimated F
SUMMER SURVEY ,	2918.,	.224,	.241,	1.08,	3, .474,	.414
SPRING SURVEY (shift,	2748.,	.201,	.233,	1.16,	4, .516,	.435
F shrinkage mean ,	2724.,	2.00,,,,			.010,	.438

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
2827.,	.15,	.14,	8,	.944,	.425

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

Year class = 1999

Fleet,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, Weights,	Estimated F
SUMMER SURVEY ,	3199.,	.215,	.150,	.70,	4, .465,	.577
SPRING SURVEY (shift,	2950.,	.197,	.177,	.90,	5, .520,	.614
F shrinkage mean ,	3953.,	2.00,,,,			.015,	.490

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
3077.,	.15,	.11,	10,	.719,	.595

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

Year class = 1998

Fleet,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, Weights,	Estimated F
SUMMER SURVEY ,	528.,	.230,	.109,	.48,	5, .455,	.975
SPRING SURVEY (shift,	472.,	.214,	.124,	.58,	6, .517,	1.048
F shrinkage mean ,	1016.,	2.00,,,,			.028,	.620

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
508.,	.16,	.08,	12,	.521,	1.001

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

Year class = 1997

Fleet,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, Weights,	Estimated F
SUMMER SURVEY ,	66.,	.269,	.233,	.86,	6, .325,	1.668
SPRING SURVEY (shift,	53.,	.232,	.116,	.50,	7, .609,	1.860
F shrinkage mean ,	197.,	2.00,,,,			.066,	.895

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
62.,	.21,	.14,	14,	.653,	1.724

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

Year class = 1996

Fleet,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, Weights,	Estimated F
SUMMER SURVEY ,	26.,	.277,	.254,	.92,	7, .474,	1.383
SPRING SURVEY (shift,	17.,	.202,	.094,	.46,	8, .453,	1.685
F shrinkage mean ,	57.,	2.00,,,,			.073,	.856

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
23.,	.22,	.15,	16,	.672,	1.473

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

Year class = 1995

Fleet,	Estimated, Survivors,	Int, s.e,	Ext, s.e,	Var, Ratio,	N, Scaled, Weights,	Estimated F
SUMMER SURVEY ,	4.,	.255,	.168,	.66,	7, .394,	2.644
SPRING SURVEY (shift,	6.,	.177,	.069,	.39,	8, .365,	2.218
F shrinkage mean ,	27.,	2.00,,,,			.241,	1.056

Weighted prediction :

Survivors, at end of year,	Int, s.e,	Ext, s.e,	N, ,	Var, Ratio,	F
7.,	.50,	.24,	16,	.474,	2.066

Table 2.2.7.1.3. Faroe Plateau (sub-division Vb1) COD. Fishing mortality at age.

YEAR,	1961,	1962,	1963,	1964,
AGE				
1,	.0000,	.0000,	.0000,	.0000,
2,	.3346,	.2701,	.2534,	.1086,
3,	.5141,	.4982,	.4138,	.2997,
4,	.4986,	.4838,	.5172,	.4523,
5,	.5737,	.7076,	.5124,	.5229,
6,	.4863,	.5569,	.5405,	.5659,
7,	.9566,	.3662,	.4879,	.6677,
8,	.8116,	.6826,	.3269,	.3531,
9,	.6715,	.5641,	.4806,	.5164,
FBAR 3- 7,	.6059,	.5226,	.4944,	.5017,

YEAR,	1965,	1966,	1967,	1968,	1969,	1970,	1971,	1972,	1973,	1974,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.1209,	.0829,	.0789,	.1010,	.1099,	.0530,	.0309,	.0464,	.0657,	.0816,
3,	.2518,	.1969,	.2389,	.2318,	.3063,	.2081,	.1337,	.1476,	.2322,	.1568,
4,	.4498,	.2552,	.2687,	.3949,	.3806,	.3654,	.2225,	.2070,	.3048,	.2046,
5,	.5622,	.4499,	.3442,	.5339,	.4180,	.3409,	.3845,	.2497,	.2813,	.2953,
6,	.6604,	.5016,	.5779,	.4472,	.5709,	.3709,	.5572,	.6058,	.2526,	.3797,
7,	.5305,	.9680,	.5203,	.7132,	.5118,	.6559,	.4651,	.4686,	.3722,	.5330,
8,	.4345,	.8520,	1.0438,	.3331,	.8457,	.4208,	.7528,	.2464,	.3259,	.3052,
9,	.5318,	.6106,	.5556,	.4882,	.5499,	.4339,	.4800,	.3578,	.3091,	.3457,
FBAR 3- 7,	.4909,	.4743,	.3900,	.4642,	.4375,	.3882,	.3526,	.3358,	.2886,	.3139,

YEAR,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0774,	.0933,	.0481,	.0588,	.0433,	.0544,	.0523,	.0586,	.0992,	.1073,
3,	.3193,	.1723,	.3036,	.1896,	.2623,	.2391,	.2877,	.2227,	.4673,	.3712,
4,	.4359,	.3665,	.4748,	.4291,	.4309,	.3695,	.3409,	.3602,	.5585,	.5791,
5,	.4134,	.5568,	.7532,	.4289,	.5049,	.4337,	.4369,	.3887,	.6411,	.6609,
6,	.4544,	.5167,	.7333,	.4851,	.4906,	.5182,	.5644,	.4047,	.7836,	.4534,
7,	.3504,	.7619,	1.1138,	.5968,	.4480,	.4119,	.6940,	.6926,	1.0780,	.4761,
8,	.4485,	.6429,	.7776,	.5674,	.6903,	.6437,	.5015,	.5526,	.9417,	.4792,
9,	.4235,	.5738,	.7783,	.5054,	.5170,	.4790,	.5115,	.4834,	.8087,	.5340,
FBAR 3- 7,	.3947,	.4749,	.6757,	.4259,	.4273,	.3945,	.4648,	.4138,	.7057,	.5082,

YEAR,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,	1993,	1994,
AGE										
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0658,	.0247,	.0291,	.0673,	.1648,	.0746,	.0322,	.0201,	.0132,	.0253,
3,	.3544,	.3546,	.2209,	.3529,	.4452,	.3267,	.1929,	.0994,	.1018,	.1127,
4,	.5077,	.6228,	.4757,	.5642,	.7608,	.6378,	.4408,	.3128,	.1853,	.1904,
5,	.6135,	.7035,	.4854,	.5496,	.7627,	.7817,	.6121,	.3375,	.2404,	.2476,
6,	.9236,	.8259,	.5562,	.7747,	.9639,	.7004,	.7233,	.6650,	.1949,	.2069,
7,	1.1084,	.8402,	.4898,	.7999,	1.0616,	.8385,	.5720,	.8316,	.4748,	.1515,
8,	1.3205,	.5410,	.6226,	.8651,	1.1062,	1.1213,	.7078,	.4336,	.5043,	.3589,
9,	.9044,	.7134,	.5302,	.7175,	.9413,	.8244,	.6166,	.5202,	.3218,	.8170,
FBAR 3- 7,	.7015,	.6694,	.4456,	.6082,	.7988,	.6570,	.5082,	.4493,	.2394,	.1818,

YEAR,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,	2003,	2004,	FBAR **-**
AGE											
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0690,	.0294,	.0330,	.0831,	.0982,	.1205,	.1320,	.1876,	.1331,	.0155,	.1121,
3,	.1603,	.1892,	.1425,	.1657,	.2893,	.3217,	.3151,	.3829,	.3615,	.2160,	.3201,
4,	.4640,	.4467,	.4013,	.2588,	.2967,	.3804,	.4382,	.5148,	.5458,	.4253,	.4953,
5,	.2798,	.8070,	.8140,	.6197,	.3268,	.2496,	.2951,	.7552,	.8045,	.5946,	.7181,
6,	.3566,	.9031,	1.0382,	.9918,	.6805,	.3312,	.3370,	.7560,	.9684,	1.0006,	.9083,
7,	.3079,	1.1110,	1.3882,	.7748,	1.0392,	.5528,	.6751,	1.2186,	.9425,	1.7244,	1.2951,
8,	.2215,	.7953,	1.2372,	1.1344,	.8779,	.7325,	.6291,	1.1147,	.8825,	1.4726,	1.1566,
9,	.9038,	.9173,	.7233,	.6773,	.5359,	.2374,	.5795,	1.2246,	1.6942,	2.0662,	1.6617,
FBAR 3- 7,	.3137,	.6914,	.7568,	.5622,	.5265,	.3671,	.4121,	.7255,	.7245,	.7922,	

Table 2.2.7.1.4. Faroe Plateau (sub-division Vb1) COD. Stock number at age.

YEAR,	1961,	1962,	1963,	1964,
AGE				
1,	25227,	24782,	26668,	10100,
2,	12019,	20654,	20290,	21834,
3,	7385,	7042,	12907,	12893,
4,	3747,	3616,	3503,	6986,
5,	2699,	1863,	1825,	1710,
6,	666,	1245,	752,	895,
7,	668,	335,	584,	358,
8,	155,	210,	190,	294,
9,	66,	56,	87,	112,
TOTAL,	52630,	59804,	66807,	55183,

YEAR,	1965,	1966,	1967,	1968,	1969,	1970,	1971,	1972,	1973,	1974,
AGE										
1,	22676,	28643,	21475,	11390,	10514,	14569,	26041,	15356,	37229,	46803,
2,	8269,	18566,	23451,	17582,	9325,	8608,	11928,	21320,	12573,	30480,
3,	16037,	5999,	13990,	17744,	13012,	6840,	6684,	9469,	16664,	9639,
4,	7823,	10207,	4034,	9020,	11522,	7843,	4548,	4788,	6689,	10816,
5,	3639,	4085,	6475,	2525,	4976,	6447,	4456,	2981,	3187,	4037,
6,	830,	1698,	2133,	3757,	1212,	2682,	3754,	2483,	1901,	1969,
7,	416,	351,	842,	980,	1967,	561,	1516,	1760,	1109,	1209,
8,	151,	200,	109,	410,	393,	965,	238,	779,	902,	626,
9,	169,	80,	70,	31,	240,	138,	519,	92,	499,	533,
TOTAL,	60009,	69829,	72579,	63439,	53161,	48654,	59683,	59029,	80752,	106115,

YEAR,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,
AGE										
1,	22687,	12208,	13128,	18318,	28803,	17100,	27026,	30727,	58330,	21150,
2,	38319,	18575,	9995,	10748,	14997,	23582,	14000,	22127,	25157,	47756,
3,	23000,	29035,	13853,	7799,	8298,	11759,	18286,	10878,	17086,	18653,
4,	6747,	13683,	20010,	8372,	5282,	5226,	7579,	11228,	7128,	8767,
5,	7217,	3572,	7765,	10190,	4463,	2811,	2957,	4413,	6412,	3339,
6,	2460,	3908,	1676,	2993,	5433,	2206,	1491,	1564,	2450,	2765,
7,	1103,	1279,	1909,	659,	1509,	2723,	1076,	694,	854,	916,
8,	581,	636,	489,	513,	297,	789,	1477,	440,	284,	238,
9,	378,	304,	274,	184,	238,	122,	339,	732,	207,	91,
TOTAL,	102492,	83200,	69098,	59776,	69320,	66318,	74232,	82804,	117908,	103674,

YEAR,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,	1993,	1994,
AGE										
1,	11613,	12113,	10558,	19873,	4566,	8189,	13935,	12353,	31009,	52925,
2,	17316,	9508,	9917,	8644,	16271,	3738,	6705,	11409,	10114,	25388,
3,	35122,	13274,	7594,	7887,	6617,	11297,	2841,	5316,	9156,	8172,
4,	10535,	20174,	7623,	4985,	4537,	3471,	6672,	1918,	3940,	6770,
5,	4022,	5192,	8860,	3879,	2322,	1736,	1502,	3515,	1148,	2681,
6,	1411,	1783,	2104,	4465,	1833,	887,	650,	667,	2054,	739,
7,	1439,	459,	639,	988,	1685,	572,	360,	258,	281,	1384,
8,	466,	389,	162,	321,	363,	477,	203,	166,	92,	143,
9,	121,	102,	185,	71,	111,	98,	127,	82,	88,	46,
TOTAL,	82046,	62994,	47643,	51113,	38303,	30466,	32994,	35684,	57882,	98248,

YEAR,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,	2003,	2004,	2005,	GMST 61-**	AMST 61-**
AGE													
1,	16341,	8315,	7703,	18594,	26513,	43775,	16672,	8785,	11579,	17696,	0,	18273,	21304,
2,	43332,	13379,	6808,	6307,	15224,	21707,	35840,	13650,	7193,	9480,	14488,	15144,	17557,
3,	20268,	33111,	10636,	5393,	4752,	11299,	15754,	25716,	9264,	5155,	7642,	11292,	13075,
4,	5978,	14136,	22436,	7552,	3741,	2913,	6706,	9412,	14357,	5283,	3401,	6860,	7921,
5,	4582,	3077,	7404,	12298,	4773,	2277,	1631,	3542,	4605,	6810,	2827,	3677,	4250,
6,	1713,	2836,	1124,	2686,	5418,	2819,	1452,	994,	1363,	1687,	3077,	1801,	2109,
7,	492,	982,	941,	326,	816,	2246,	1657,	849,	382,	424,	508,	835,	994,
8,	974,	296,	265,	192,	123,	236,	1058,	691,	205,	122,	62,	340,	428,
9,	82,	639,	109,	63,	51,	42,	93,	462,	185,	70,	23,	138,	194,
TOTAL,	93761,	76771,	57427,	53411,	61410,	87313,	80863,	64100,	49133,	46726,	32027,		

Table 2.2.7.1.5. Faroe Plateau (sub-division Vb1) COD. Summary table.

	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	0.39
1968	17582	110433	82484	29930	0.3629	0.4642
1969	9325	105537	83487	32371	0.3877	0.4375
1970	8608	98398	82035	24183	0.2948	0.3882
1971	11928	78218	63308	23010	0.3635	0.3526
1972	21320	76439	57180	18727	0.3275	0.3358
1973	12573	107682	80516	22228	0.2761	0.2886
1974	30480	136663	95831	24581	0.2565	0.3139
1975	38319	149774	105676	36775	0.348	0.3947
1976	18575	154919	116736	39799	0.3409	0.4749
1977	9995	136017	111863	34927	0.3122	0.6757
1978	10748	94338	76608	26585	0.347	0.4259
1979	14997	83769	65380	23112	0.3535	0.4273
1980	23582	84537	58386	20513	0.3513	0.3945
1981	14000	86907	62058	22963	0.37	0.4648
1982	22127	96625	64695	21489	0.3322	0.4138
1983	25157	121639	76932	38133	0.4957	0.7057
1984	47756	150221	94847	36979	0.3899	0.5082
1985	17316	129606	83165	39484	0.4748	0.7015
1986	9508	98522	72952	34595	0.4742	0.6694
1987	9917	77651	61527	21391	0.3477	0.4456
1988	8644	65617	51648	23182	0.4488	0.6082
1989	16271	58848	38176	22068	0.5781	0.7988
1990	3738	37906	28781	13487	0.4686	0.657
1991	6705	28548	20847	8750	0.4197	0.5082
1992	11409	35232	20223	6396	0.3163	0.4493
1993	10114	50699	32657	6107	0.187	0.2394
1994	25388	84545	42866	9046	0.211	0.1818
1995	43332	145266	54193	23045	0.4252	0.3137
1996	13379	144259	85826	40422	0.471	0.6914
1997	6808	97611	81719	34304	0.4198	0.7568
1998	6307	68360	57389	24005	0.4183	0.5622
1999	15224	68929	47648	19906	0.4178	0.5265
2000	21707	97299	48538	22433	0.4622	0.3671
2001	35840	122395	63008	28883	0.4584	0.4121
2002	13650	112213	63133	39086	0.6191	0.7255
2003	7193	74224	51004	29281	0.5741	0.7245
2004	9480	50780	33782	17287	0.5117	0.7922
Arith.						
Mean	21001	92745	63702	24853	0.3972	0.5018
0 Units	(Thousands)	(Tonnes)	(Tonnes)		(Tonnes)	

Table 2.2.8.1.1. Faroe Plateau (sub-division Vb1) COD. Input to management option table.

Recruitment

	XSA	RCT3	Geomean 61-04
YC2002	9480		
YC2003	14488		
YC2004			14732
YC2005			14732

Stock size

2005
14488
7642
3401
2827
3077
508
62
23

Directly from XSA output

Maturity

Age	Observed 2005	Av.03-05 2006	Av.03-05 2007
2	0.05	0.02	0.02
3	0.66	0.49	0.49
4	0.9	0.82	0.82
5	0.93	0.91	0.91
6	0.98	0.95	0.95
7	0.92	0.93	0.93
8	1	1	1
9	1	1	1
10	1	1	1

Exploitation pattern (not rescaled)

Av02-04 2005	Av02-04 2006	Av02-04 2007
0.1121	0.1121	0.1121
0.3201	0.3201	0.3201
0.4953	0.4953	0.4953
0.7181	0.7181	0.7181
0.9083	0.9083	0.9083
1.2952	1.2952	1.2952
1.1566	1.1566	1.1566
1.6617	1.6617	1.6617
0.7474	0.7474	0.7474

Weights

Est.from Jan-Feb 2005	As2004 2006	As2004 2007
1.0244	1.0375	1.0375
1.3640	1.1544	1.1544
1.7371	1.6932	1.6932
2.3030	2.3632	2.3632
3.4245	3.8305	3.8305
5.1771	5.1906	5.1906
7.9185	6.3257	6.3257
7.8950	7.6563	7.6563
9.8230	9.5733	9.5733

Table 2.2.8.1.2. Faroe Plateau (sub-division Vb1) COD. Management option table.

MFDP VERSION 1						
Run: Run1						
Index file 2/5-2005						
Time and date: 11:19 02/05/05						
Fbar age range: 3-7						
2005						
Biomass	**SSB**	**FMult**	**FBar**	**Landings**		
51523	32412	1.0000	0.7474	17199		
2006					**2007**	
Biomass	**SSB**	**FMult**	**FBar**	**Landings**	**Biomass**	**SSB**
49666	26114	0.0000	0.0000	0	68791	42672
.	26114	0.1000	0.0747	2104	66246	40375
.	26114	0.2000	0.1495	4057	63885	38254
.	26114	0.3000	0.2242	5872	61692	36291
.	26114	0.4000	0.2990	7561	59653	34474
.	26114	0.5000	0.3737	9136	57752	32788
.	26114	0.6000	0.4484	10607	55979	31222
.	26114	0.7000	0.5232	11984	54323	29765
.	26114	0.8000	0.5979	13274	52772	28409
.	26114	0.9000	0.6727	14484	51319	27143
.	26114	1.0000	0.7474	15622	49956	25961
.	26114	1.1000	0.8221	16693	48675	24855
.	26114	1.2000	0.8969	17703	47469	23819
.	26114	1.3000	0.9716	18656	46334	22848
.	26114	1.4000	1.0464	19557	45262	21936
.	26114	1.5000	1.1211	20411	44250	21079
.	26114	1.6000	1.1959	21220	43293	20272
.	26114	1.7000	1.2706	21988	42386	19511
.	26114	1.8000	1.3453	22718	41527	18794
.	26114	1.9000	1.4201	23412	40711	18117
.	26114	2.0000	1.4948	24074	39936	17476
Input units are thousands and kg - output in tonnes						

Table 2.2.8.4.1. Faroe Plateau (sub-division Vb1) COD. Input to yield per recruit calculations (long term prediction).

	EXPLOITATION	WEIGHTATAGE	PROPMATURE
	pattern		
	Average	Average	Average
	1999-2004	1978-2004	1983-2005
	Not rescaled		
Age 2	0.1145	1.0631	0.0300
Age 3	0.3144	1.6029	0.5478
Age 4	0.4335	2.3063	0.8422
Age 5	0.5043	3.1212	0.9430
Age 6	0.679	3.8907	0.9835
Age 7	0.8856	4.8529	0.9852
Age 8	0.8473	5.9260	0.9974
Age 9	0.8543	7.4842	1.0000

Table 2.2.8.4.2. Faroe Plateau (sub-division Vb1) COD. Output from yield per recruit calculations (long term prediction).

MFYPR version 1
Run: YLD1
Time and date: 12:59 02/05/05
Yield per results

FMult	Fbar	CatchNos	Yield	StockNos	Biomass	SpwnNosJan	SSBJan	SpwnNosSpwn	SSBSpwn
0.0000	0.0000	0.0000	0.0000	4.4029	12.7983	2.9120	10.7722	2.9120	10.7722
0.1000	0.0563	0.1557	0.5694	4.0405	10.9891	2.5630	8.9978	2.5630	8.9978
0.2000	0.1127	0.2671	0.9181	3.7469	9.5821	2.2820	7.6227	2.2820	7.6227
0.3000	0.1690	0.3487	1.1287	3.5059	8.4744	2.0528	6.5446	2.0528	6.5446
0.4000	0.2253	0.4101	1.2532	3.3055	7.5915	1.8636	5.6890	1.8636	5.6890
0.5000	0.2817	0.4574	1.3241	3.1367	6.8788	1.7055	5.0017	1.7055	5.0017
0.6000	0.3380	0.4949	1.3619	2.9928	6.2963	1.5718	4.4430	1.5718	4.4430
0.7000	0.3944	0.5253	1.3793	2.8689	5.8144	1.4575	3.9834	1.4575	3.9834
0.8000	0.4507	0.5506	1.3844	2.7610	5.4110	1.3589	3.6010	1.3589	3.6010
0.9000	0.5070	0.5721	1.3821	2.6662	5.0694	1.2729	3.2792	1.2729	3.2792
1.0000	0.5634	0.5906	1.3755	2.5822	4.7772	1.1973	3.0057	1.1973	3.0057
1.1000	0.6197	0.6068	1.3665	2.5071	4.5248	1.1303	2.7710	1.1303	2.7710
1.2000	0.6760	0.6213	1.3564	2.4396	4.3047	1.0706	2.5678	1.0706	2.5678
1.3000	0.7324	0.6342	1.3457	2.3784	4.1113	1.0170	2.3904	1.0170	2.3904
1.4000	0.7887	0.6459	1.3351	2.3228	3.9399	0.9686	2.2343	0.9686	2.2343
1.5000	0.8450	0.6566	1.3246	2.2718	3.7870	0.9247	2.0961	0.9247	2.0961
1.6000	0.9014	0.6664	1.3145	2.2250	3.6498	0.8846	1.9729	0.8846	1.9729
1.7000	0.9577	0.6754	1.3047	2.1817	3.5260	0.8479	1.8624	0.8479	1.8624
1.8000	1.0140	0.6838	1.2954	2.1417	3.4136	0.8141	1.7629	0.8141	1.7629
1.9000	1.0704	0.6916	1.2866	2.1044	3.3111	0.7830	1.6728	0.7830	1.6728
2.0000	1.1267	0.6989	1.2781	2.0696	3.2173	0.7541	1.5909	0.7541	1.5909

Reference point	F multiplier	Absolute F
Fbar(3-7)	1.0000	0.5634
FMax	0.8103	0.4565
F0.1	0.4458	0.2512
F35%SPR	0.7535	0.4245
Flow	0.0442	0.0249
Fmed	0.6683	0.3765
Fhigh	1.674	0.9431

Weights in kilograms

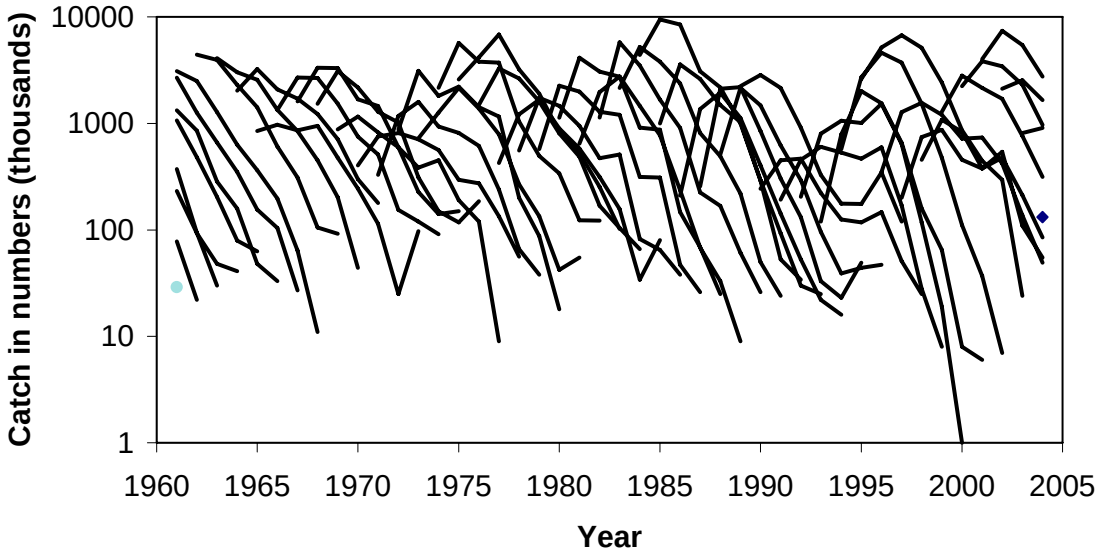


Figure 2.2.3.1. Faroe Plateau (sub-division VB1) COD. Catch in numbers.

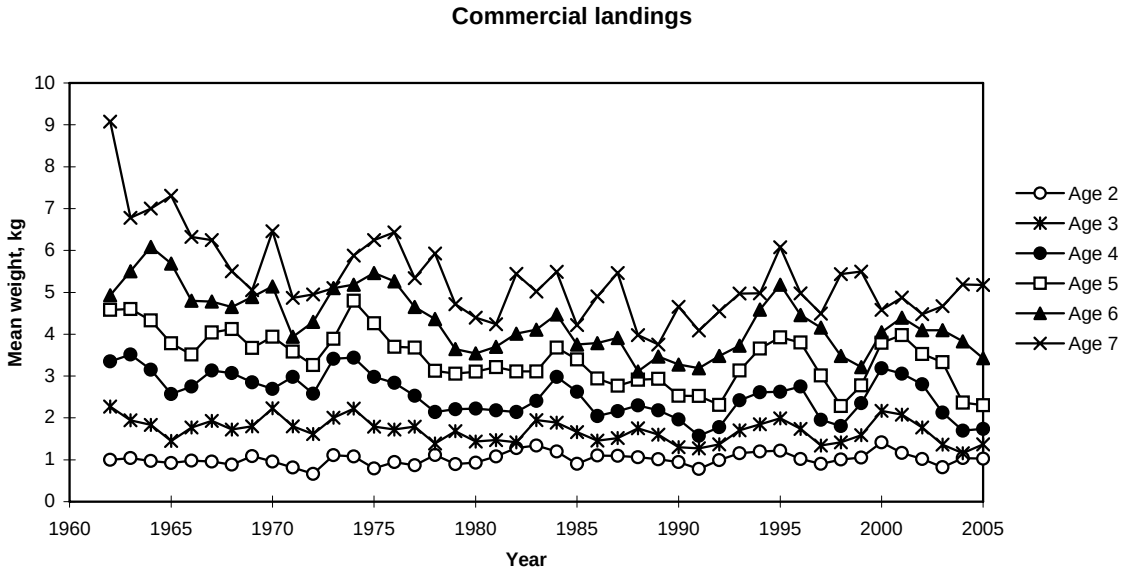


Figure 2.2.4.1. Faroe Plateau (sub-division VB1) COD. Mean weight at age 1961-2004. The estimated weights in 2005 are also shown.

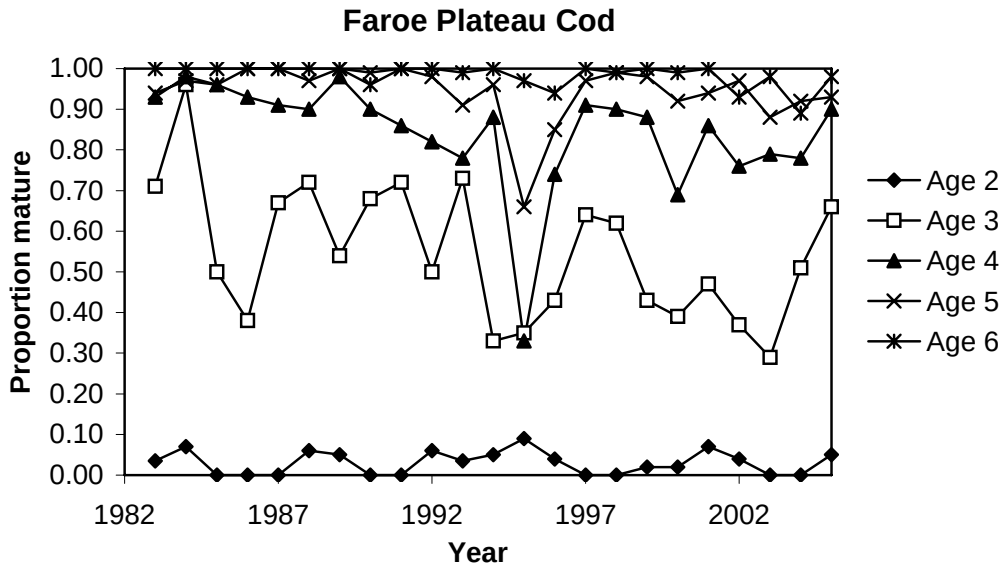


Figure 2.2.5.1. Faroe Plateau (sub-division VB1) COD. Proportion mature at age as observed in the spring groundfish survey.

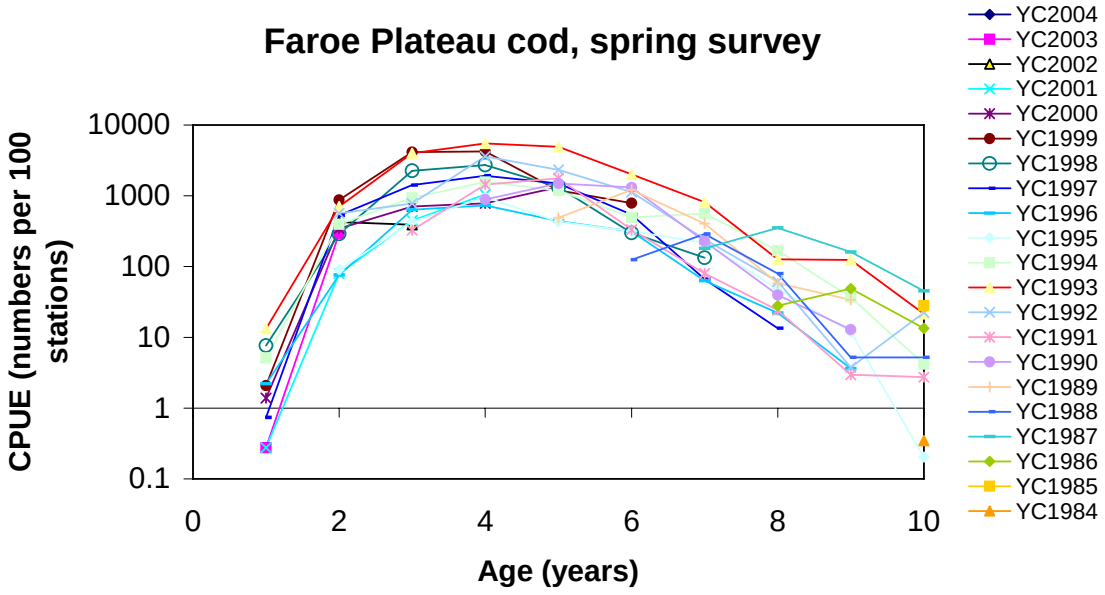


Figure 2.2.6.1. Faroe Plateau (sub-division VB1) COD. Catch curves from the spring groundfish survey.

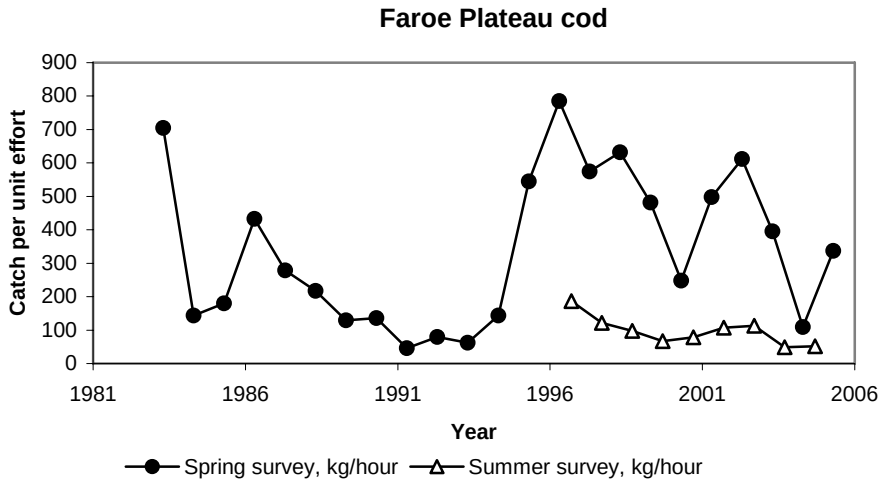


Figure 2.2.6.2. Faroe Plateau (sub-division VB1) COD. Catch per unit effort (kg/hour) in the spring, and summer groundfish survey.

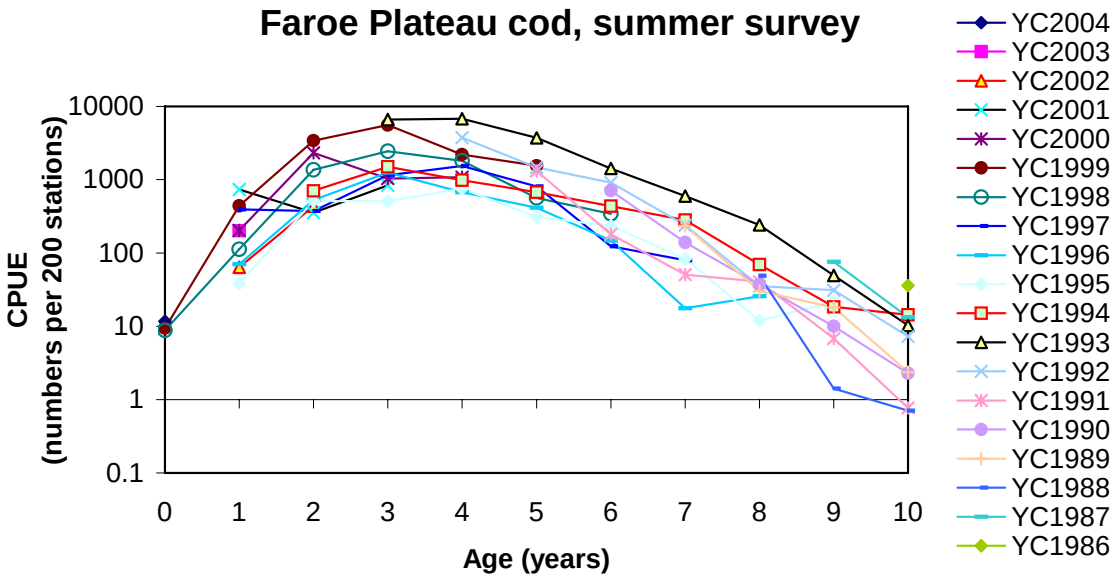


Figure 2.2.6.3. Faroe Plateau (sub-division VB1) COD. Catch curves from the summer groundfish survey.

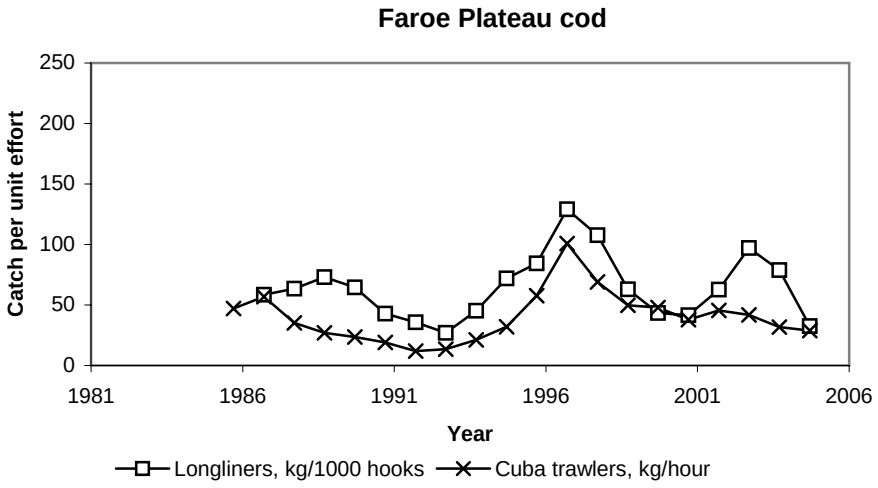


Figure 2.2.7.1.1. Faroe Plateau (sub-division VB1) COD. Catch per unit effort for Cuba trawlers and longliners.

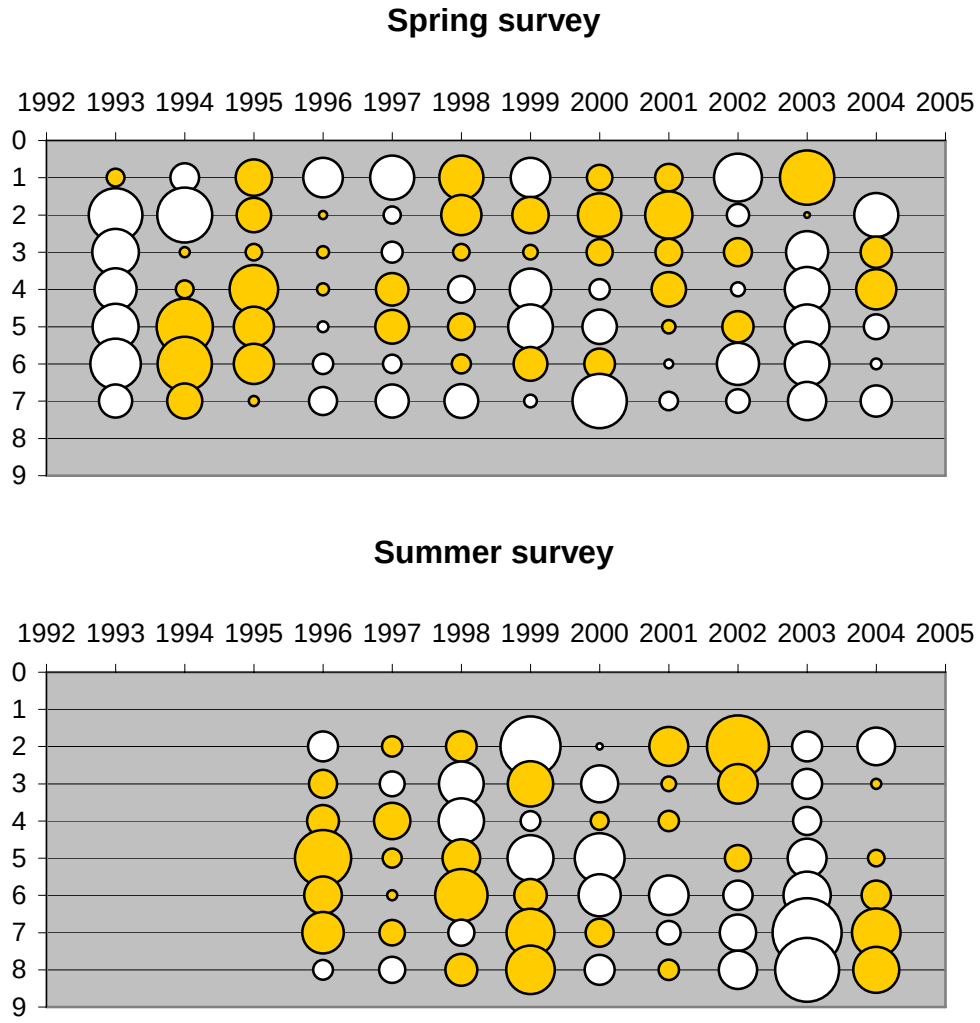


Figure 2.2.7.1.2. Faroe Plateau (sub-division VB1) COD. Log catchability residuals for the spring and summer survey. The residuals for age 8 in the spring survey are not presented because some values were off scale. White bubbles indicate negative residuals.

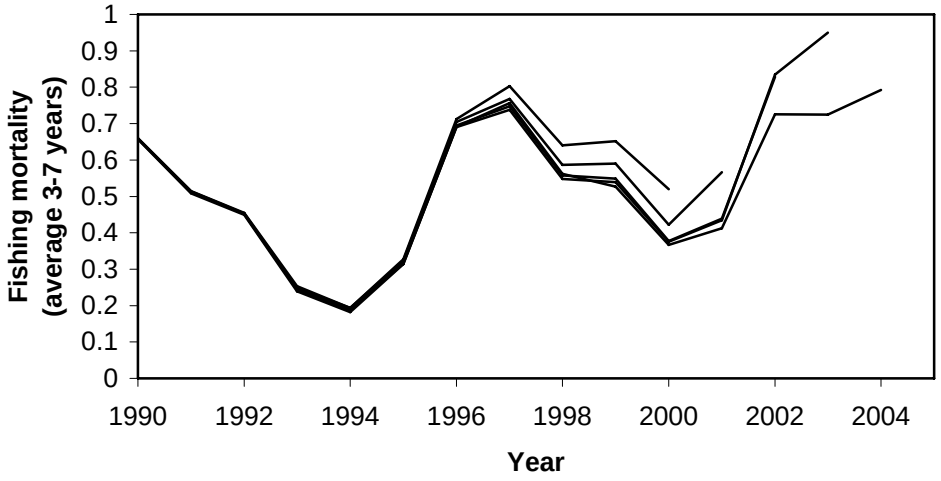


Figure 2.2.7.1.3. Faroe Plateau (sub-division VB1) COD. Results from the XSA retrospective analysis.

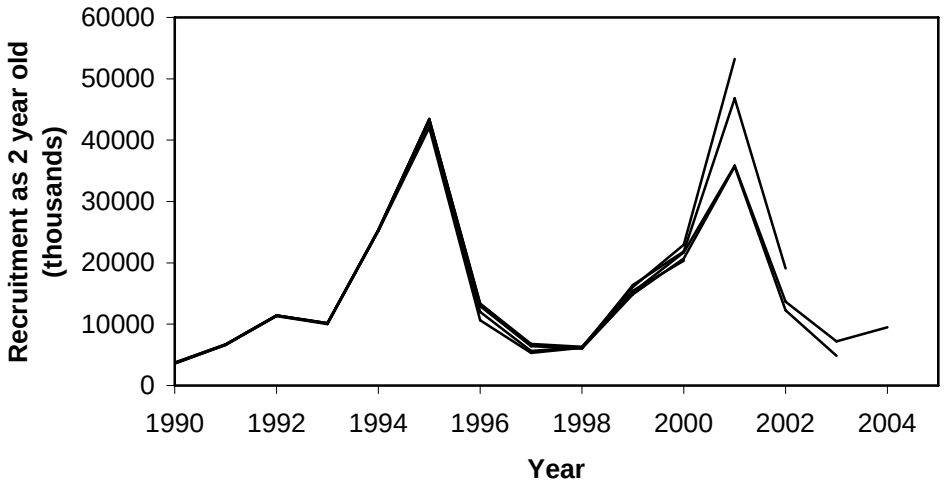


Figure 2.2.7.1.3. Faroe Plateau (sub-division VB1) COD. Results from the XSA retrospective analysis. Continued.

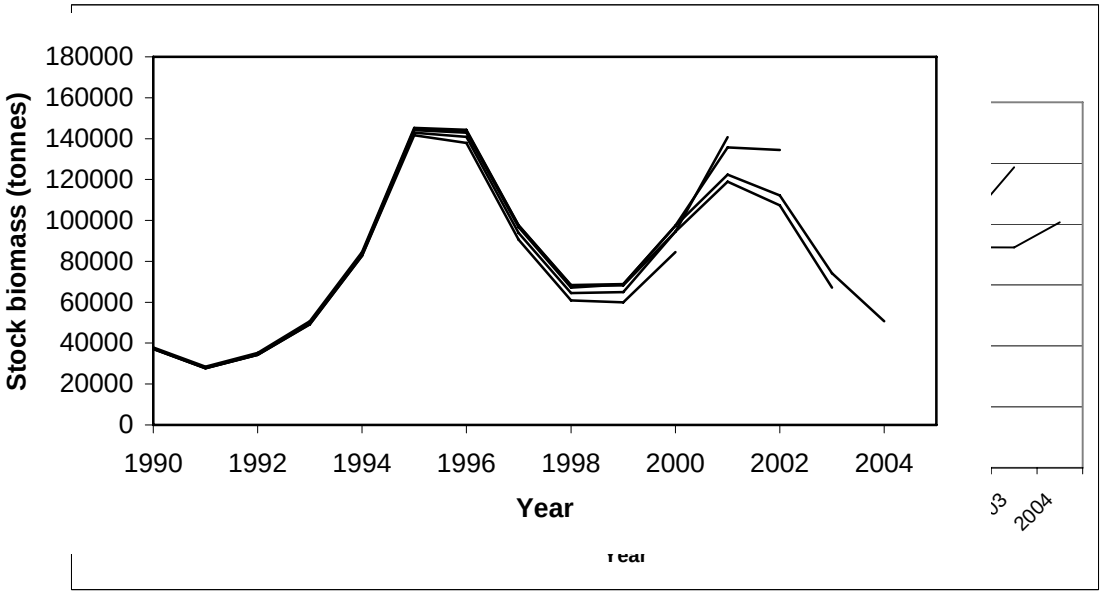


Figure 2.2.7.1.3. Faroe Plateau (sub-division VB1) COD. Results from the XSA retrospective analysis. Continued.

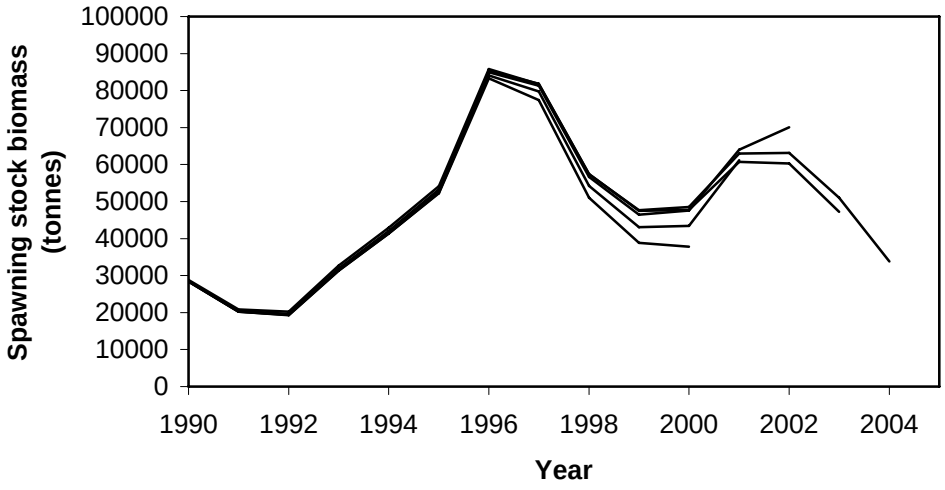
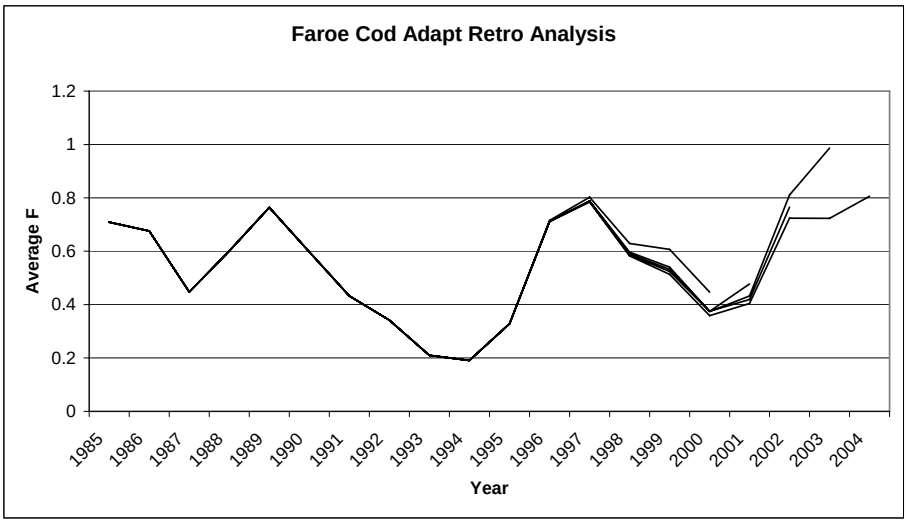
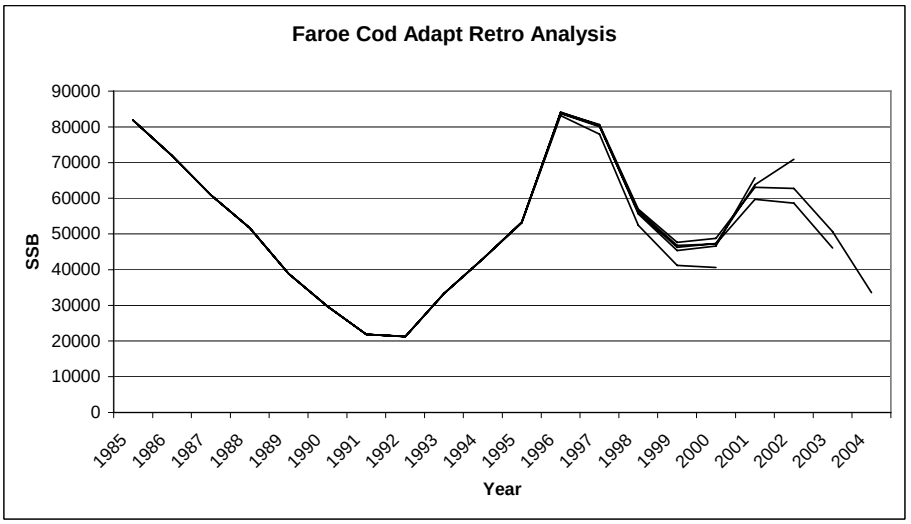


Figure 2.2.7.1.3. Faroe Plateau (sub-division VB1) COD. Results from XSA retrospective analysis. Continued.





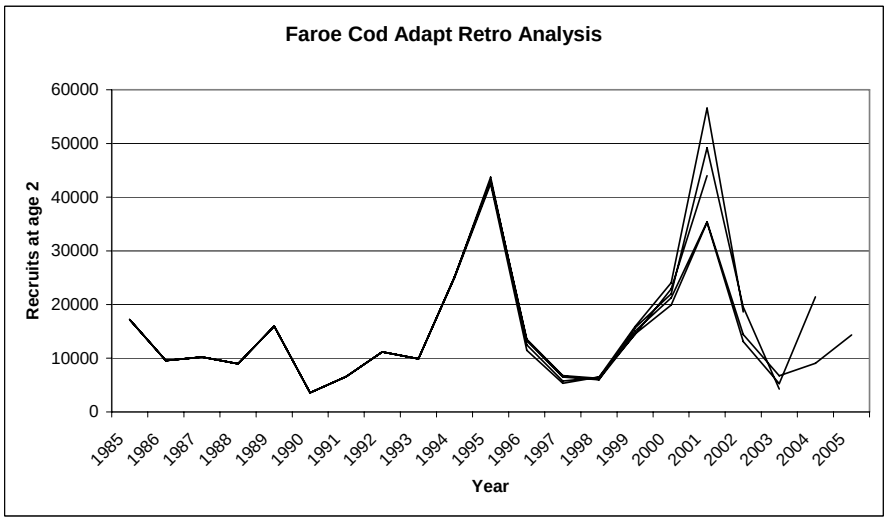
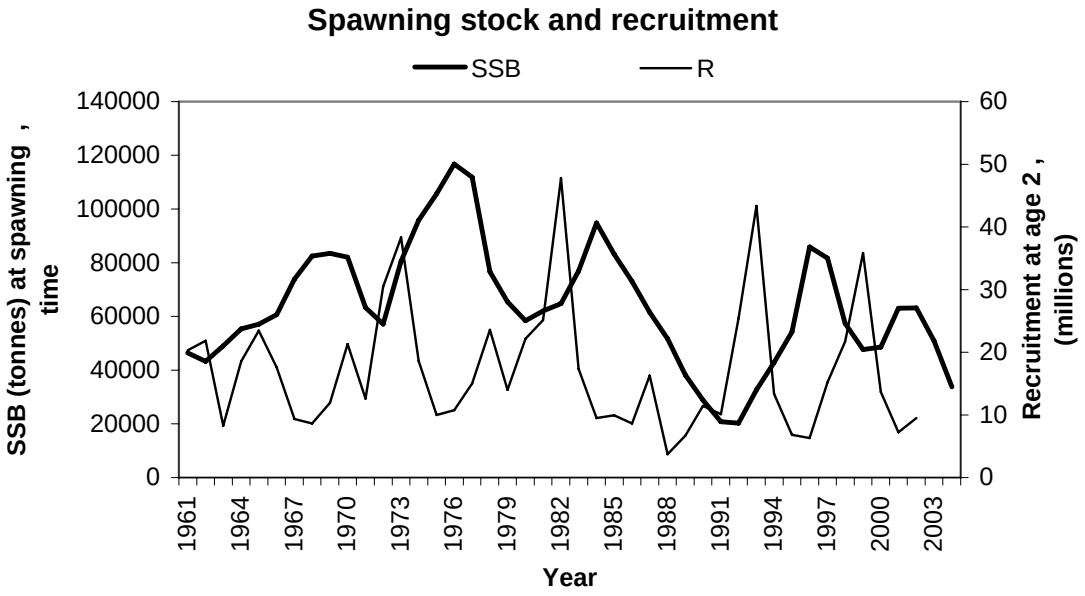


Figure 2.2.7.1.4. Retrospective pattern from the ADAPT calibrated with the summer and the spring surveys ages 2 to 8.



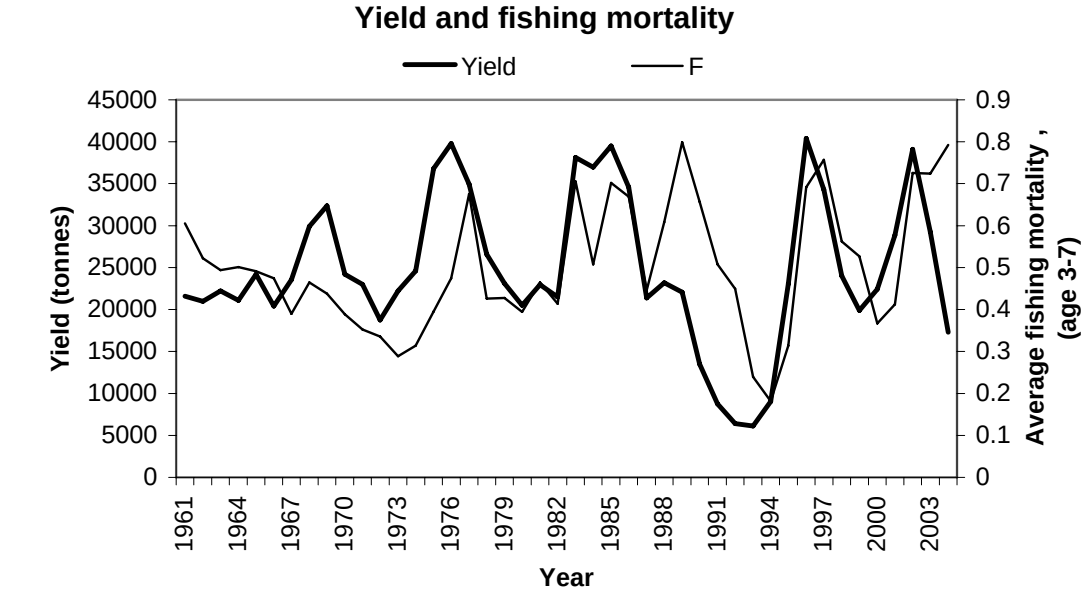


Figure 2.2.7.1.5. Faroe Plateau (sub-division VB1) COD. Yield and fishing versus year. Spawning stock biomass (SSB) and recruitment (year class) versus year.

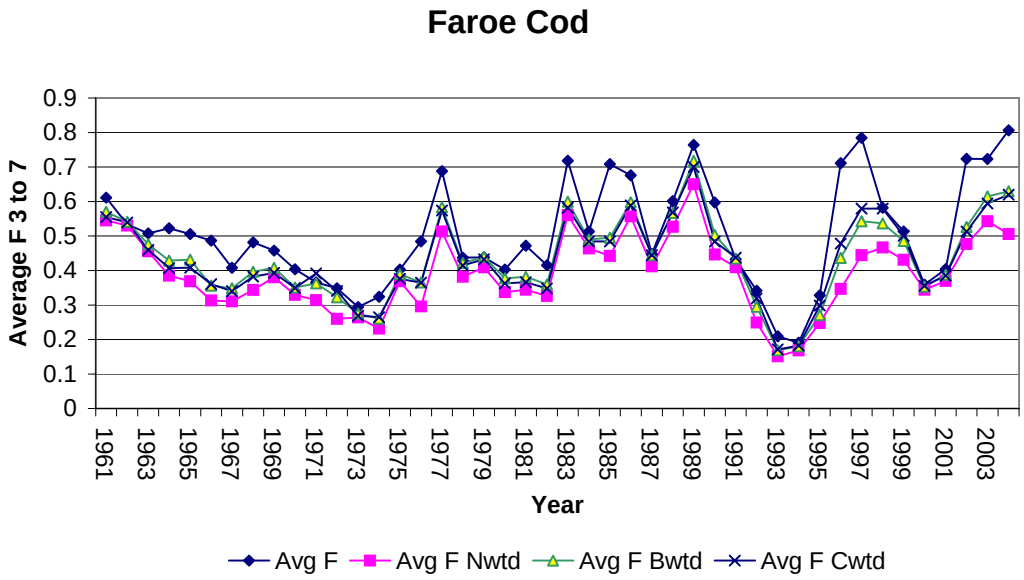


Figure 2.2.7.1.6. Faroe Plateau (sub-division VB1) COD. Different measures of fishing mortality: straight arithmetic average (Avg F), weighted by stock numbers (Nwtd), weighted by stock biomass (Bwtd) or weighted by catch (Cwtd).

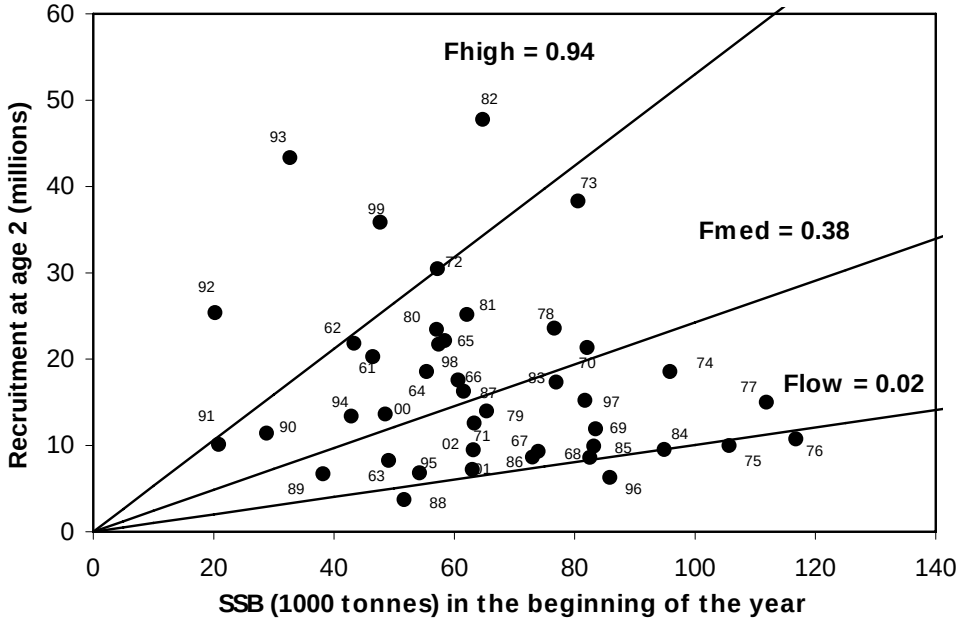


Figure 2.2.7.2.1. Faroe Plateau (sub-division VB1) COD. Spawning stock – recruitment relationship 1961-2002. Years are shown at each data point.

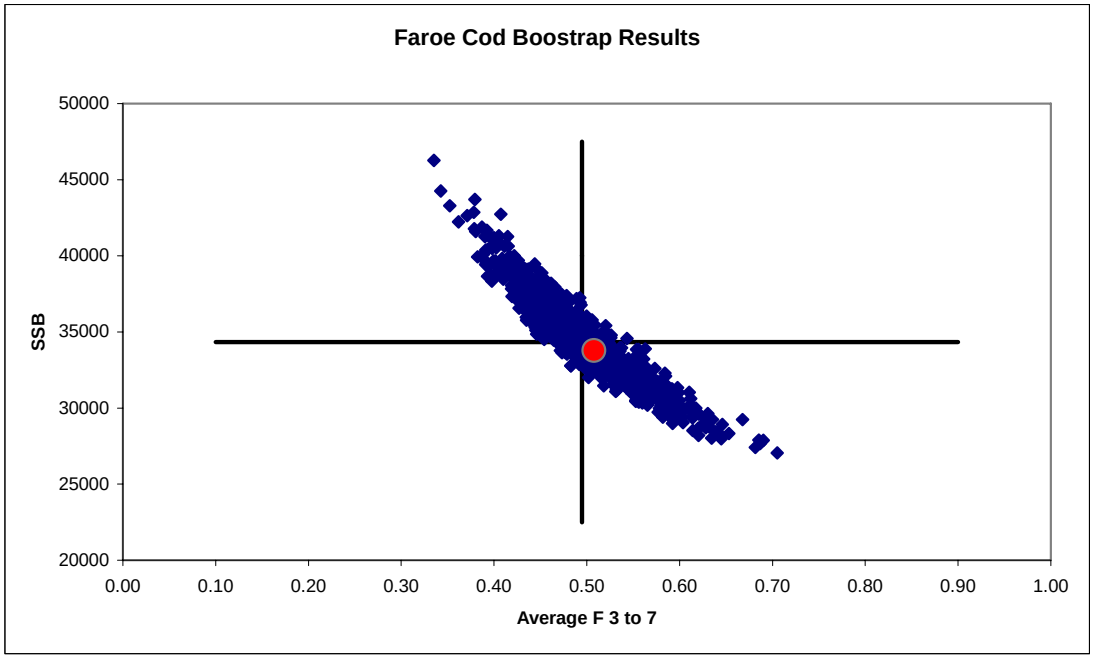


Figure 2.2.7.2.2. F and SSB's for 2004 from a 1000 bootstraps of the ADAPT with the two surveys. The XSA estimate is shown as a red point.

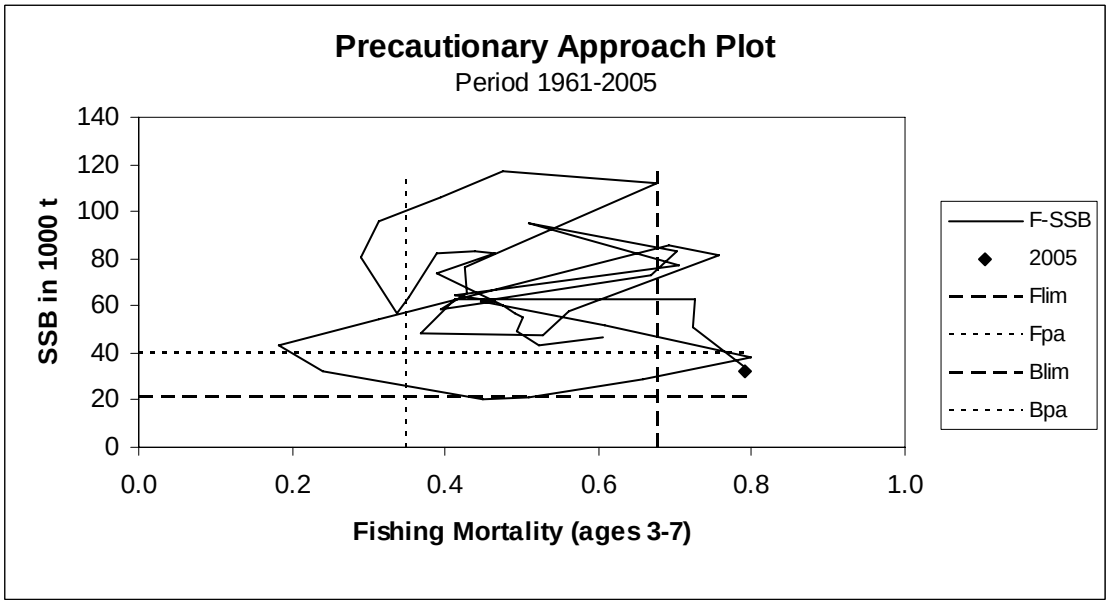
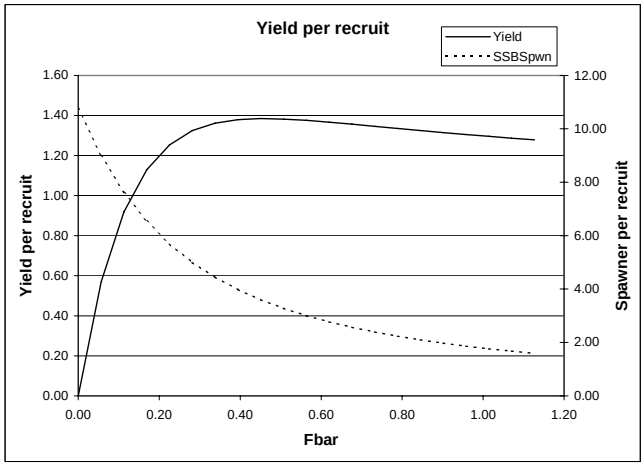
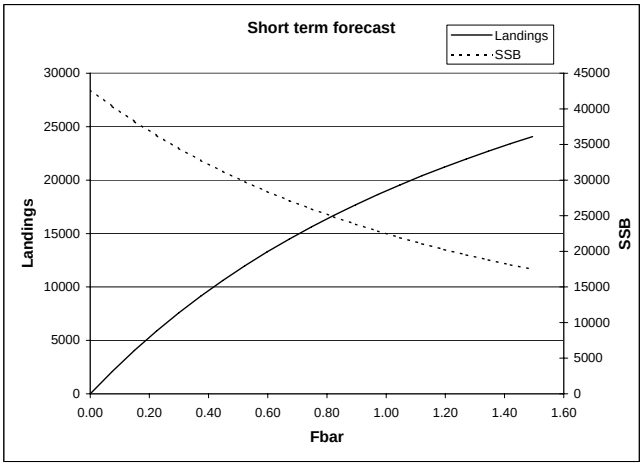


Figure 2.2.8.2.1. Faroe Plateau (sub-division VB1) COD. Spawning stock biomass versus fishing mortality 1961-2005. Output from standard graph software.





MFYPR version 1
Run: YLD1
Time and date: 12:59 02/05/05

Reference point	F multiplier	Absolute F
Fbar(3-7)	1.0000	0.5634
FMax	0.8103	0.4565
F0.1	0.4458	0.2512
F35%SPR	0.7535	0.4245
Flow	0.0442	0.0249
Fmed	0.6683	0.3765
Fhigh	1.6740	0.9431

Weights in kilograms

MFDP version 1
Run: Run1
Index file 2/5-2005
Time and date: 11:19 02/05/05
Fbar age range: 3-7

Input units are thousands and kg - output in tonnes

Figure 2.2.8.4.1. Faroe Plateau (sub-division VB1) COD. Yield per recruit and spawning stock biomass (SSB) per recruit versus fishing mortality (left figure). Landings and SSB versus Fbar (3-7).

2.3 Faroe Bank Cod

Answers to terms of reference for the working group will be marked with square brackets. Terms of reference which apply to the Faroe Bank Cod are:

b) assess the status of and provide effort options and expected corresponding catches for 2006 for cod, haddock, and saithe in Division Vb as these stocks are under effort control

(2) comment on the outcome of existing management measures including technical measures, TACs, effort control and management plans

(4) update the description of fisheries exploiting the stocks, including major regulatory changes and their potential effects. The description of the fisheries should include an enumeration of the number, capacity and effort of vessels prosecuting the fishery by country

(7) provide on a national basis an overview of the sampling of the basic assessment data for the stocks considered

(8) provide specific information on possible deficiencies in the 2005 assessments including, at least, any major inadequacies in the data on landings, effort or discards; any major inadequacies in research vessel surveys data, and any major difficulties in model formulation; including inadequacies in available software. The consequences of these deficiencies for both the assessment of the status of the stocks and the projection should be clarified.

2.3.1 Trends in landings and effort

[ToR 4] Total nominal catches of the Faroe Bank cod from 1986 to 2004 as officially reported to ICES are given in Table 2.3.1.1 and since 1965 in Figure 2.3.1.1. British catches reported to be taken on the Faroe Bank are all assumed to be taken on the Faroe Plateau and are therefore not used in the assessment. Landings have been highly irregular from 1965 to the mid 1980s, reflecting the opportunistic nature of the cod fishery on the Bank, with peak landings slightly exceeding 5 000t in 1973. The trend of landings has been smoother since 1987, declining from about 3 500t in 1987 to only 330 t in 1992 before increasing to 3 600t in 1997. In 2004 landings were estimated at 4 300t about 1 400 t less than in 2003 (Figure 2.3.1.1). Longline fishing effort increased substantially in 2003 and although it decreased in 2004 it remains the second highest fishing effort observed since 1988 (Figure 2.3.1.1).

[ToR 8] There may be problems with the catch figures for Faroe Bank. The vessels may fish on both Faroe Plateau and Faroe Bank during the same trip. The catches of cod on Faroe Bank are sometimes reported on the landing slips and vessels larger than 15 GRT are obliged to have logbooks. The Faroes Coastal Guard is splitting the landings into Vb1 and Vb2 on the basis of landing slips and logbooks. Since small boats don't fill out logbooks and may not land the catch, the catch figures on the Faroe Bank are actually estimates rather than absolute figures.

The error in the catches of Faroe Bank cod may be in the order of some hundred tonnes, not thousand tonnes.

In 1990, the decreasing trend in cod landings from Faroe Bank lead ACFM to advise the Faroese authorities to close the bank to all fishing. This advice was followed for depths shallower than 200 meters. In 1992 and 1993 longliners and jiggers were allowed to participate in an experimental fishery inside the 200 meters depth contour. For the quota year 1 September 1995 to 31 August 1996 a fixed quota of 1 050 t was set. The new management regime with fishing days was introduced on 1 June 1996 allowing longliners and jiggers to fish inside the 200 m contour. The trawlers are allowed to fish outside the 200 m contour.

[ToR 4] For the fishing years from 1 Sep 2004 to 31 Aug 2005 the number of allocated fishing days has been reduced by 10%. In 2005 the authorities have introduces at total fishing ban during the spawning period, i.e. 1 March to 1 May.

2.3.2 Stock assessment

[ToR 7] Biological samples have been taken from commercial landings since 1974 (the 2004 sampling intensity is shown in the text table below and from the groundfish survey since 1983. In 2000, an attempt was made to assess the stock using XSA with catch at age for 1992-1999, using the spring groundfish survey as a tuning series (1995-1999) but the WG and ACFM concluded that it could only be taken as indicative due to scarce catch-at-age data. No attempt was made to update the XSA in subsequent years given the poor sampling for age composition particularly for trawl landings.

Table 2.3.2.1. Samples of lengths, otoliths, and individual weights of Faroe Bank cod in 2004

FLEET	SIZE	SAMPLES	LENGTHS	OTOLITHS	SAMPLE WEIGHTS
Longliners	< 100 GRT	4	820	120	260
Longliners	> 100 GRT	27	5411	658	2003
Total		31	6231	778	2263

[ToR 7] The Faroese groundfish surveys (spring and summer) cover the Faroe Bank and cod is mainly taken within the 200 m depth contour. The catches of cod per trawl hour in depths shallower than 200 meter are shown in Figure 2.3.2.1.

The spring survey was initiated in 1983 and discontinued in 2003. The summer survey has been carried out since 1996. The CPUE of the spring survey was low during 1988 to 1995 varying between 73 and 95 kg per tow. Although noisy, the survey suggests higher, possibly increasing biomass during 1995 - 2003. Since the spring survey has been discontinued, the summer survey is the only survey, which can give updated information on trends in stock size. The agreement is good between the two indices during 1996 to 2001, but they diverged in 2002 and 2003.

The figure of length distributions (figure 2.3.2.2 and figure 2.3.2.3) show in general good recruitment of 1 year old in the summer survey from 2000 – 2003 (lengths 26 – 40 cm), corresponding to good recruitment of 2 years old in the spring surveys from 2001 to 2003 (40 – 55 cm). The summer survey shows poor recruitment of 1 years old in 2004.

The recruitment can simply be estimated by counting number of fish in the small length groups in the surveys. The figure below shows a fairly good correlation between spring survey recruitment and summer survey recruitment. According to the summer survey the recruitment of 1 year old has been good from 2000 to 2003, while the recruitment has been relative poor in 2004 (Figure 2.3.2.4).

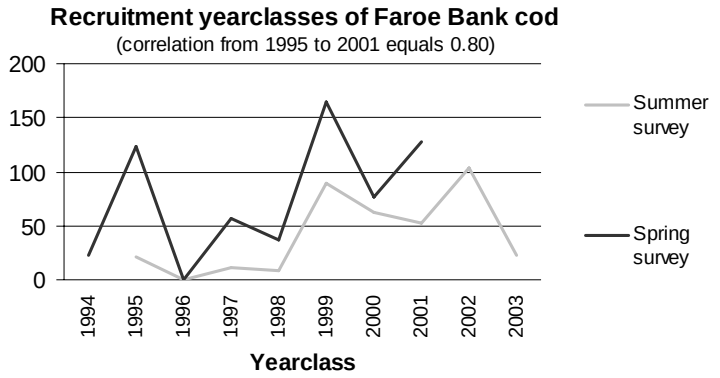


Figure 2.3.2.4. Estimated recruitment from surveys. In summer surveys the 1 year old recruitment is estimated. In spring surveys the recruitment of 2 year old is estimated.

Figure 2.3.2.5 shows a positive correlation between the survey indices and the landings in the same year., but the relationship between the summer survey and the landings deteriorates in 2003 and 2004. The ratio of landings to the survey indices provide an exploitation ratio (Figure 2.3.2.5), which can be used as a proxy to relative changes in fishing mortality. For the summer survey, the results suggest that fishing mortality has been reasonably stable during 1996 to 2002, but that it increased steeply in 2003, consistent with the 160% increase in longline fishing days in that year. The decrease in longline fishing days in 2004 did not materialise as a decrease in exploitation ratio.

In 2005 a statistical catch at age model based on summer indices was used to assess the stock. The relative fishing mortality from the separable model suggests a similar but somehow lower mortality in 2004 than the exploitation ratio (Figure 2.3.2.6).

2.3.2.1 Comment on the assessment

An XSA was attempted in the 2000 assessment but not since. The NWWG concludes that the poor sampling for age composition, particularly for the trawler landings whose catch is not separated into Faroe Bank or Faroe Plateau during the same trips. Therefore, XSA is not considered useful until reliable coverage of the total catch at age can be obtained.

2.3.3 Reference points

There are no analytical basis to suggest reference points based on XSA or an accepted general production analysis.

2.3.4 Management considerations

The landing estimates are uncertain because since 1996 vessels are allowed to fish both on the Plateau and on Faroe Bank during the same trip, rendering landings from both areas uncertain. Given the relative size of the two fisheries, this is a bigger problem for Faroe Bank cod than for Faroe Plateau cod, but the magnitude remains unquantified for both. The ability to provide advice depends on the reliability of input data. If the cod landings from Faroe Bank are not known, it is difficult to provide advice on landings. If the fishery management agency intends to manage the two fisheries to protect the productive capacity of each individual unit, then it is necessary to regulate the catch removed from each stock. Simple measures should make it possible to identify if the catch is originating from the Bank or from the Plateau e.g. by storing in different section of the hold.

[Tor 2] The effort has been extremely high in 2003 and is still fairly high in 2004 (Fig. 2.3.1.1). An exploitation ratio can be calculated via the catches and cpue from the surveys.

The very high effort in 2003 and 2004, results in an extremely high exploitation ratio. Even though there might be uncertainties due too poor data from the surveys, there is no doubt, that the exploitation rate is very high and may not be sustainable.

[ToR b] The recruitment of the 2002 years class seems to be good, while there are indications of bad recruitment of the 2003 year class.

Table 2.3.1.1. Faroe Bank (sub-division Vb2) cod. Nominal catches (tonnes) by countries 1986-2003 as officially reported to ICES. From 1992 the catches by Faroe Islands and Norway are used in the assessment.

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Faroe Islands	1836	3409	2960	1270	289	297	122	264	717	561
Norway	6	23	94	128	72	38	32	2	8	40
UK (E/W/NI)	-	-	-	-	-	-	+	1	1	-
UK (Scotland) [1]	63	47	37	14	205	90	176	118	227	551
United Kingdom										
Total	1905	3479	3091	1412	566	425	330	385	953	1152
Used in assessment					289	297	122	264	717	561

	1996	1997	1998	1999	2000	2001	2002	2003	2004 *
Faroe Islands	2051	3459	3092	1001		1094	1840	5957	4535
France						- [2]			
Norway	55	135	147	88	49	51	25	72	18
UK (E/W/NI) [2]	- [2]	- [2]	- [2]	-	-	-	-	-	-
UK (Scotland) [3]	382	277	265	210	245	288	218	254	-
United Kingdom				-	-	-	-	-	259 [3]
Total	2488	3871	3504	1299	294	1433	2083	6283	4812
Correction of Faroese catches in Vb2						-65	-109	-353	-269
Used in assessment	2051	3459	3092	1001	1194	1080	1756	5676	4284

***) Preliminary**

1) Includes Vb1

2) Included in Vb1

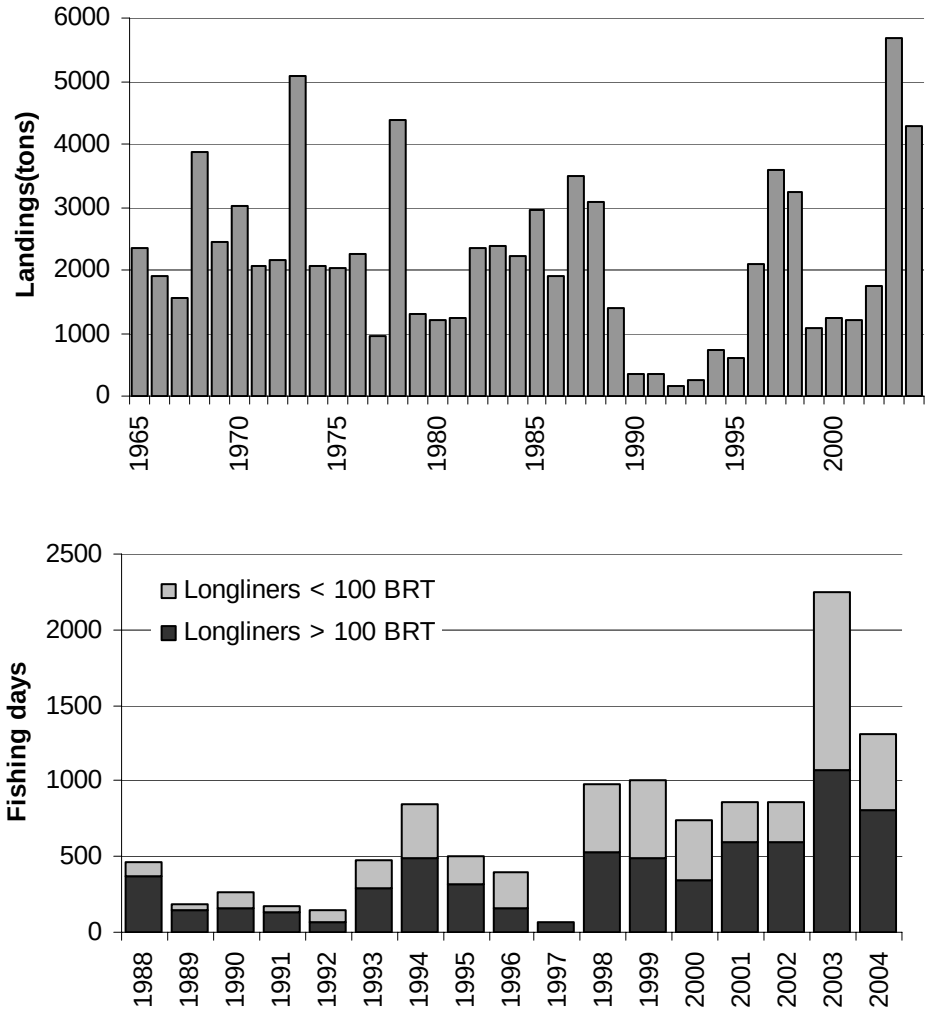


Figure 2.3.1.1. Faroe Bank (sub-division Vb2) cod. Reported landings 1965-2004. Since 1992 only catches from Faroese and Norwegian vessels are considered to be taken on Faroe Bank. Lower plot: fishing days 1988-2004 for long line gear type in the Faroe Bank (exerted).

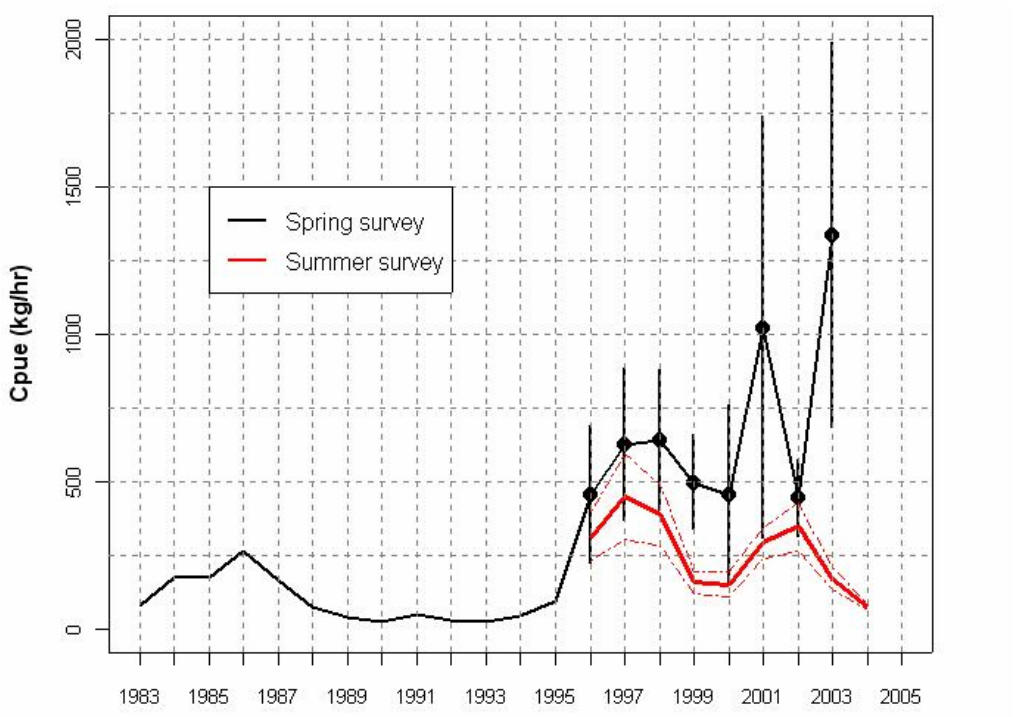


Figure 2.3.2.1. Faroe Bank (sub-division Vb2) cod. Catch per unit of effort in the spring groundfish survey and summer survey.

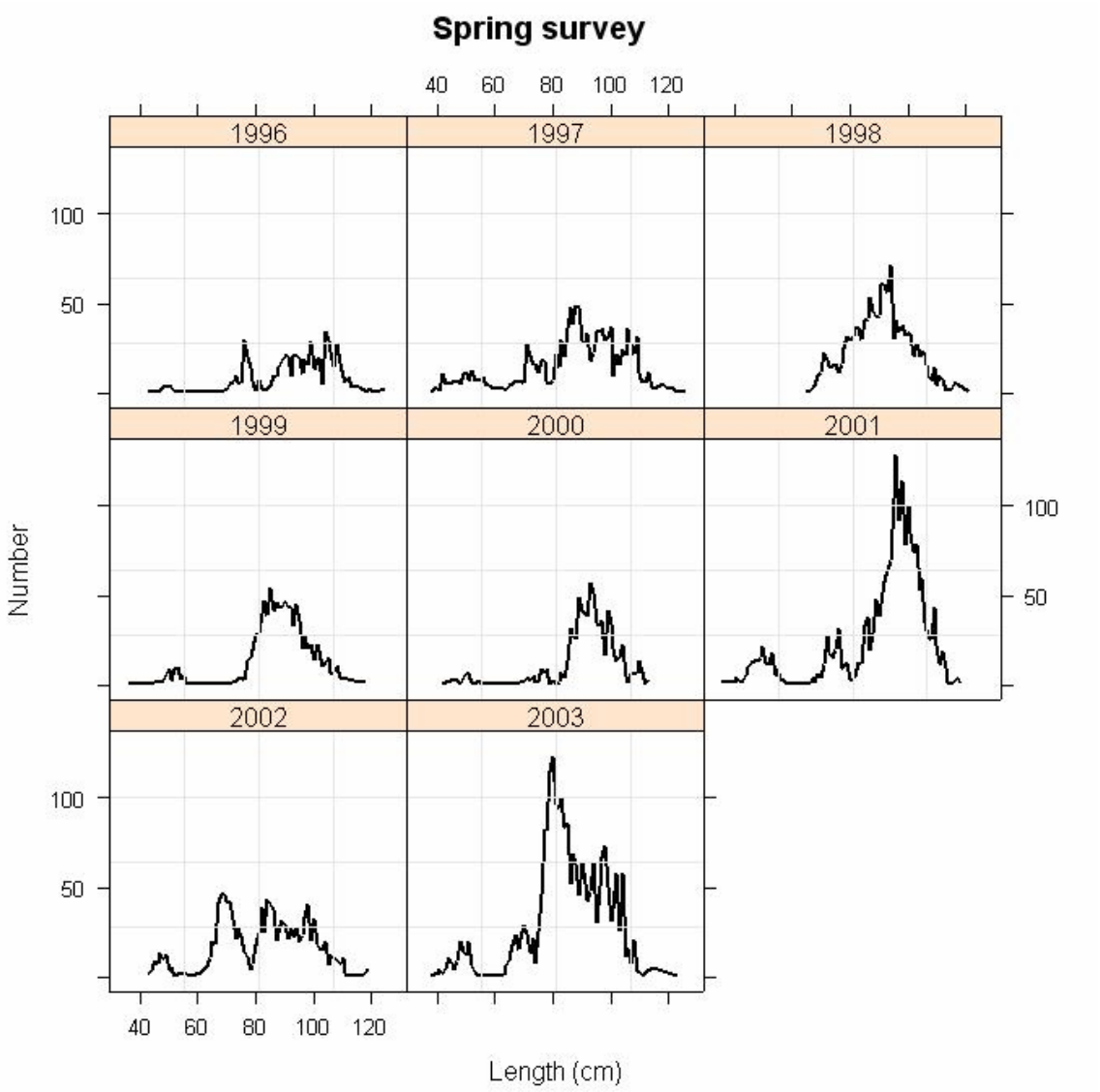


Figure 2.3.2.2. Faroe Bank (sub-division Vb2) cod. Length distributions in the spring survey

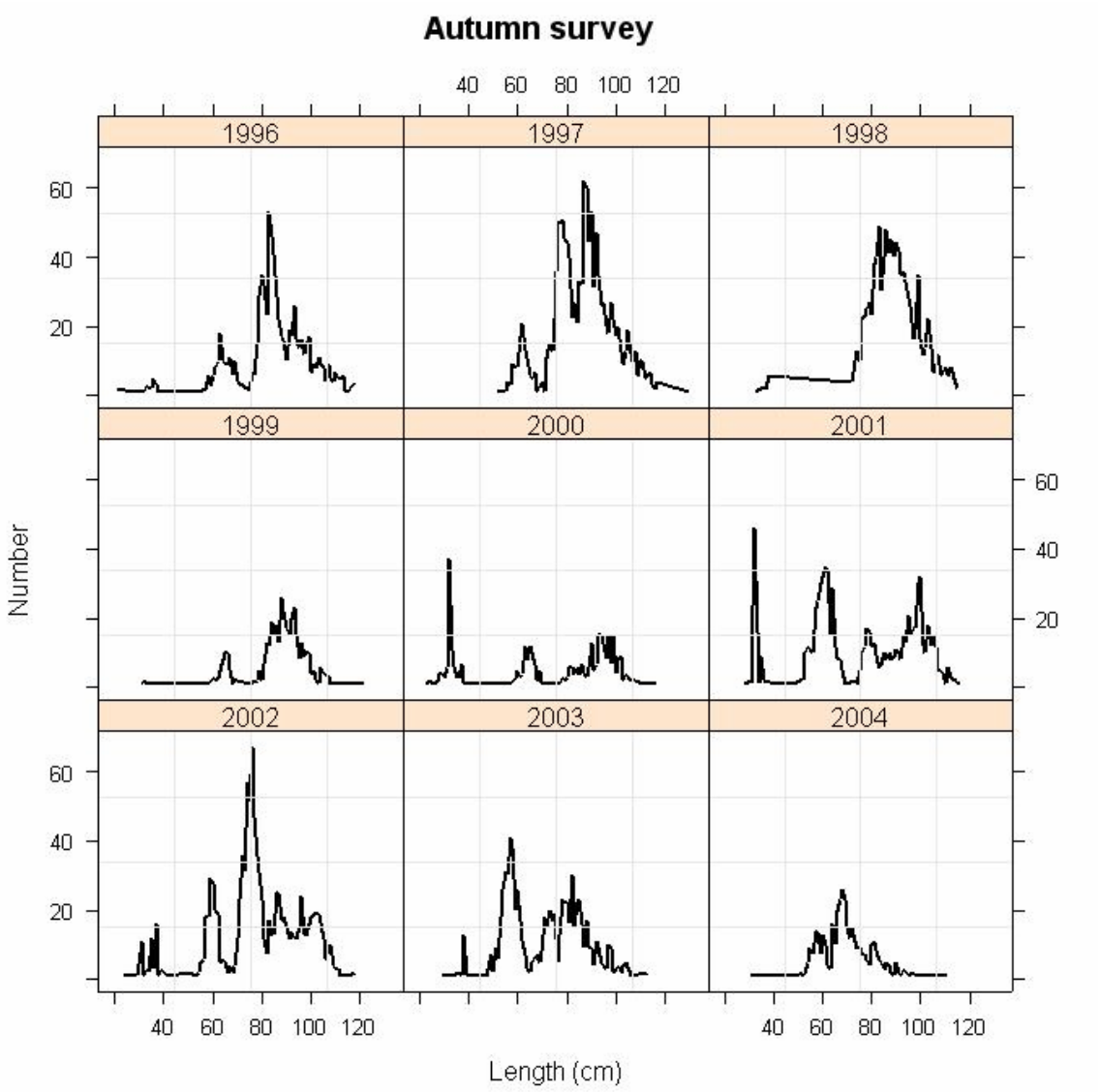


Figure 2.3.2.3. Faroe Bank (sub-division Vb2) cod. Length distributions in the summer survey.

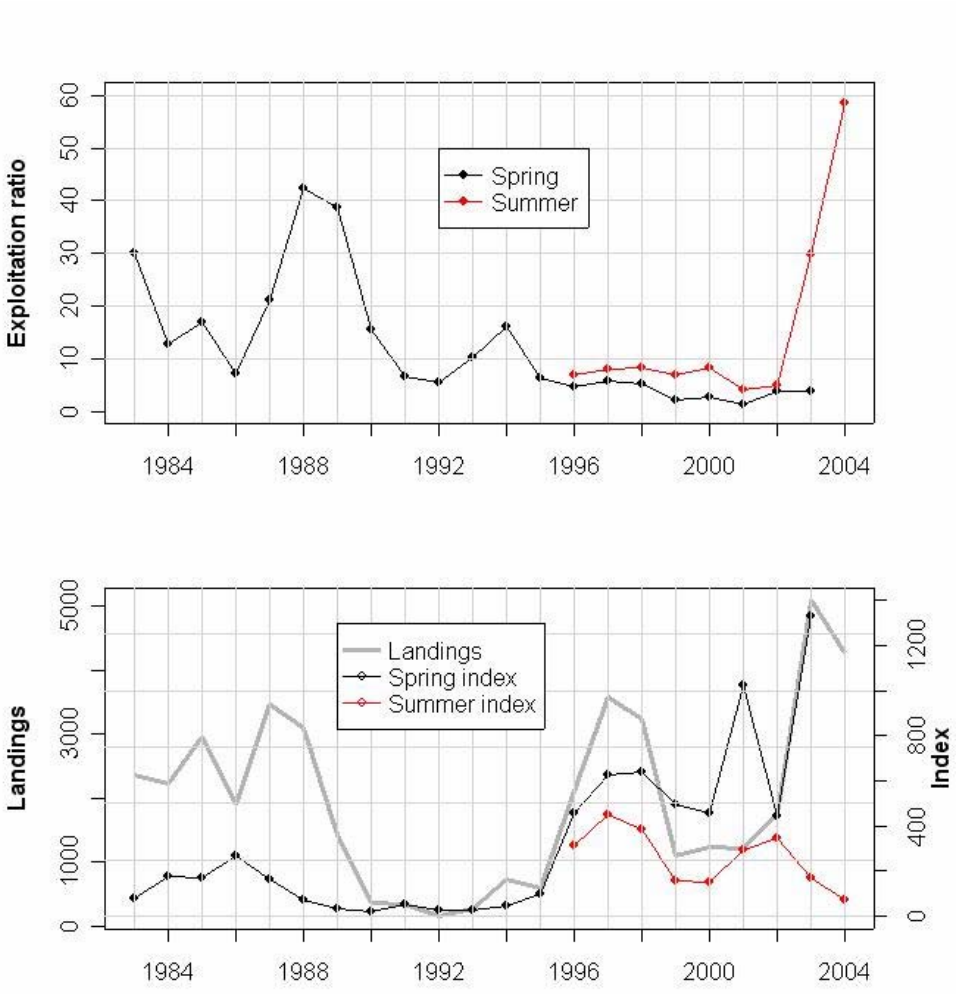


Figure 2.3.2.5. Faroe Bank (Sub-division Vb2) cod. Exploitation ratio (ratio of landings to survey interpreted as an index of exploitation rate). Lower plot: Landings and cpue (kg/hr) in spring and summer survey

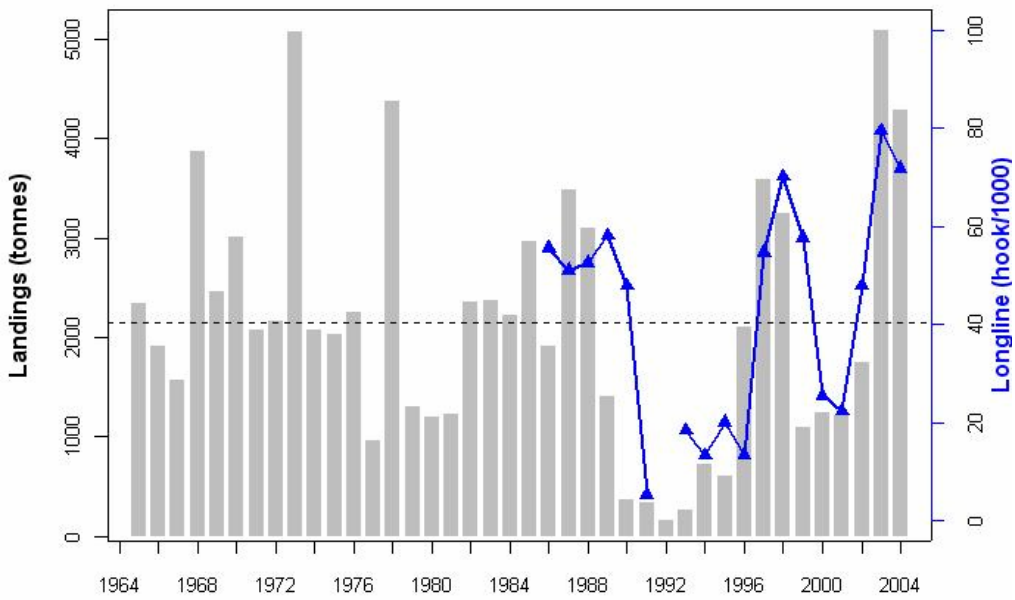


Figure 2.3.2.5. Faroe Bank (sub-division Vb2) cod. Reported landings 1965-2004 and cpue (hook/100) based on logbooks of five longliners.

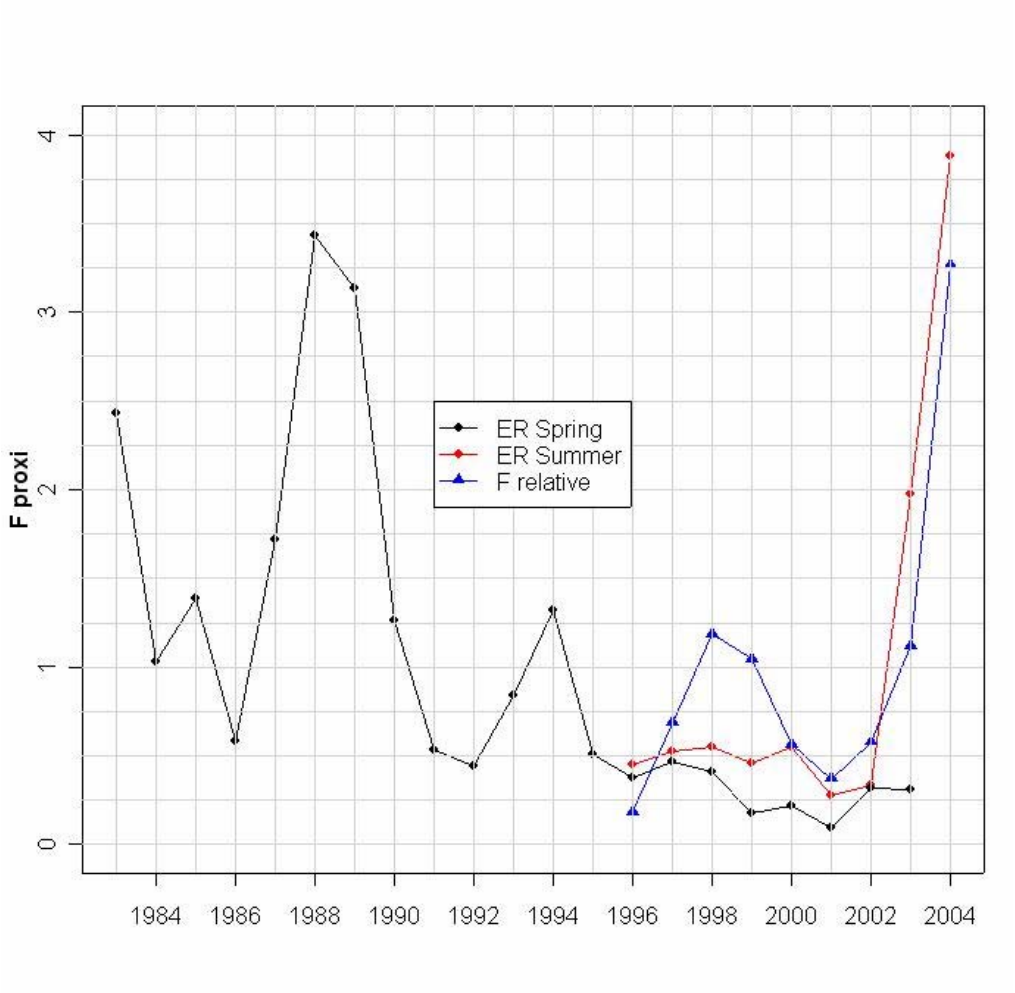


Figure 2.3.2.6. Faroe Bank (Sub-division Vb2) cod. Relation between exploitation ratio (ratio of landings to survey interpreted as an index of exploitation rate) and relative fishing mortality from statistical catch at age

2.4 Faroe Haddock

2.4.1 Introduction

Haddock in Faroese Waters, i.e. ICES Sub-Divisions Vb1 and Vb2 and in the southern part of ICES Division IIa, close to the border of Sub-Division Vb1, are generally believed to belong to the same stock and are treated as one management unit named Faroe haddock. Haddock is distributed all over the Faroe Plateau and the Faroe Bank from shallow water down to more than 450 m. Spawning takes place from late March to the beginning of May with a peak in the middle of April and occurs in several areas on the Faroe Plateau and on the Faroe Bank. Neither does the haddock form as dense spawning aggregations like cod and saithe, nor does it perform ordinary spawning migrations. After spawning, eggs and fry are pelagic for about 4 months over the Plateau and Bank and settling starts in August. This is a prolonged process and pelagic juveniles can be found at least until September. Also during the first years of life they can be pelagic and this vertical distribution seems to be connected to year class strength, with large year classes staying pelagic for a longer time period. No special nursery areas can be found, because young haddock are distributed all over the Plateau and Bank. After settling the haddock is regarded very stationary as seen in tagging experiments. Different growth in different parts of the distribution area as well as a large degree of heterogeneity in genetic investigations support this.

2.4.2 Trends in landings and fisheries

Nominal landings of Faroe haddock have in recent years increased very rapidly from only 4 000 t in 1993 to almost 27 000 t in 2003; the 2004 landings amounted to about 24 000t which is in line with the figure from the short term prediction last year. Most of the landings are taken from the Faroe Plateau, but the landings from the Faroe Bank (Sub-Division Vb2) have in recent years been increasing and were in 2002-2004 at about 4-5 000t (Tables 2.4.1 and 2.4.2). As can be seen from Figure 2.4.1, landings in 2002-2004 reached historical highs. The cumulative landings by month (Figure 2.4.2) suggest that landings are expected to stay high in 2005.

Faroese vessels have taken almost the entire catch in recent years (Figure 2.4.1). Table 2.4.3 shows the Faroese landings since 1985 and the proportion taken by each fleet category. The longliners have been taken most of the catches in recent years followed by the pair trawlers.

The 2004 monthly Faroese landings of haddock by fleet category from Subdivisions Vb1 and Vb2, are shown in Figure 2.4.3. As usual, the landings from the Plateau were high in the first month of the year until the end of the spawning time in April/May, stayed low during the summer and increased again in late autumn. On the Faroe Bank, the monthly landings in 2004 showed almost the same pattern as on the Plateau.

2.4.3 Catch-at-age

For the Faroese landings, catch-at-age data were provided for fish taken from the Faroe Plateau and the Faroe Bank. The sampling intensity in 2004, which has decreased somewhat as compared to 2003 (except for weight measurements which have increased considerable), is shown in the table below.

	OPEN BOATS	LLINERS <100GRT	LLINERS <100GRT	OB TRAWL <400HP	OB TRAWL >400HP	PAIRTRAWL <1000HP	PAIRTRAWL >1000HP	TOTAL
No. of samples	9	71	101	2	17	3	53	256
No. of length measurements	1456	14623	20531	440	3188	602	11525	52365
No. of age measurements	609	1558	2632	60	300	60	1079	6298
No. of weighted fish	60	7419	7349	60	2455	60	1079	18482

As has been the practise in the past, samples from each fleet category were disaggregated by season and then raised by the catch proportions to give the 2004 catch-at-age in numbers for each fleet (Table 2.4.4). Catches of some minor fleets have been included under the "Others" heading. No catch-at-age data were available from other nations fishing in Faroese waters. Therefore, catches by UK and France trawlers were assumed to have the same age composition as Faroese otter board trawlers larger than 1 000 HP. The Norwegian longliners were assumed to have the same age distribution as the Faroese longliners greater than 100 GRT. The most recent data were revised according to the final catch figures. The resulting total catch-at-age in numbers is given in Tables 2.4.4 and 2.4.5, and in Figure 2.4.4 the LN (catch-at-age in numbers) is shown for the whole period of analytical assessments.

In general the catch-at-age matrix in recent years appears consistent, except for the behaviour of a few small year classes, both in numbers and mean weights at age. Also there are some problems with what ages should be included in the plus group; there are some periods where no or only a few fishes are older than 9 years, and other period with a quite substantial plus group (10+). These problems have been addressed in former reports of this WG and will not be further dealt with here, although the plus group in 2003-2004 is large.

No estimates of discards of haddock are available. However, since almost no quotas are used in the management of this stock, the incitement to discard in order to high grade the catches should be low. Moreover there is a ban on discarding.. The landings statistics is therefore regarded as being adequate for assessment purposes.

2.4.4 Weight-at-age

Mean weight-at-age data are provided for the Faroese fishery (Table 2.4.6). Figure shows the mean weights-at-age in the landings for age groups 2-7 since 1976. During the period, weights have shown cyclical changes, and have decreased during the most recent 2-3 years except for age 2 to very low values in 2004). From commercial sampling in Jan-Feb, mean weights for most ages are increasing again in 2005 (Figure 2.4.5B). This increase was also observed in the 2005 spring survey.

The mean weight at age in the stock are assumed equal to those in the landings.

2.4.5 Maturity-at-age

Maturity-at-age data is available from the Faroese Spring Groundfish Surveys 1982–2005. The survey is carried out in February-March, so the maturity-at-age is determined just prior to the spawning of haddock in Faroese waters and the determinations of the different maturity stages is relatively easy.

In order to reduce eventual year-to-year effects due to possible inadequate sampling and at the same time allow for trends in the series, the routine by the WG has been to use a 3-year running average in the assessment. For the years prior to 1982, average maturity-at-age from the

surveys 1982–1995 was adopted (Table 2.4.7 and Figure 2.4.6). The proportion mature for the youngest ages has been declining the last 2-3 years.

2.4.6 Assessment

2.4.6.1 Tuning and estimates of fishing mortality

Commercial cpue series. Several commercial catch per unit effort series are updated every year, but as discussed in previous reports of this WG it is questionable to use them directly for tuning of the VPA due to changes in catchability caused by productivity variations in the area (see Faroe Plateau cod), to a different behaviour of the fleets after the introduction of the new management system and, recently, to the low prices which apparently make fleets try to avoid grounds with high abundances of haddock, especially the younger age groups. The opposite may also happen if prices of haddock become high as compared to other species. However, the age-aggregated cpue series are presented and compared to the present VPA estimates of biomass (Figure 2.4.7). In general there is agreement between the series and the VPA biomass estimates, although in some periods the two series are conflicting.

Fisheries independent cpue series. Two annual groundfish surveys are available, one carried out in February-March since 1982 (100 stations per year down to 500 m depth), and the other in August-September since 1996 (200 stations per year down to 500 m depth). Biomass estimates (kg/hour) are available for both series, age disaggregated data is available for the summer series, but due to problems with the database (see last years report), age disaggregated data for the spring survey are only available since 1994. Figure 2.4.8 shows the cpue indices from the surveys (kg/hour) compared to the VPA estimates of the total exploitable biomass of haddock; in general, there is a good agreement between these series.

Since the Faroe haddock this year is on the update list, it was intended to carry on with the same tuning series as last year, i.e the spring and the summer survey (Table 2.4.8), and to keep the same settings in the XSA (Table 2.4.9). However, survey indices have been updated and revised because not all available data were included previously to construct the ALK-key used to calculate the age disaggregated indices. Moreover, in the spring survey last year the 2003 ALK key was used to calculate the 2004 age disaggregated indices. The 2003 and 2004 indices were also questioned by the ACFM review group last year (see Technical minutes). To illustrate the effect of the revisions, the spaly 2004 XSA was performed using these new indices, and the results are presented in the text table below.

Text table: %-change with revised tuning series:

	R at age 2	Exploit. B	SSB	F (3-7)
2000	-1.6	4.3	7.1	-2.8
2001	11.6	7.9	7.0	0.5
2002	2.6	7.9	8.6	-0.6
2003	10.9	7.7	8.7	1.2

The revised tuning indices all in all produce a more optimistic view of the stock status.

Also the settings in the XSA have been slightly changed (in accordance with the technical minutes from the ACFM Review Group 2004 for Faroe Plateau cod on the use of a power function for the youngest ages). As was the case last year, this years VPA didn't converge (the absolute residual between iterations 49 and 50 was .0002). The use of a power function for the youngest ages was not supported by the statistical diagnostics and a run without power was tried. This time convergence was obtained after 40 iteration and the statistical diagnostics were slightly improved. Since the SE on age 1 in the summer survey was very high this age was omitted in the tuning. Again the statistical diagnostics were slightly improved and the XSA converged in 39 iterations. A comparison between point estimates in the terminal year

from these runs is shown below (and the actual runs can be found in the \personal\jakup folder):

Comparisons of 2005 runs	Recruits age 2	Total BIO	Total SSB	Fbar(3-7)
Spaly prel.	29292	135668	101855	0.3113
Spaly, -power	28718	133093	99781	0.3173
Spaly, - power, - age 1 summersurvey	28964	134250	100749	0.3136

Log q residuals for the two surveys are shown in Figures 2.4.9 and 2.4.10; they are except for some slight differences comparable to those in last years assessment. LN(numbers at age) for the surveys are presented in Figures 2.4.11-2.4.12 and show consistent patterns, especially the summer survey. Further analysis of the performances of the two series are shown in figures 2.4.13 – 2.4.17. In general, although not so convincing for the youngest ages, there is a good relationship between the indices for one year class in two successive years (Figures 2.4.13-2.4.14). The same applies when comparing the corresponding indices at age from the two surveys (Figure 2.4.15) and also when relating the two survey indices at age to this years VPA estimates of the same ages (Figures 2.4.16-2.4.17).

The retrospective pattern of this XSA is shown in Figure 2.4.18. Being in general acceptable, overestimation of fishing mortality and corresponding underestimate of spawning stock biomass is evident in recent years. The retrospective pattern of the fishing mortality is hampered by strange values of some small poorly sampled year classes which in some years are included in the FBAR reference ages (se below).

Results. The fishing mortalities from the final XSA run are given in Table 2.4.10 and in Figure 2.4.22B. According to this the fishing mortality showed an overall decline since the early 1960s and has been estimated to be below or at the natural mortality of 0.2 in several years from the late 1970s. Since 1993 it has been increasing again and in 1998 it was estimated above 0.5, but decreased again to being about 0.3 in 2004.

As discussed in last years report there are problems in using the standard FBAR(3-7) to illustrate fishing mortality on this stock. The main issue here is that some small year classes are so noisy that they deteriorate the arithmetic average of F's ages 3-7. This is illustrated in Figure 2.4.19 with very high fishing mortality on age 8 in 2004 but the number at age is very small. For calculation of reference FBAR(age 3-7) this year it is not a problem but as input for the prediction the default for this stock has been to use last 3 years average unscaled and here these small year classes in some cases will have too big weight in the average F. This problem is not solved by using a weighted FBAR (by pop. numbers) or a proxy for exploitation rate (catch divided by total exploitable biomass) although they seem to be more robust than the arithmetic FBAR (Figure 2.4.20). The main issue is the strange performance of some small year classes; an ad hoc solution could be to simply take them out of the calculation of FBAR. Inspecting recent F's by year class, especially the year classes from 1992 and 1996 create problems and they were consequently taken out from the F matrix. The results of this exercise are shown in Figure 2.4.21.

This will not make the retrospective pattern of F smoother because when going back in time, other small year classes will create noise. For this years assessment, the suggested procedure may be sufficient but in a coming benchmark assessment this needs to be investigated much more in details.

2.4.6.2 Stock estimates and recruitment

Compared to former assessments, the 2000 assessment changed the perception of stock size (and fishing mortality) considerably and this year's assessment is consistent with this. The stock size in numbers is given in Table 2.4.11 and a summary of the VPA with the biomass estimates is given in Tables 2.4.12 and 2.4.18 and in Figure 2.4.22. According to this assessment, the spawning stock biomass has shown big changes in recent years. It decreased from 69 000 t in 1987 to 24 000 t in 1994, increased again to 90 000 t in 1998, decreased to about 60 000 t in 2000 and has increased since to above 115 000 t in 2003; the 2004 point estimate is 101 000t (Figure 2.4.22). The decline in the spawning stock began in the late 1970s due to very poor recruitment in the years before. The stabilization at relatively high SSB's in the mid–1980s was due to the relatively good 1982 and 1983 year classes, but the decline since was partly due to poor year classes since the mid–1980s, as well as the pronounced decline in the mean weights-at-age in the stock. The main reason for the very abrupt increase in the spawning stock biomass is the recruitment and growth of the very large 1993 year class and the well-above-average 1994 year class. The most recent increase in the spawning stock is due to new strong year classes entering the fishery of which the 1999 year class is the highest on record. In the past there have been considerable doubts about the sizes of incoming year classes. Due to the lack of reliable recruitment indices it has been usual to replace XSA estimates with the geometric mean of a reference periods recruitments at age 2. With the presence of two survey series and inclusion of indices from them for ages outside the commercial catch at age the information on incoming year classes has improved; as last year it was not felt worthwhile to repeat the use of RCT3 for this purpose since the same information is derived directly from the XSA. The 1999 YC is now confirmed being the highest on record at age 2 (126 mio.), the YC's from 2000 and 2001 are estimated above average and the 2002 YC slightly below average, Tables 2.4.12, 2.4.18 and Figure 2.4.22.

2.4.7 Prediction of catch and biomass

2.4.7.1 Input data

2.4.7.1.1 Short-term prediction

The input data for the short-term predictions are given in Tables 2.4.13-14. All year classes up to 2003 are from the final VPA, the 2004-2005 year classes at age 2 are estimated from the XSA at ages 0 and 1 and applying a natural mortality of 0.2 in a forward calculation of the numbers using basic VPA equations. The YC 2005 at age 2 in 2007 is estimated as the geometric mean of the 2-year-olds in 1980-2005.

The exploitation pattern used in the prediction was derived from averaging the 2002–2004 fishing mortality matrices from the final VPA without rescaling to the recent value and omitting the 1996 year class as explained above (1.4.6.1). This is in line with what was done last year when the same effect was obtained by using years without the noisy year classes in the average. The same exploitation pattern was used for all three years.

The mean weight-at-age for ages 2-10 in 2005-2007 was calculated as last year using the cohort approach as described in the 2003 WG report. The weights at age in 2004 were used as starting points. By inspecting the weights at age 2 for recent years (Figure 2.4.5), they appear very stable and the weight at age 2 in year 2004 were assumed for all the years. Then the remaining weights at age were derived by adding the corresponding Geometric mean growth for each cohort age a to age a+1. The mean weights for the +group in 2004 was also applied in 2005-2007. The same weights-at-age were used for the catch and for the stock as was done in the assessment.

The maturity ogive for 2005 is based on samples from the Faroese Groundfish Spring Survey 2005 and the ogives in 2006-2007 are estimated as the average of the smoothed 2003-2005 values.

2.4.7.1.2 Long-term Prediction

The input data for the long-term yield and spawning stock biomass (yield-per-recruit calculations) are listed in Table 2.4.16. Mean weights-at-age (stock and catch) are averages for the 1977–2004 period. The maturity ogives are averages for the years 1982-2004. The exploitation pattern is the same as in the short term prediction.

2.4.7.2 Biological reference points

The yield- and spawning stock biomass per recruit (age 2) based on the long-term data are shown in Table 2.4.17 and Figure 2.4.21. $\mathbf{F}_{max}$ and $\mathbf{F}_{0.1}$ are indicated here as 0.52 and 0.19, respectively. From Figure 2.4.20, showing the recruit/spawning stock relationship, and from Table 2.4.17, $\mathbf{F}_{med}$, and $\mathbf{F}_{high}$ were calculated at 0.30 and 1.44, respectively.

In previous assessments of this stock the Minimum Biological Acceptable Limit (MBAL) was set at 40 000 t because the occurrence of good recruitment was considerably higher when the spawning stock biomass is above this value (Figure 2.4.23) and ACFM established $\mathbf{B}_{lim}$ = 40 000 t. In the 1998 assessment, the $\mathbf{B}_{pa}$ was calculated as the value lying 2 standard deviations above $\mathbf{B}_{lim}$, that is 65 000 t. By examining among other things the SSB-R plot, ACFM instead proposed $\mathbf{B}_{pa}$ = 55 000 t. The reference point $\mathbf{F}_{pa}$ was proposed by ACFM as the $\mathbf{F}_{med}$ value of 0.25. The $\mathbf{F}_{lim}$ is defined being two standard deviations above $\mathbf{F}_{pa}$ and was set by ACFM at 0.40. The SG on Precautionary Reference Points for Advice on Fishery Management (SGPRP – February 2003) suggested that B_{lim} for Faroe haddock could be decreased to 20 000t, considering that two strong year classes have been produced at SSB below $\mathbf{B}_{lim}$. The Working Group last year considered it premature to change $\mathbf{B}_{lim}$ at that time. Of the 5 year classes produced at SSB below $\mathbf{B}_{lim}$, three were very small, and two strong. The strong year classes are believed to be due to favourable environmental conditions, and there are no guarantee that similarly good environmental conditions would occur again should the SSB decrease below $\mathbf{B}_{lim}$.

This year the NWWG has analysed existing reference points (see 2.1.6). The addition of new stock and recruitment pairs since the original analysis in 1998 clearly indicates that B_{lim} is likely to be lower than the existing value. Segmented regressions done for the SGPRP 2003 indicate a breaking point in the order of 23 000t. The 2005 NWWG suggest that the new B_{lim} for Faroe haddock be set at 23 000t.

2.4.7.3 Projections of catch and biomass

2.4.7.3.1 Short-term prediction

In the light of the performance of the new management system, it is not unrealistic to assume fishing mortalities in 2005 as the average of some recent years, here the unscaled average of F(2002-2004); however, possible changes in the catchability of the fleets (which seem to be linked to productivity changes in the environment) could undermine this assumption. The fleet is almost the same and the number of fishing days per fleet was only reduced by 1.5% for the fishing year 1 Sept 2004 – 31 Aug 2005. The landings in 2005 are then predicted to be about 28 500 t (highest on record), and continuing with this fishing mortality will result in 2006 landings of about 22 000 t. The SSB will decrease to 97 000 t in 2005, 77 000 t in 2006, and to 57 000 t in 2007. The results of the short-term prediction are shown in Table 2.4.15 and in Figure 2.4.21.

2.4.8 Medium-term projections

Medium-term projections have been made using the the ADAPT results from last year, the USA National Marine Fisheries Service NFT SRFIT software and the Fish Lab software (see 2.1.6).

2.4.9 Management considerations

Since management of haddock also need to take into account measures for cod and saithe, management considerations are given in Chapter 1.2 for all 3 stocks.

2.4.10 Comments on the assessment

As explained in 3.4.6.1, the tuning files this year have been revised and one of the settings of XSA changed, but this did not result in any major differences as compared to last years assessment. By updating the input files with the newest information, following changes in the 2003 estimates were observed as compared to last year:

ASSESSMENT YEAR	RECRUITMENT AGE 2	EXPLOITABLE BIOMASS	SPAWNING STOCK BIOMASS	FISHING MORTALITY (F_{3-7})
2004	20 000 000	122 000 t	96 000 t	0.48
2005	36 000 000	153 000 t	115 000 t	0.40

Since the 2003 estimate of recruitment in this years assessment is higher and the fishing mortalities considerable smaller, the perception of stock status now is more optimistic.

As in 2004, the ADAPT component of the assessment toolbox developed by the USA National Marine Fisheries Service (*http://nft.nefsc.noaa.gov/*) has been systematically applied to the main stocks in the Faroes (Faroe Plateau cod, haddock and saithe). One of the objectives of the exercise was to use the bootstrap feature of the toolbox to evaluate the uncertainties in the assessment. A second objective was to compare the absolute estimates obtained with the two assessment methods, using similar data and assumptions.

Figure 2.4.25 shows the time trends in recruitment, SSB and fishing mortality of ADAPT calibrations as compared to the accepted 2005 XSA as well as the stock in numbers in 2005. In general, both methods are producing similar estimates for R, SSB and stock in numbers whereas there are some differences in the F estimates with ADAPT producing somewhat higher values. The role of the small year classes in calculations of FBAR are similar in the two methods. In the figure, 3 different weightings of the FBAR are shown, producing much lower values in recent years than the arithmetic average F(3-7).

Figure 2.4.26 shows the F and SSB's from a 1000 bootstraps of the ADAPT. The figure also shows the F and SSB from the XSA assessment. F in both methods is the FBAR weighted with stock numbers. The XSA results fall almost in the middle of the cloud of bootstrapped ADAPT results.

Figure 2.4.27 shows the retrospective pattern of the ADAPT. It is comparable with the XSA retro.

Although some time was spent examining model diagnostics, a more careful examination would be necessary if this approach were the main basis for providing advice. ADAPT, as implemented in the NMFS Toolbox, provides few knobs to tweak. Therefore the changes in assessment results from year to year are likely to results from changes in the data (or selection of data) rather than in changing the settings of the assessment software.

Table 2.4.1 Faroe Plateau (Sub-division Vb1) HADDOCK. Nominal catches (tonnes) by countries 1982-2004, as officially reported to ICES , and the total Working Group estimate in Vb.

Country	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Denmark	-	-	-	-	1	8	4	-	-	-	4,655	
Faroe Islands	10,319	11,898	11,418	13,597	13,359	13,954	10,867	13,506	11,106	8,074	164	3,622
France[1]	2	2	20	23	8	22	14	-	-	-	-	-
Germany	1	+	+	+	1	1	-	+	+	+		-
Norway	12	12	10	21	22	13	54	111	94	125	71	28
UK (Engl. and Wales)	-	-	-	-	-	2	-	-	7	-	54	81
UK (Scotland)[3]	1	-	-	-	-	-	-	-	-	-	-	-
United Kingdom												
Total	10,335	11,912	11,448	13,641	13,391	14,000	10,939	13,617	11,207	8,199	4,944	3,731
Working Group estimate[4,8]	11,937	12,894	12,378	15,143	14,477	14,882	12,178	14,325	11,726	8,429	5,476	4,026

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 [2]
Faroe Islands	3,675	4,549	9,152	16,585	19,135	16,643		13,821	21,337	22,199	19,184
France[1]					2 [2]	- [2]	6	8 [5]	2	4	1
Germany		5	-	-		33	1	2	6	1	6
Greenland											
Iceland									4		
Norway	22	28	45	45 [2]	71	411	355	257 [2]	227 [2]	292	229
UK (Engl. and Wales)	31	23	5	22	30 [1]	59 [5]	19 [5]	4 [5]	11 [5]	14 [5]	
UK (Scotland)[11]	-	-	…	…	…						
United Kingdom											201 [5]
Total	3,728	4,605	9,202	16,652	19,238	17,146	381	14,092	21,587	22,510	19,621
Working Group estimate[4,8,9]	4,252	4,948	9,642	17,924	22,210	18,482	15,821	15,890	25,011	26,970	23,811

1) Including catches from Sub-division Vb2. Quantity unknown 1989-1991, 1993 and 1995-2001.

2) Preliminary data

3)From 1983 to 1996 catches included in Sub-division Vb2.

4) Includes catches from Sub-division Vb2 and Division IIa in Faroese waters.

5) Reported as Division Vb.

6) Included in Vb2

7) Includes 14 reported as Vb

8)Includes French and Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service

9) Includes Faroese landings reported to the NWWG by the Faroese Fisheries Laboratory

Table 2.4.2 Faroe Bank (Sub-division Vb2) HADDOCK. Nominal catches (tonnes) by countries, 1982-2004, as officially reported to ICES, and the total Working Group estimate in Vb2.

Country	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Faroe Islands	1,533	967	925	1,474	1,050	832	1,160	659	325	217	338	185
France[1]	-	-	-	-	-	-	-	-	-	-	-	-
Norway	1	2	5	3	10	5	43	16	97	4	23	8
UK (Engl. and Wales)	-	-	-	-	-	-	-	-	-	-	+	+
UK (Scotland)[3]	48	13	+	25	26	45	15	30	725	287	869	102
Total	1,582	982	930	1,502	1,086	882	1,218	705	1,147	508	1,230	295

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004 [2]
Faroe Islands	353	303	338	1,133	2,810	1,110		2,001	3,878	4,934	4,804
France[1]	-	-	-	-							
Norway	1	1	40	4	60	3	48	66	28	55	17
UK (Engl. and Wales)	+	... [1]	… [1]	… [1]	… [1]	[1]	[1]	[1]	[1]	[1]	[1]
UK (Scotland)[3]	170	39	62	135	102	193	185	148	177 [4]	185 [4]	[1]
Total	524	343	440	1,272	2,972	1,306	233	2,215	4,083	5,174	4,821

1) Catches included in Sub-division Vb1.

2) Provisional data

3)From 1983 to 1996 includes also catches taken in Sub-division Vb1 (see Table 2.4.1)

4) Reported as Division Vb.

Table 2.4.3 Total Faroese landings of haddock from Division Vb 1985-2004 and the contribution (%) by each fleet category (metier). Total catch in this table may deviate from official landings.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Open boats	7	7	11	2	3	2	3	2	1	1	1	2	2	2	2	1	2	3	4	4
Longliners < 100GRT	39	39	39	49	58	60	56	46	24	18	23	28	31	30	23	24	29	31	34	40
Longliners > 100GRT	13	12	13	19	18	18	18	22	25	25	38	36	38	40	40	36	38	34	42	42
Otterboard trawlers < 400HP	1	2	2	2	1	1	2	2	8	8	7	6	3	2	2	4	2	2	1	1
Otter board trawlers 400-999HP	6	3	5	4	3	3	1	1	3	2	5	7	6	6	5	5	5	4	3	2
Otterboard trawlers > 1000HP	8	5	2	2	2	2	2	1	1	3	2	2	3	3	7	5	5	11	3	1
Pairtrawlers < 1000HP	19	20	17	11	7	5	7	11	13	10	8	7	6	5	6	7	6	4	4	2
Pairtrawlers > 1000HP	6	10	9	9	6	8	11	14	22	29	16	13	12	12	14	19	12	10	8	7
Nets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jigging	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	1	2	1	1
Other gears	0	1	1	2	1	1	1	1	3	3	0	0	0	0	0	0	0	0	0	0
Total catch, tonnes gutted	13570	12967	13829	10697	12866	10319	7469	4103	3275	3629	4371	8535	15890	19669	16062	13881	13555	21842	22516	19396

Table 2.4.4 **Haddock in ICES Division Vb 2004**
Catch at age in numbers by fleet category

Age	Vb1 Open Boats	Vb1 LLiners < 100GRT	Vb1 LLiners > 100GRT	Vb1 OB. trawl. < 400HP	Vb1 OB. trawl. 400-999HP	Vb1 OB. trawl. > 1000HP	Vb1 Pair trawl. < 1000HP	Vb1 Pair trawl. > 1000HP	Vb 1 Others	Vb1 All Faroese Fleets	Vb2 All Faroese LLiners	Vb2 All Faroese Pairtrawlers	Vb2 Others	Vb2 All Faroese Fleets
1	0	0	2	0	0	0	0	0	0	3	0	0	0	0
2	4	69	21	0	0	0	1	2	9	108	104	28	10	141
3	62	625	256	6	15	7	19	46	177	1157	660	182	49	891
4	172	1850	1506	34	57	31	78	210	486	4398	333	95	18	446
5	358	3442	3130	77	112	72	177	501	865	8782	1301	384	45	1730
6	50	388	434	8	12	6	16	42	103	1067	79	23	3	106
7	19	162	139	2	5	1	6	13	39	387	20	6	0	27
8	2	19	24	0	1	1	3	9	9	66	19	6	0	25
9	3	32	69	0	1	0	2	5	14	126	31	9	2	41
10	11	154	142	1	2	1	3	9	33	360	38	12	1	51
11	11	150	161	1	3	1	3	7	39	376	26	8	1	34
12	0	1	0	0	0	0	0	0	0	2	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total no.	691	6892	5884	129	207	119	309	844	1774	16833	2611	751	129	3491
Catch, t.	679	6652	5963	114	191	106	285	772	1721	16484	3413	986	160	4559

Notes: Numbers in 1000'
Catch, gutted weight in tonnes
Others includes netters, jiggers, other small categories and catches not otherwise accounted for
LLiners = Longliners OB.trawl. = Otterboard trawlers Pair Trawl. = Pair trawlers

Table 2.4.5 Faroe Haddock. Catch number-at-age.

```
   Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD1_IND
    At 16/04/2005  14:27

       Table  1    Catch numbers at age                      Numbers*10**-3
       YEAR,       1961,    1962,    1963,    1964,
       AGE
         0,           0,       0,       0,       0,
         1,           0,       0,       0,       0,
         2,        7932,    9631,   13552,    2284,
         3,        7330,   13977,    8907,    7457,
         4,        5134,    5233,    7403,    3899,
         5,        1937,    2361,    2242,    2360,
         6,        1305,    1407,    1539,    1120,
         7,         838,     868,     860,     728,
         8,         236,     270,     257,     198,
         9,          59,      72,      75,      49,
       +gp,           0,       0,       0,       0,
0    TOTALNUM,    24771,   33819,   34835,   18095,
     TONSLAND,    20831,   27151,   27571,   19490,
     SOPCOF %,       89,      90,      90,     101,

       Table  1    Catch numbers at age                         Numbers*10**-3
       YEAR,       1965,    1966,    1967,    1968,    1969,    1970,    1971,    1972,    1973,    1974,
       AGE
         0,           0,       0,       0,       0,       0,       0,       0,       0,       0,       0,
         1,           0,       0,       0,       0,       0,       0,       0,       0,       0,       0,
         2,        1368,    1081,    1425,    5881,    2384,    1728,     717,     750,    3300,    5633,
         3,        4286,    3304,    2405,    4097,    7539,    4855,    4393,    3744,    8388,    2899,
         4,        5133,    4804,    2599,    2812,    4567,    6581,    4727,    4179,    1236,    3970,
         5,        1443,    2710,    1785,    1524,    1565,    1624,    3267,    2706,    2786,     451,
         6,        1209,    1112,    1426,    1526,    1485,    1383,    1292,    1171,     916,     976,
         7,         673,     740,     631,     923,    1224,    1099,     864,     696,    1051,     466,
         8,        1345,     180,     197,     230,     378,     326,     222,     180,     150,     535,
         9,          43,      54,      52,      68,     114,      68,     147,     113,      68,      68,
       +gp,           0,       0,       0,       0,       0,       0,       0,       0,      11,     147,
0    TOTALNUM,    15500,   13985,   10520,   17061,   19256,   17664,   15629,   13539,   17906,   15145,
     TONSLAND,    18479,   18766,   13381,   17852,   23272,   21361,   19393,   16485,   17976,   14773,
     SOPCOF %,       94,      109,     102,     103,     108,     103,      99,      98,      98,      97,

      Table  1    Catch numbers at age                         Numbers*10**-3
       YEAR,       1975,    1976,    1977,    1978,    1979,    1980,    19881,    1982,    1983,    1984
       AGE
         0,           0,       0,       0,       0,       0,       0,       0,       0,       0,       0,
         1,           0,       0,       0,       0,       0,       0,       0,       0,       0,       0,
         2,        7337,    4396,     255,      32,       1,     143,      74,     539,     441,    1195,
         3,        7952,    7858,    4039,    1022,    1161,      58,     455,     934,    1969,    1561,
         4,        2097,    6798,    5168,    4248,    1754,    3724,     202,     784,     383,    2462,
         5,        1371,    1251,    4918,    4054,    3341,    2583,    2586,     298,     422,     147,
         6,         247,    1189,    2128,    1841,    1850,    2496,    1354,    2182,      93,     234,
         7,         352,     298,     946,     717,     772,    1568,    1559,     973,    1444,      42,
         8,         237,     720,     443,     635,     212,     660,     608,    1166,     740,     861,
         9,         419,     258,     731,     243,     155,      99,     177,    1283,     947,     388,
       +gp,         187,     318,     855,     312,      74,      86,      36,     214,     795,     968,
0    TOTALNUM,    20199,   23086,   19483,   13104,    9320,   11417,    7051,    8373,    7234,    7858,
     TONSLAND,    20715,   26211,   25555,   19200,   12418,   15016,   12233,   11937,   12894,   12378,
     SOPCOF %,      117,     107,      98,      99,     104,     100,     109,      92,     106,     106,

 Table  1    Catch numbers at age                        Numbers*10**-3
       YEAR,       1985,    1986,    1987,    1988,    1989,    1990,    1991,    1992,    1993,    1994,
       AGE
         0,           0,       0,       0,       0,       0,       0,       0,       0,       0,       0,
         1,           0,       0,       0,       0,       0,       0,       0,       0,       0,       0,
         2,         985,     230,     283,     655,      63,     105,      77,      40,     113,     277,
         3,        4553,    2549,    1718,     444,    1518,    1275,    1044,     154,     298,     191,
         4,        2196,    4452,    3565,    2463,     658,    1921,    1774,     776,     274,     307,
         5,        1242,    1522,    2972,    3036,    2787,     768,    1248,    1120,     554,     153,
         6,         169,     738,    1114,    2140,    2554,    1737,     651,     959,     538,     423,
         7,          91,      39,     529,     475,    1976,    1909,    1101,     335,     474,     427,
         8,          61,     130,      83,     151,     541,     885,     698,     373,     131,     383,
         9,         503,      71,      48,      18,     133,     270,     317,     401,     201,     125,
       +gp,         973,     712,     334,     128,      81,     108,      32,     162,     185,     301,
0    TOTALNUM,    10773,   10443,   10646,    9510,   10311,    8978,    6942,    4320,    2768,    2587,
     TONSLAND,    15143,   14477,   14882,   12178,   14325,   11726,    8429,    5476,    4026,    4252,
     SOPCOF %,      106,     101,     102,      97,     100,     102,     106,     106,     104,     100,
```

Table 2.4.5 (cont.) Faroe Haddock. Catch number-at-age.

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

Table 2.4.5 (Con'd)

	YEAR,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,	2003,	2004,
	AGE										
	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
	1,	0,	0,	0,	0,	0,	0,	0,	0,	0,	0,
	2,	804,	326,	77,	106,	174,	1461,	4380,	1520,	133,	251,
	3,	452,	5234,	2913,	1055,	1142,	3061,	3128,	14083,	3423,	2069,
	4,	235,	1019,	10517,	5269,	942,	210,	2423,	2888,	13599,	4950,
	5,	226,	179,	710,	9856,	4677,	682,	173,	1203,	2216,	10747,
	6,	132,	163,	116,	446,	6619,	2685,	451,	133,	946,	1198,
	7,	295,	161,	123,	99,	226,	2846,	1151,	240,	162,	421,
	8,	290,	270,	93,	87,	26,	79,	1375,	846,	333,	92,
	9,	262,	234,	220,	95,	20,	1,	17,	1099,	855,	171,
	+gp,	295,	394,	516,	502,	192,	71,	18,	34,	930,	836,
0	TOTALNUM,	2991,	7980,	15285,	17515,	14018,	11096,	13116,	22046,	22597,	20735,
	TONSLAND,	4948,	9642,	17924,	22210,	18482,	15821,	15890,	25011,	26970,	23811,
	SOPCOF %,	103,	100,	103,	101,	100,	104,	100,	100,	100,	99,

Table 2.4.6 Faroe Haddock. Catch weight-at-age.

```
Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD1_IND

At 16/04/2005  14:27

   Table  2    Catch weights at age (kg)
   YEAR,       1961,    1962,    1963,    1964,
   AGE
     0,        .0000,   .0000,   .0000,   .0000,
     1,        .0000,   .0000,   .0000,   .0000,
     2,        .4700,   .4700,   .4700,   .4700,
     3,        .7300,   .7300,   .7300,   .7300,
     4,       1.1300,  1.1300,  1.1300,  1.1300,
     5,       1.5500,  1.5500,  1.5500,  1.5500,
     6,       1.9700,  1.9700,  1.9700,  1.9700,
     7,       2.4100,  2.4100,  2.4100,  2.4100,
     8,       2.7600,  2.7600,  2.7600,  2.7600,
     9,       3.0700,  3.0700,  3.0700,  3.0700,
   +gp,       3.5500,  3.5500,  3.5500,  3.5500,
0    SOPCOFAC,     .8938,   .9011,   .8964,  1.0131,


   Table  2    Catch weights at age (kg)
   YEAR,       1965,    1966,    1967,    1968,    1969,    1970,    1971,    1972,    1973,    1974,
   AGE
     0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     2,        .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,   .4700,
     3,        .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,   .7300,
     4,       1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,  1.1300,
     5,       1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,  1.5500,
     6,       1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,  1.9700,
     7,       2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,  2.4100,
     8,       2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,  2.7600,
     9,       3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,  3.0700,
   +gp,       3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,  3.5500,
0    SOPCOFAC,     .9401,  1.0920,  1.0166,  1.0278,  1.0835,  1.0274,   .9874,   .9795,   .9776,   .9718,


   Table  2    Catch weights at age (kg)
   YEAR,       1975,    1976,    1977,    1978,    1979,    1980,    1981,    1982,    1983,    1984,
   AGE
     0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     2,        .4700,   .4700,   .3110,   .3570,   .3570,   .6430,   .4520,   .7000,   .4700,   .6810,
     3,        .7300,   .7300,   .6330,   .7900,   .6720,   .7130,   .7250,   .8960,   .7400,  1.0110,
     4,       1.1300,  1.1300,  1.0440,  1.0350,   .8940,   .9410,   .9570,  1.1500,  1.0100,  1.2550,
     5,       1.5500,  1.5500,  1.4260,  1.3980,  1.1560,  1.1570,  1.2370,  1.4440,  1.3200,  1.8120,
     6,       1.9700,  1.9700,  1.8250,  1.8700,  1.5900,  1.4930,  1.6510,  1.4980,  1.6600,  2.0610,
     7,       2.4100,  2.4100,  2.2410,  2.3500,  2.0700,  1.7390,  2.0530,  1.8290,  2.0500,  2.0590,
     8,       2.7600,  2.7600,  2.2050,  2.5970,  2.5250,  2.0950,  2.4060,  1.8870,  2.2600,  2.1370,
     9,       3.0700,  3.0700,  2.5700,  3.0140,  2.6960,  2.4650,  2.7250,  1.9610,  2.5400,  2.3680,
   +gp,       3.5500,  3.5500,  2.5910,  2.9200,  3.5190,  3.3100,  3.2500,  2.8560,  3.0400,  2.6860,
0    SOPCOFAC,    1.1712,  1.0746,   .9784,   .9947,  1.0380,  1.0017,  1.0870,   .9238,  1.0554,  1.0602,


   Table  2    Catch weights at age (kg)
   YEAR,       1985,    1986,    1987,    1988,    1989,    1990,    1991,    1992,    1993,    1994,
   AGE
     0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
     2,        .5280,   .6080,   .6050,   .5010,   .5800,   .4380,   .5470,   .5250,   .7550,   .7540,
     3,        .8590,   .8870,   .8310,   .7810,   .7790,   .6990,   .6930,   .7240,   .9820,  1.1030,
     4,       1.3910,  1.1750,  1.1260,   .9740,   .9230,   .9390,   .8840,   .8170,  1.0270,  1.2540,
     5,       1.7770,  1.6310,  1.4620,  1.3630,  1.2070,  1.2040,  1.0860,  1.0380,  1.1920,  1.4650,
     6,       2.3260,  1.9840,  1.9410,  1.6800,  1.5640,  1.3840,  1.2760,  1.2490,  1.3780,  1.5930,
     7,       2.4400,  2.5190,  2.1730,  1.9750,  1.7460,  1.5640,  1.4770,  1.4300,  1.6430,  1.8040,
     8,       2.4010,  2.5830,  2.3470,  2.3440,  2.0860,  1.8180,  1.5740,  1.5640,  1.7960,  2.0490,
     9,       2.5320,  2.5700,  3.1180,  2.2480,  2.4240,  2.1680,  1.9300,  1.6330,  1.9710,  2.2250,
   +gp,       2.6860,  2.9220,  2.9330,  3.2950,  2.5140,  2.3350,  2.1530,  2.1260,  2.2400,  2.4230,
0    SOPCOFAC,    1.0559,  1.0141,  1.0197,   .9695,  1.0025,  1.0195,  1.0635,  1.0554,  1.0361,   .9969,
```

Table 2.4.6 (cont.) Faroe Haddock. Catch weight-at-age.

```
   Table  2    Catch weights at age (kg)
```

Table 2.4.6 (Cont'd)

	YEAR,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,	2003,	2004,
	AGE										
	0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
	1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
	2,	.6660,	.5340,	.5190,	.6220,	.5040,	.6610,	.6080,	.5840,	.5710,	.5740,
	3,	1.0540,	.8580,	.7710,	.8460,	.6240,	.9360,	.9400,	.8570,	.7150,	.7700,
	4,	1.4890,	1.4590,	1.0660,	1.0160,	.9740,	1.1660,	1.3740,	1.4050,	1.0080,	.8870,
	5,	1.7790,	1.9930,	1.7990,	1.2830,	1.2200,	1.4830,	1.7790,	1.7990,	1.5370,	1.1590,
	6,	1.9400,	2.3300,	2.2700,	2.0800,	1.4900,	1.6160,	1.9710,	1.9740,	1.9110,	1.6380,
	7,	2.1820,	2.3510,	2.3400,	2.5560,	2.4560,	1.8930,	2.1190,	2.3010,	2.0910,	1.8700,
	8,	2.3570,	2.4690,	2.4750,	2.5720,	2.6580,	2.8210,	2.3730,	2.3700,	2.3010,	2.4380,
	9,	2.4900,	2.7770,	2.5010,	2.4520,	2.5980,	3.7490,	2.7500,	2.6260,	2.4060,	2.3570,
	+gp,	2.6780,	2.5820,	2.6760,	2.7530,	2.9530,	3.1960,	3.9660,	3.1300,	2.5350,	2.4170,
0	SOPCOFAC,	1.0331,	1.0043,	1.0250,	1.0106,	.9975,	1.0363,	.9963,	1.0008,	1.0002,	.9929,

Table 2.4.7 Faroe Haddock. Proportion mature-at-age.

Run title : FAROE HADDOCK (ICES DIVISION Vb) HAD1_IND

At 16/04/2005 14:27

Table 5 Proportion mature at age

YEAR,	1961,	1962,	1963,	1964,
AGE				
0,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,
2,	.0600,	.0600,	.0600,	.0600,
3,	.4800,	.4800,	.4800,	.4800,
4,	.9100,	.9100,	.9100,	.9100,
5,	1.0000,	1.0000,	1.0000,	1.0000,
6,	1.0000,	1.0000,	1.0000,	1.0000,
7,	1.0000,	1.0000,	1.0000,	1.0000,
8,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,
+gp,	1.0000,	1.0000,	1.0000,	1.0000,

Table 5 Proportion mature at age

YEAR,	1965,	1966,	1967,	1968,	1969,	1970,	1971,	1972,	1973,	1974,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0600,	.0600,	.0600,	.0600,	.0600,	.0600,	.0600,	.0600,	.0600,	.0600,
3,	.4800,	.4800,	.4800,	.4800,	.4800,	.4800,	.4800,	.4800,	.4800,	.4800,
4,	.9100,	.9100,	.9100,	.9100,	.9100,	.9100,	.9100,	.9100,	.9100,	.9100,
5,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
6,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
7,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
8,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
+gp,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,

Table 5 Proportion mature at age

YEAR,	1975,	1976,	1977,	1978,	1979,	1980,	1981,	1982,	1983,	1984,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0600,	.0600,	.0600,	.0600,	.0600,	.0600,	.0600,	.0800,	.0800,	.0800,
3,	.4800,	.4800,	.4800,	.4800,	.4800,	.4800,	.4800,	.6200,	.6200,	.7600,
4,	.9100,	.9100,	.9100,	.9100,	.9100,	.9100,	.9100,	.8900,	.8900,	.9800,
5,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
6,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
7,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
8,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
+gp,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,

Table 5 Proportion mature at age

YEAR,	1985,	1986,	1987,	1988,	1989,	1990,	1991,	1992,	1993,	1994,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0300,	.0300,	.0500,	.0500,	.0200,	.0800,	.1600,	.1800,	.1100,	.0500,
3,	.6200,	.4300,	.3200,	.2400,	.2200,	.3700,	.5800,	.6500,	.5000,	.4200,
4,	.9600,	.9500,	.9100,	.8900,	.8700,	.9000,	.9300,	.9100,	.8500,	.8600,
5,	1.0000,	.9900,	.9800,	.9800,	.9900,	1.0000,	1.0000,	1.0000,	.9700,	.9600,
6,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	.9900,	.9900,
7,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
8,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
+gp,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,

Table 2.4.7 (cont.) Faroe Haddock. Proportion mature-at-age.

Table 5	Proportion mature at age									
YEAR,	1995,	1996,	1997,	1998,	1999,	2000,	2001,	2002,	2003,	2004,
AGE										
0,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
1,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,	.0000,
2,	.0300,	.0300,	.0100,	.0100,	.0100,	.0200,	.0900,	.0800,	.0700,	.0000,
3,	.4700,	.4700,	.4700,	.3600,	.3500,	.3600,	.5400,	.4900,	.4500,	.3500,
4,	.9100,	.9300,	.9100,	.8700,	.8600,	.8700,	.9300,	.9700,	.9700,	.9400,
5,	.9600,	.9800,	1.0000,	.9900,	.9900,	.9900,	1.0000,	1.0000,	.9900,	.9900,
6,	.9900,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
7,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
8,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
9,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,
+gp,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,	1.0000,

Table 2.4.8 Faroe haddock. Spaly tuning files.

```
FAROE Haddock (ICES SUBDIVISION VB)       COMB-SURVEY-SPALY.dat
102
SUMMER SURVEY
1996 2004
1 1 0.6 0.7
2 8
200   33809.09  61257.93   1138.05    210.25   286.72   238.48   416.44
200   10153.82  26402.10  47024.66    852.22   177.11    81.49   163.30
200    1688.61   3499.92  14734.54  18399.09   285.78    89.61    73.64
200    9167.29   5844.31   1548.86   8698.75  9829.62   204.06     7.89
200   17723.85   8395.42    416.41   1308.52  4645.47  5699.29    85.81
200  100503.06  11990.85   4426.07    174.57   629.27  2615.71  3209.95
200   51168.91  57922.82   5538.84   1909.63   162.47   395.07  1256.27
200   35959.21  26787.80  35943.72   3962.66   621.93   101.63   428.87
200   29942.18  16914.49  15178.57  16633.34   885.68   185.66    24.20
SPRING SURVEY SHIFTED
1993 2004
1 1 0.95 1.0
0 6
100  16196.00   1960.30    270.20    339.50    173.40         305.60   399.60
100  40990.90  19464.30   1067.30    217.80    150.70          49.00   141.10
100  27375.80  29575.90  21281.30    663.10     98.20          73.90    56.00
100   3190.50   7534.90  16164.90  25478.90    628.10         146.10    37.00
100   3628.60    363.30   4482.00  10150.50  12687.70         336.20     9.90
100   5180.40   6746.60    113.70   1542.20   4417.10        3139.20    48.70
100  26833.10   8354.40   4858.70    198.10    443.90        1669.60  1940.70
100  30814.70  36511.50   3582.40   1063.20     26.80         110.60   427.70
100  22179.90  17168.00  25895.60   1934.90    684.90          40.60   101.70
100  12024.50  19448.80  13525.50  12734.40    776.10         230.10    19.30
100   1823.10  15626.50  10769.00   7487.70  11212.50         487.50    79.10
100   5814.70   4064.20   9667.50   6182.00   4565.90        4912.80   238.60
```

Table 2.4.9 Faroe haddock 2005 xsa.

```
Lowestoft VPA Version 3.1                          28/04/2005  16:00

Extended Survivors Analysis

FAROE HADDOCK (ICES DIVISION Vb)                HAD1_IND

CPUE data from file D:\Vpa\vpa2005\Tuning\comb-survey-spaly-revsum.dat

Catch data for  44 years. 1961 to 2004. Ages  0 to  10.

     Fleet,            First, Last, First, Last, Alpha,  Beta
                     ,    year, year,  age ,  age
SUMMER SURVEY         ,   1996, 2004,   2,     8,   .600,   .700
SPRING SURVEY SHIFTE,   1993, 2004,   0,     6,   .950,  1.000


Time series weights :

     Tapered time weighting not applied


Catchability analysis :

     Catchability independent of stock size for all ages

     Catchability independent of age for ages >=    6


Terminal population estimation :

     Survivor estimates shrunk towards the mean F
     of the final   5 years or the   5 oldest ages.

     S.E. of the mean to which the estimates  are shrunk =    .500

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

     Prior weighting not applied


Tuning converged after   39 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,  1995,  1996,  1997,  1998,  1999,  2000,  2001,  2002,  2003,  2004

     0,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000
     1,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000,  .000
     2,  .009,  .008,  .009,  .032,  .012,  .070,  .039,  .031,  .004,  .010
     3,  .103,  .070,  .089,  .167,  .570,  .305,  .209,  .170,  .091,  .081
     4,  .312,  .357,  .197,  .230,  .221,  .189,  .422,  .305,  .247,  .184
     5,  .297,  .416,  .454,  .287,  .329,  .247,  .235,  .384,  .406,  .315
     6,  .172,  .364,  .526,  .582,  .319,  .319,  .257,  .287,  .597,  .402
     7,  .208,  .327,  .518, 1.277,  .670,  .219,  .219,  .211,  .681,  .586
     8,  .172,  .298,  .319,  .882, 1.769,  .524,  .156,  .249,  .508, 1.131
     9,  .233,  .205,  .424,  .632,  .507,  .260,  .200,  .181,  .428,  .537
```

Table 2.4.9 (cont.) Faroe haddock 2005 xsa.

```
XSA population numbers (Thousands)

                          AGE
 YEAR ,       0,        1,        2,        3,        4,        5,        6,        7,        8,        9,

 1995 ,    1.39E+04, 5.69E+04, 1.05E+05, 5.08E+03, 9.69E+02, 9.71E+02, 9.25E+02, 1.74E+03, 2.03E+03, 1.39E+03,
 1996 ,    5.47E+03, 1.14E+04, 4.66E+04, 8.51E+04, 3.75E+03, 5.81E+02, 5.91E+02, 6.38E+02, 1.16E+03, 1.40E+03,
 1997 ,    2.38E+04, 4.48E+03, 9.33E+03, 3.78E+04, 6.49E+04, 2.15E+03, 3.14E+02, 3.36E+02, 3.76E+02, 7.03E+02,
 1998 ,    3.57E+04, 1.94E+04, 3.67E+03, 7.57E+03, 2.83E+04, 4.36E+04, 1.12E+03, 1.52E+02, 1.64E+02, 2.24E+02,
 1999 ,    1.89E+05, 2.93E+04, 1.59E+04, 2.91E+03, 5.24E+03, 1.84E+04, 2.68E+04, 5.11E+02, 3.46E+01, 5.56E+01,
 2000 ,    8.17E+04, 1.54E+05, 2.40E+04, 1.29E+04, 1.35E+03, 3.44E+03, 1.09E+04, 1.60E+04, 2.14E+02, 4.83E+00,
 2001 ,    5.35E+04, 6.69E+04, 1.26E+05, 1.83E+04, 7.77E+03, 9.11E+02, 2.20E+03, 6.46E+03, 1.05E+04, 1.04E+02,
 2002 ,    4.32E+04, 4.38E+04, 5.48E+04, 9.96E+04, 1.22E+04, 4.17E+03, 5.90E+02, 1.39E+03, 4.25E+03, 7.35E+03,
 2003 ,    1.21E+04, 3.54E+04, 3.59E+04, 4.35E+04, 6.88E+04, 7.34E+03, 2.33E+03, 3.62E+02, 9.24E+02, 2.71E+03,
 2004 ,    1.97E+04, 9.92E+03, 2.90E+04, 2.92E+04, 3.25E+04, 4.40E+04, 4.00E+03, 1.05E+03, 1.50E+02, 4.55E+02,

 Estimated population abundance at 1st Jan 2005

    ,     0.00E+00, 1.62E+04, 8.12E+03, 2.35E+04, 2.21E+04, 2.21E+04, 2.63E+04, 2.19E+03, 4.78E+02, 3.97E+01,

 Taper weighted geometric mean of the VPA populations:

    ,     2.85E+04, 2.39E+04, 2.04E+04, 1.57E+04, 1.04E+04, 6.10E+03, 3.49E+03, 1.96E+03, 9.98E+02, 4.93E+02,

 Standard error of the weighted Log(VPA populations) :

    ,       1.0248,   1.0286,   1.0294,   1.0096,   1.0187,   1.0033,    .9623,   1.0096,   1.1842,   1.4470,


 Log catchability residuals.


 Fleet : SUMMER SURVEY

  Age  ,  1995,  1996,  1997,  1998,  1999,  2000,  2001,  2002,  2003,  2004
     0 , No data for this fleet at this age
     1 , No data for this fleet at this age
     2 , 99.99,  -.09,   .31,  -.53,  -.32,  -.04,   .02,   .17,   .23,   .26
     3 , 99.99,  -.06,  -.07,  -.44,  1.30,   .00,  -.06,  -.20,  -.20,  -.27
     4 , 99.99,  -.32,   .45,   .14,  -.43,  -.41,   .35,   .06,   .15,   .00
     5 , 99.99,  -.02,   .10,   .05,   .19,  -.08,  -.77,   .20,   .38,  -.04
     6 , 99.99,   .35,   .60,  -.15,   .04,   .19,  -.25,  -.27,  -.10,  -.41
     7 , 99.99,   .06,  -.25,  1.14,   .35,  -.05,   .07,  -.29,   .01,  -.52
     8 , 99.99,   .01,   .21,   .61,   .50,   .26,  -.25,  -.22,   .40,  -.26


 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,   -5.3891,   -5.3957,   -5.8119,   -5.8959,   -6.0024,   -6.0024,   -6.0024,
 S.E(Log q),     .2838,     .5044,     .3214,     .3225,     .3284,     .4795,     .3650,


 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,     .89,    1.374,      5.92,     .96,      9,     .24,   -5.39,
  3,    1.36,   -1.998,      3.71,     .81,      9,     .59,   -5.40,
  4,     .85,    3.019,      6.37,     .98,      9,     .19,   -5.81,
  5,     .92,    1.207,      6.11,     .97,      9,     .29,   -5.90,
  6,    1.07,    -.742,      5.90,     .95,      9,     .36,   -6.00,
  7,    1.15,   -1.160,      5.80,     .90,      9,     .53,   -5.94,
  8,    1.14,   -2.196,      5.81,     .97,      9,     .31,   -5.86,
```

Table 2.4.9 (cont.) Faroe haddock 2005 xsa.

```
Fleet : SPRING SURVEY SHIFTED

 Age  ,  1993,  1994
    0 , -1.05,   .70
    1 ,  -.19,  -.68
    2 ,  -.29,  -.21
    3 ,   .00,   .01
    4 ,  -.17,  -.02
    5 ,  -.06,  -.86
    6 ,   .46,  -.06
    7 , No data for this fleet at this age
    8 , No data for this fleet at this age


 Age  ,  1995,  1996,  1997,  1998,  1999,  2000,  2001,  2002,  2003,  2004
    0 ,  1.90,   .68,  -.66,  -.71,  -.73,   .25,   .34,  -.06,  -.67,   .00
    1 ,   .55,   .79, -1.30,   .15,  -.05,  -.23,  -.15,   .40,   .39,   .32
    2 ,  -.03,   .50,   .83, -1.89,   .38,  -.28,   .00,   .18,   .35,   .46
    3 ,  -.22,   .57,   .48,   .28,  -.42,  -.49,  -.33,  -.18,   .04,   .24
    4 ,   .06,   .61,   .61,   .42,  -.20, -1.68,   .03,  -.40,   .48,   .27
    5 ,   .00,  1.31,   .87,  -.07,   .20,  -.91,  -.60,  -.24,  -.03,   .40
    6 ,   .02,   .24,  -.28,   .09,   .34,  -.26,  -.16,  -.48,  -.14,   .23
    7 , No data for this fleet at this age
    8 , No data for this fleet at this age


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


   Age ,         0,         1,         2,         3,         4,         5,         6
Mean Log q,   -5.6327,   -5.6185,   -5.9617,   -6.1218,   -6.4601,   -6.6928,   -7.0694,
S.E(Log q),     .8390,     .5754,     .6896,     .3443,     .6238,     .6514,     .2829,


Regression statistics :


Ages with q independent of year class strength and constant w.r.t. time.

Age, Slope , t-value , Intercept, RSquare, No Pts, Reg s.e,  Mean Q

 0,    1.49,   -1.433,      3.27,     .47,     12,    1.19,   -5.63,
 1,     .96,     .286,      5.82,     .81,     12,     .57,   -5.62,
 2,     .81,    1.522,      6.70,     .87,     12,     .53,   -5.96,
 3,     .92,    1.257,      6.40,     .96,     12,     .31,   -6.12,
 4,     .82,    2.082,      6.91,     .93,     12,     .45,   -6.46,
 5,    1.00,    -.001,      6.69,     .84,     12,     .68,   -6.69,
 6,     .92,    1.425,      7.12,     .97,     12,     .25,   -7.07,


Terminal year survivor and F summaries :

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

Year class = 2004

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,        1.,   .000,       .000,    .00,   0,  .000,     .000
SPRING SURVEY SHIFTE,     16166.,   .873,       .000,    .00,   1, 1.000,     .000

  F shrinkage mean  ,         0.,    .50,,,,                          .000,     .000

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
    16166.,       .87,      .00,    1,    .000,   .000
```

Table 2.4.9 (cont.) Faroe haddock 2005 xsa

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

Year class = 2003

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,        1.,   .000,       .000,    .00,   0,  .000,     .000
SPRING SURVEY SHIFTE,     8123.,   .494,       .461,    .93,   2, 1.000,     .000

  F shrinkage mean  ,         0.,    .50,,,,                         .000,     .000

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     8123.,       .49,      .46,    2,    .933,   .000


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

Year class = 2002

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,    30468.,   .300,       .000,    .00,   1,  .524,     .007
SPRING SURVEY SHIFTE,    32257.,   .407,       .141,    .35,   3,  .285,     .007

  F shrinkage mean  ,     7142.,    .50,,,,                         .191,     .031

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
    23487.,       .22,      .33,    5,   1.498,   .010


Age  3   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
SUMMER SURVEY       ,    24552.,   .261,       .211,    .81,   2,  .446,     .073
SPRING SURVEY SHIFTE,    29647.,   .269,       .039,    .15,   4,  .422,     .061

  F shrinkage mean  ,     6028.,    .50,,,,                         .133,     .270

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
    22069.,       .18,      .23,    7,   1.328,   .081


Age  4   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
SUMMER SURVEY       ,    23253.,   .207,       .092,    .44,   3,  .526,     .176
SPRING SURVEY SHIFTE,    23921.,   .249,       .068,    .27,   5,  .358,     .172

  F shrinkage mean  ,    13954.,    .50,,,,                         .116,     .278

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
    22138.,       .15,      .08,    9,    .506,   .184
```

Table 2.4.9 (cont.) Faroe haddock 2005 xsa.

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

Year class = 1999

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,     26666.,   .180,       .060,    .34,   4,  .573,     .311
SPRING SURVEY SHIFTE,     25926.,   .236,       .150,    .63,   6,  .300,     .319

  F shrinkage mean  ,     25572.,    .50,,,,                        .126,     .322

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
    26302.,       .14,      .06,   11,    .453,   .315


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

Year class = 1998

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,      2078.,   .169,       .151,    .89,   5,  .489,     .420
SPRING SURVEY SHIFTE,      2242.,   .201,       .111,    .55,   7,  .389,     .394

  F shrinkage mean  ,      2520.,    .50,,,,                        .122,     .358

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
     2191.,       .13,      .08,   13,    .624,   .402


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

Year class = 1997

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,       431.,   .178,       .135,    .76,   6,  .490,     .634
SPRING SURVEY SHIFTE,       405.,   .206,       .080,    .39,   7,  .297,     .664

  F shrinkage mean  ,       767.,    .50,,,,                        .213,     .403

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
      478.,       .15,      .10,   14,    .674,   .586


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

Year class = 1996

Fleet,                Estimated,    Int,       Ext,    Var,    N, Scaled,  Estimated
     ,                Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
SUMMER SURVEY       ,        29.,   .174,       .139,    .80,   7,  .486,    1.344
SPRING SURVEY SHIFTE,        21.,   .202,       .196,    .97,   7,  .192,    1.607

  F shrinkage mean  ,        91.,    .50,,,,                        .322,     .647

Weighted prediction :

Survivors,        Int,      Ext,    N,    Var,     F
at end of year,   s.e,      s.e,     ,   Ratio,
       40.,       .19,      .21,   15,   1.119,  1.131
```

Table 2.4.9 (cont.) Faroe haddock 2005 xsa.

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

 Year class = 1995

 Fleet,                  Estimated,    Int,       Ext,    Var,    N, Scaled,  Esti-
mated
      ,                 Survivors,    s.e,       s.e,   Ratio,    , Weights,    F
 SUMMER SURVEY       ,       212.,   .152,       .132,    .87,   7,  .526,     .548
 SPRING SURVEY SHIFTE,       226.,   .192,       .219,   1.14,   7,  .257,     .522

   F shrinkage mean  ,       223.,    .50,,,,                        .216,     .528

 Weighted prediction :

 Survivors,        Int,      Ext,    N,    Var,     F
 at end of year,   s.e,      s.e,     ,   Ratio,
       218.,       .14,      .10,   15,    .671,   .537
```

Table 2.4.10 Faroe haddock. Fishing mortality (F) at age.

```
    Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD1_IND

    At 28/04/2005  16:01

                  Terminal Fs derived using XSA (With F shrinkage)

       Table  8    Fishing mortality (F) at age
       YEAR,       1961,    1962,    1963,    1964,
       AGE
         0,        .0000,   .0000,   .0000,   .0000,
         1,        .0000,   .0000,   .0000,   .0000,
         2,        .1875,   .3232,   .3801,   .0876,
         3,        .4162,   .5866,   .5639,   .3722,
         4,        .4209,   .5980,   .7261,   .5193,
         5,        .4387,   .3480,   .5591,   .5369,
         6,        .5879,   .6706,   .4026,   .6107,
         7,        .9483,  1.0499,  1.2493,   .3375,
         8,        .8742,   .9736,  1.1139,  1.2027,
         9,        .6600,   .7351,   .8185,   .6472,
       +gp,        .6600,   .7351,   .8185,   .6472,
0  FBAR  3- 7,     .5624,   .6506,   .7002,   .4753,


       Table  8    Fishing mortality (F) at age
       YEAR,       1965,    1966,    1967,    1968,    1969,    1970,    1971,    1972,    1973,    1974,
       AGE
         0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         2,        .0691,   .0609,   .0641,   .1261,   .0860,   .0552,   .0526,   .0253,   .1671,   .1266,
         3,        .2354,   .2370,   .1872,   .2647,   .2363,   .2528,   .1937,   .4226,   .4307,   .2172,
         4,        .4767,   .4515,   .2971,   .3483,   .5320,   .3344,   .4187,   .2854,   .2384,   .3728,
         5,        .3678,   .5006,   .2997,   .2847,   .3329,   .3639,   .2755,   .4518,   .3133,   .1278,
         6,        .5882,   .5421,   .5406,   .4540,   .4975,   .5559,   .5559,   .1495,   .2694,   .1713,
         7,        .9618,   .9128,   .6906,   .8367,   .8276,   .8739,   .8376,   .6719,   .1945,   .2133,
         8,       2.3618,   .7509,   .6634,   .5851,  1.0630,   .5429,   .4223,   .4058,   .2906,   .1433,
         9,        .9619,   .6372,   .5022,   .5057,   .6565,   .5385,   .5060,   .3956,   .2626,   .2067,
       +gp,        .9619,   .6372,   .5022,   .5057,   .6565,   .5385,   .5060,   .3956,   .2626,   .2067,
0  FBAR  3- 7,     .5260,   .5288,   .4030,   .4376,   .4853,   .4762,   .4563,   .3963,   .2893,   .2205,


                  Terminal Fs derived using XSA (With F shrinkage)

       Table  8    Fishing mortality (F) at age
       YEAR,       1975,    1976,    1977,    1978,    1979,    1980,    1981,    1982,    1983,    1984,
       AGE
         0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         2,        .1228,   .0907,   .0108,   .0010,   .0004,   .0324,   .0236,   .0382,   .0249,   .0326,
         3,        .2649,   .1875,   .1126,   .0546,   .0456,   .0284,   .1370,   .4601,   .1907,   .1155,
         4,        .2412,   .3808,   .1811,   .1662,   .1252,   .2019,   .1307,   .3696,   .3462,   .3870,
         5,        .2114,   .2215,   .5268,   .2110,   .1908,   .2743,   .2105,   .2897,   .3481,   .2156,
         6,        .0956,   .2869,   .7241,   .3814,   .1404,   .2129,   .2257,   .2763,   .1371,   .3312,
         7,        .0859,   .1600,   .3900,   .5752,   .2716,   .1696,   .1997,   .2513,   .2974,   .0845,
         8,        .1598,   .2537,   .3784,   .4960,   .3296,   .3943,   .0916,   .2256,   .3085,   .2907,
         9,        .1594,   .2620,   .4433,   .3683,   .2125,   .2519,   .1724,   .2841,   .2891,   .2632,
       +gp,        .1594,   .2620,   .4433,   .3683,   .2125,   .2519,   .1724,   .2841,   .2891,   .2632,
0  FBAR  3- 7,     .1798,   .2474,   .3869,   .2777,   .1547,   .1774,   .1807,   .3294,   .2639,   .2268,


       Table  8    Fishing mortality (F) at age
       YEAR,       1985,    1986,    1987,    1988,    1989,    1990,    1991,    1992,    1993,    1994,
       AGE
         0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         2,        .0274,   .0094,   .0326,   .0383,   .0043,   .0120,   .0277,   .0164,   .0707,   .0481,
         3,        .1674,   .0920,   .0905,   .0656,   .1170,   .1121,   .1593,   .0712,   .1627,   .1641,
         4,        .2362,   .2455,   .1798,   .1814,   .1310,   .2130,   .2250,   .1705,   .1747,   .2515,
         5,        .3442,   .2556,   .2573,   .2293,   .3214,   .2226,   .2087,   .2164,   .1768,   .1395,
         6,        .4122,   .3541,   .3016,   .2984,   .3077,   .3405,   .2986,   .2456,   .1529,   .1989,
         7,        .2064,   .1553,   .4652,   .2025,   .4979,   .3988,   .3770,   .2468,   .1840,   .1745,
         8,        .1701,   .5110,   .5737,   .2313,   .3743,   .4354,   .2470,   .2101,   .1435,   .2224,
         9,        .2753,   .3060,   .3578,   .2297,   .3285,   .3240,   .2727,   .2189,   .1671,   .1982,
       +gp,        .2753,   .3060,   .3578,   .2297,   .3285,   .3240,   .2727,   .2189,   .1671,   .1982,
0  FBAR  3- 7,     .2733,   .2205,   .2589,   .1955,   .2750,   .2574,   .2537,   .1901,   .1702,   .1857,
```

Table 2.4.10 (cont.) Faroe haddock. Fishing mortality (F) at age.

```
       Table  8    Fishing mortality (F) at age
       YEAR,       1995,    1996,    1997,    1998,    1999,    2000,    2001,    2002,    2003,    2004,

       AGE
         0,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         1,        .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,   .0000,
         2,        .0085,   .0078,   .0092,   .0325,   .0122,   .0698,   .0390,   .0311,   .0041,   .0096,
         3,        .1035,   .0704,   .0890,   .1672,   .5699,   .3048,   .2094,   .1700,   .0910,   .0814,
         4,        .3120,   .3569,   .1972,   .2301,   .2213,   .1894,   .4223,   .3047,   .2466,   .1843,
         5,        .2972,   .4165,   .4542,   .2871,   .3291,   .2472,   .2355,   .3837,   .4063,   .3146,
         6,        .1717,   .3637,   .5258,   .5818,   .3185,   .3192,   .2568,   .2867,   .5965,   .4019,
         7,        .2076,   .3271,   .5179,  1.2771,   .6704,   .2194,   .2193,   .2111,   .6813,   .5860,
         8,        .1722,   .2983,   .3189,   .8825,  1.7692,   .5238,   .1564,   .2486,   .5081,  1.1310,
         9,        .2333,   .2048,   .4245,   .6322,   .5072,   .2596,   .1996,   .1806,   .4284,   .5366,
       +gp,        .2333,   .2048,   .4245,   .6322,   .5072,   .2596,   .1996,   .1806,   .4284,   .5366,
0  FBAR  3- 7,     .2184,   .3069,   .3568,   .5086,   .4218,   .2560,   .2687,   .2713,   .4043,   .3136,
```

Table 2.4.11 Faroe haddock. Stock number (N) at age.

```
    Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD1_IND

    At 28/04/2005  16:01

                  Terminal Fs derived using XSA (With F shrinkage)

       Table 10    Stock number at age (start of year)              Numbers*10**-3
       YEAR,       1961,    1962,    1963,    1964,

       AGE
         0,        70656,   44920,   33782,   30144,
         1,        47070,   57849,   36777,   27658,
         2,        51279,   38537,   47362,   30111,
         3,        23796,   34806,   22837,   26515,
         4,        16517,   12850,   15850,   10638,
         5,         6028,    8877,    5786,    6278,
         6,         3245,    3182,    5132,    2708,
         7,         1512,    1476,    1332,    2809,
         8,          448,     480,     423,     313,
         9,          135,     153,     148,     114,
       +gp,            0,       0,       0,       0,
0       TOTAL,    220684,  203130,  169430,  137288,



       Table 10    Stock number at age (start of year)              Numbers*10**-3
       YEAR,       1965,    1966,    1967,    1968,    1969,    1970,    1971,    1972,    1973,    1974,

       AGE
         0,        37828,   81825,   47695,   53093,   23056,   49503,   35349,   78098,  104643,   83617,
         1,        24680,   30971,   66992,   39049,   43469,   18877,   40530,   28941,   63941,   85674,
         2,        22645,   20206,   25357,   54849,   31971,   35589,   15455,   33183,   23695,   52351,
         3,        22586,   17302,   15565,   19471,   39585,   24018,   27574,   12005,   26489,   16414,
         4,        14961,   14614,   11176,   10568,   12234,   25588,   15272,   18601,    6441,   14098,
         5,         5182,    7605,    7618,    6799,    6108,    5884,   14995,    8226,   11448,    4155,
         6,         3005,    2937,    3774,    4622,    4187,    3584,    3348,    9321,    4287,    6852,
         7,         1204,    1366,    1398,    1800,    2403,    2085,    1683,    1572,    6572,    2681,
         8,         1641,     377,     449,     574,     638,     860,     712,     596,     657,    4429,
         9,           77,     127,     146,     189,     262,     180,     409,     382,     325,     403,
       +gp,            0,       0,       0,       0,       0,       0,       0,       0,      52,     866,
0       TOTAL,    133808,  177328,  180170,  191013,  163913,  166169,  155328,  190926,  248551,
271539,
```

Table 2.4.11 (cont.) Faroe haddock. Stock number (N) at age.

```
Run title : FAROE HADDOCK (ICES DIVISION Vb)                HAD1_IND

At 28/04/2005  16:01

               Terminal Fs derived using XSA (With F shrinkage)

      Table 10    Stock number at age (start of year)              Numbers*10**-3
      YEAR,       1975,    1976,    1977,    1978,    1979,    1980,    1981,    1982,    1983,    1984,

      AGE
        0,        39142,   52483,    4174,    7393,    5222,   23722,   29545,   61449,   60031,   40354,
        1,        68460,   32047,   42970,    3418,    6053,    4275,   19422,   24189,   50310,   49149,
        2,        70144,   56050,   26238,   35180,    2798,    4956,    3500,   15901,   19804,   41191,
        3,        37764,   50790,   41912,   21251,   28774,    2290,    3928,    2799,   12531,   15816,
        4,        10816,   23723,   34473,   30660,   16474,   22508,    1822,    2804,    1446,    8478,
        5,         7950,    6958,   13272,   23548,   21259,   11901,   15058,    1309,    1587,     838,
        6,         2994,    5268,    4564,    6416,   15611,   14382,    7406,    9989,     802,     917,
        7,         4727,    2228,    3238,    1812,    3587,   11108,    9517,    4839,    6204,     573,
        8,         1773,    3551,    1554,    1795,     834,    2239,    7675,    6381,    3081,    3773,
        9,         3142,    1237,    2256,     872,     895,     491,    1236,    5734,    4169,    1853,
      +gp,         1396,    1516,    2615,    1110,     425,     424,     250,     950,    3477,    4595,
0       TOTAL,    248309,  235852,  177267,  133456,  101934,   98296,   99360,  136345,  163444,  167535,


      Table 10    Stock number at age (start of year)              Numbers*10**-3
      YEAR,       1985,    1986,    1987,    1988,    1989,    1990,    1991,    1992,    1993,    1994,

      AGE
        0,        14541,   28770,   24324,   14453,    4641,    4062,    2728,    9716,  156380,   69462,
        1,        33039,   11905,   23555,   19915,   11833,    3800,    3326,    2233,    7955,  128033,
        2,        40240,   27050,    9747,   19285,   16305,    9688,    3111,    2723,    1828,    6513,
        3,        32643,   32054,   21938,    7724,   15196,   13292,    7837,    2477,    2193,    1395,
        4,        11536,   22606,   23937,   16407,    5922,   11068,    9729,    5472,    1889,    1526,
        5,         4714,    7458,   14480,   16373,   11204,    4253,    7324,    6360,    3778,    1299,
        6,          553,    2735,    4729,    9166,   10658,    6652,    2787,    4867,    4194,    2592,
        7,          539,     300,    1572,    2864,    5568,    6415,    3874,    1693,    3117,    2947,
        8,          431,     359,     210,     808,    1915,    2771,    3525,    2176,    1083,    2123,
        9,         2310,     298,     176,      97,     525,    1078,    1468,    2254,    1444,     768,
      +gp,         4440,    2965,    1218,     685,     317,     428,     147,     906,    1323,    1841,
0       TOTAL,    144985,  136499,  125886,  107777,   84086,   63508,   45855,   40877,  185184,  218497,


      Table 10    Stock number at age (start of year)              Numbers*10**-3
      YEAR,    1995,    1996,    1997,    1998,  1999,    2000,    2001,  2002,    2003,    2004,  2005,

      AGE
        0,       13924,    5468,   23751,   35750,  188640,   81750,   53501,   43210,   12117,   19745,       0,
        1,       56870,   11400,    4477,   19446,   29270,  154446,   66931,   43803,   35377,    9921,   16166,
        2,      104824,   46561,    9333,    3666,   15921,   23964,  126449,   54798,   35863,   28964,    8123,
        3,        5082,   85095,   37826,    7572,    2905,   12877,   18298,   99565,   43490,   29241,   23487,
        4,         969,    3752,   64934,   28334,    5245,    1345,    7773,   12151,   68774,   32509,   22069,
        5,         971,     581,    2150,   43648,   18430,    3442,     911,    4172,    7335,   44002,   22138,
        6,         925,     591,     314,    1117,   26818,   10857,    2201,     590,    2327,    4000,   26302,
        7,        1739,     638,     336,     152,     511,   15967,    6460,    1394,     362,    1049,    2191,
        8,        2026,    1157,     376,     164,      35,     214,   10498,    4247,     924,     150,     478,
        9,        1392,    1397,     703,     224,      56,       5,     104,    7351,    2712,     455,      40,
      +gp,        1558,    2340,    1635,    1170,     528,     341,     109,     226,    2924,    2202,    1272,
0       TOTAL,  190281,  158979,  145835,  141241,  288357,  305208,  293235,  271506,  212205,  172240,  122265,
```

Table 2.4.12 Faroe haddock. Stock summary VPA 2005.

	Table	16	Summary	(without	SOP	correction)		
Terminal	Fs		derived	using	XSA	(With	F	shrinkage)
	Recruits	Recruits	Total	Total	Landings	Yield/SSB	FBAR(3-7)	FBAR(3-7)REV
Year	Age 0	Age 2	Biomass	SSB				
1961	70656	51279	81164	47797	20831	0.4358	0.5624	0.5624
1962	44920	38537	83420	51875	27151	0.5234	0.6506	0.6506
1963	33782	47362	80753	49547	27571	0.5565	0.7002	0.7002
1964	30144	30111	68577	44128	19490	0.4417	0.4753	0.4753
1965	37828	22645	65655	45556	18479	0.4056	0.526	0.5260
1966	81825	20206	60934	43953	18766	0.427	0.5288	0.5288
1967	47695	25357	60207	41960	13381	0.3189	0.403	0.4030
1968	53093	54849	78079	45381	17852	0.3934	0.4376	0.4377
1969	23056	31971	83820	53425	23272	0.4356	0.4853	0.4853
1970	49503	35589	87308	59865	21361	0.3568	0.4762	0.4762
1971	35349	15455	81767	62918	19393	0.3082	0.4563	0.4563
1972	78098	33183	83099	61990	16485	0.2659	0.3963	0.3962
1973	104643	23695	82778	61599	17976	0.2918	0.2893	0.2893
1974	83617	52351	95451	64658	14773	0.2285	0.2205	0.2205
1975	39142	70144	121867	75442	20715	0.2746	0.1798	0.1798
1976	52483	56050	135741	89285	26211	0.2936	0.2474	0.2473
1977	4174	26238	121194	96488	25555	0.2649	0.3869	0.3869
1978	7393	35180	120787	97396	19200	0.1971	0.2777	0.2777
1979	5222	2798	97901	85582	12418	0.1451	0.1547	0.1547
1980	23722	4956	87863	82112	15016	0.1829	0.1774	0.1774
1981	29545	3500	79214	76089	12233	0.1608	0.1807	0.1807
1982	61449	15901	68567	57019	11937	0.2094	0.3294	0.3294
1983	60031	19804	64311	52063	12894	0.2477	0.2639	0.2639
1984	40354	41191	84061	54204	12378	0.2284	0.2268	0.2268
1985	14541	40240	95120	63214	15143	0.2396	0.2733	0.2733
1986	28770	27050	100141	66532	14477	0.2176	0.2205	0.2205
1987	24324	9747	89460	68612	14882	0.2169	0.2589	0.2589
1988	14453	19285	79416	63449	12178	0.1919	0.1955	0.1954
1989	4641	16305	72740	53393	14325	0.2683	0.275	0.2750
1990	4062	9688	56662	45865	11726	0.2557	0.2574	0.2574
1991	2728	3111	41663	37351	8429	0.2257	0.2537	0.2537
1992	9716	2723	31805	29603	5476	0.185	0.1901	0.1901
1993	156380	1828	28632	25843	4026	0.1558	0.1702	0.1702
1994	69462	6513	30229	24287	4252	0.1751	0.1857	0.1911
1995	13924	104824	96344	25570	4948	0.1935	0.2184	0.2255
1996	5468	46561	120159	56939	9642	0.1693	0.3069	0.2537
1997	23751	9333	115657	89175	17924	0.201	0.3568	0.2680
1998	35750	3666	100376	89717	22210	0.2476	0.5086	0.2281
1999	188640	15921	80440	70377	18482	0.2626	0.4218	0.2896
2000	81750	23964	84050	60558	15821	0.2613	0.256	0.2727
2001	53501	126449	150039	71418	15890	0.2225	0.2687	0.2770
2002	43210	54798	176354	102883	25011	0.2431	0.2713	0.2674
2003	12117	35863	153439	115100	26970	0.2343	0.4043	0.3351
2004	19745	28964	134250	100749	23811	0.2363	0.3136	0.3136
Arith.								
Mean	43288	30572	88898	62749	16613	0.2726	0.3327	0.3193
Units	(Thousands)	(Thousands)	(Tonnes)	(Tonnes)	(Tonnes)			

Table 2.4.13 **Management option tables INPUT DATA** **FAROE HADDOCK**

Stock size

The yearclasses up to 2003 included are derived from the final 2005 XSA.
The yearclasses 2004-2005 at age 2 are estimated from the 2005 XSA
and apply a natural mortality of 0.2 in forward calculations of the numbers using standard VPA equations
The yearclass 2005 at age 2 in 2007 is estimated as the geomean of the yearclasses since 1980

	Age0	Age1	Age2
YC2003	12117	9921	8123
YC2004	19745	16166	13235
YC2005			14751
0.818731			

Age	2005	2006	2007
2	8123	13000	14750
3	23487		
4	22069		
5	22138		
6	26302		
7	2191		
8	478		
9	40		
10+	1272		

Predicted values rounded

Year	age 2	Geomean(1980-2004)
1980	4956	
1981	3500	
1982	15901	
1983	19804	
1984	41191	
1985	40240	
1986	27050	
1987	9747	
1988	19285	14751
1989	16305	
1990	9688	
1991	3111	
1992	2723	
1993	1828	
1994	6513	
1995	104824	
1996	46561	
1997	9333	
1998	3666	
1999	15921	
2000	23964	
2001	126449	
2002	54798	
2003	35863	
2004	28964	
2005	8123	
2006	13235	
2007	14751	

Proportion mature at age

Age	2005	2006	2007	2003	2004	2005	Avg(02-04)
2	0.00	0.02	0.02	0.07	0.00	0.00	0.02
3	0.41	0.40	0.40	0.45	0.35	0.41	0.40
4	0.93	0.95	0.95	0.97	0.94	0.93	0.95
5	0.99	0.99	0.99	0.99	0.99	0.99	0.99
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10+	1.00	1.00	1.00	1.00	1.00	1.00	1.00

The maturity at age 2006-2007 is estimated as the
average of the maturity at age 2003-2005

Catch/stock weights at age

Prediction using mean catch weight at age a+1 = mean catch weight at age a in year t + avg weight increase b

Age	2005	2006	2007
2	0.574	0.574	0.574
3	0.786	0.786	0.786
4	0.997	1.018	1.018
5	1.134	1.275	1.302
6	1.373	1.343	1.510
7	1.744	1.462	1.431
8	1.964	1.832	1.536
9	2.506	2.018	1.883
10+	2.417	2.417	2.417

	2004	2005	2006	2007	
2	0.574	0.574	0.574	0.574	Age 2 = age 2 in 2004
3	0.77	0.786	0.786	0.786	
4	0.887	0.997	1.018	1.018	
5	1.159	1.134	1.275	1.302	
6	1.638	1.373	1.343	1.510	
7	1.87	1.744	1.462	1.431	
8	2.438	1.964	1.832	1.536	
9	2.357	2.506	2.018	1.883	
10+	2.417	2.417	2.417	2.417	Age 10+ = age 10+ in 2004

Growth rate estimated her as the geomean of YC increments since 1975

Exploitation pattern

Age	2003	2004	2005
2	0.0149	0.0149	0.0149
3	0.1141	0.1141	0.1141
4	0.2452	0.2452	0.2452
5	0.3682	0.3682	0.3682
6	0.4992	0.4992	0.4992
7	0.3986	0.3986	0.3986
8	0.3784	0.3784	0.3784

	2002.0000	2003.0000	2004.0000	Average F for 2002-04
2	0.0311	0.0041	0.0096	0.0149
3	0.1700	0.0910	0.0814	0.1141
4	0.3047	0.2466	0.1843	0.2452
5	0.3837	0.4063	0.3146	0.3682
6		0.5965	0.4019	0.4992
7	0.2111		0.5860	0.3986
8	0.2486	0.5081		0.3784

Age	Av F(2002-2004)
2	0.0149
3	0.1141
4	0.2452
5	0.3682
6	0.4992
7	0.3986
8	0.3784

YPR-analysis

Table 2.4.14 Faroe haddock. Management option table - Input data

MFDP version 1
Run: jr1
Time and date: 17:06 4/30/2005
Fbar age range: 3-7

2005 Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	8123	0.2	0	0	0	0.574	0.0149	0.574
3	23487	0.2	0.41	0	0	0.786	0.1141	0.786
4	22069	0.2	0.93	0	0	0.997	0.2452	0.997
5	22138	0.2	0.99	0	0	1.134	0.3682	1.134
6	26302	0.2	1	0	0	1.373	0.4992	1.373
7	2191	0.2	1	0	0	1.744	0.3986	1.744
8	478	0.2	1	0	0	1.964	0.3784	1.964
9	40	0.2	1	0	0	2.506	0.3819	2.506
10	1272	0.2	1	0	0	2.417	0.3819	2.417

2006 Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	13000	0.2	0	0	0	0.574	0.0149	0.574
3 .		0.2	0.4	0	0	0.786	0.1141	0.786
4 .		0.2	0.95	0	0	1.018	0.2452	1.018
5 .		0.2	0.99	0	0	1.275	0.3682	1.275
6 .		0.2	1	0	0	1.343	0.4992	1.343
7 .		0.2	1	0	0	1.462	0.3986	1.462
8 .		0.2	1	0	0	1.832	0.3784	1.832
9 .		0.2	1	0	0	2.018	0.3819	2.018
10 .		0.2	1	0	0	2.417	0.3819	2.417

2007 Age	N	M	Mat	PF	PM	SWt	Sel	CWt
2	14750	0.2	0	0	0	0.574	0.0149	0.574
3 .		0.2	0.4	0	0	0.786	0.1141	0.786
4 .		0.2	0.95	0	0	1.018	0.2452	1.018
5 .		0.2	0.99	0	0	1.302	0.3682	1.302
6 .		0.2	1	0	0	1.51	0.4992	1.510
7 .		0.2	1	0	0	1.431	0.3986	1.431
8 .		0.2	1	0	0	1.536	0.3784	1.536
9 .		0.2	1	0	0	1.883	0.3819	1.883
10 .		0.2	1	0	0	2.417	0.3819	2.417

Input units are thousands and kg - output in tonnes

Table 2.4.15 Faroe haddock. Management option table - Results

MFDP version 1
Run: jr1
Index file 02/05/2004
Time and date: 17:06 4/30/2005
Fbar age range: 3-7

2005 Biomass	SSB	FMult	FBar	Landings
114278	96932	1	0.3251	28581

2006 Biomass	SSB	FMult	FBar	Landings	2007 Biomass	SSB
88578	76973	0.0	0.0000	0	93032	79090
.	76973	0.1	0.0325	2612	90381	76455
.	76973	0.2	0.0650	5127	87831	73919
.	76973	0.3	0.0975	7550	85375	71478
.	76973	0.4	0.1300	9884	83012	69129
.	76973	0.5	0.1625	12133	80737	66868
.	76973	0.6	0.1950	14300	78546	64692
.	76973	0.7	0.2275	16388	76437	62597
.	76973	0.8	0.2601	18400	74406	60580
.	76973	0.9	0.2926	20340	72449	58637
.	76973	1.0	0.3251	22209	70565	56767
.	76973	1.1	0.3576	24012	68750	54966
.	76973	1.2	0.3901	25750	67002	53231
.	76973	1.3	0.4226	27425	65317	51560
.	76973	1.4	0.4551	29042	63694	49950
.	76973	1.5	0.4876	30601	62130	48399
.	76973	1.6	0.5201	32104	60623	46904
.	76973	1.7	0.5526	33555	59170	45464
.	76973	1.8	0.5851	34955	57769	44076
.	76973	1.9	0.6176	36306	56419	42739
.	76973	2.0	0.6501	37610	55117	41450

Input units are thousands and kg - output in tonnes

Table 2.4.16 Faroe haddock. Long-term Prediction - Input data

MFYPR version 1
Run: jr2
Index file 02/05/2004
Time and date: 18:11 4/30/2005
Fbar age range: 3-7

Age	M	Mat	PF	PM	SWt	Sel	CWt
2	0.2	0.06	0	0	0.527	0.0149	0.527
3	0.2	0.46	0	0	0.786	0.1141	0.786
4	0.2	0.91	0	0	1.107	0.2452	1.107
5	0.2	0.99	0	0	1.477	0.3682	1.477
6	0.2	1.00	0	0	1.836	0.4992	1.836
7	0.2	1.00	0	0	2.179	0.3986	2.179
8	0.2	1.00	0	0	2.447	0.3784	2.447
9	0.2	1.00	0	0	2.704	0.3819	2.704
10	0.2	1.00	0	0	3.079	0.3819	3.079

Weights in kilograms

Table 2.4.17 Faroe haddock. Long-term Prediction - Results

MFYPR version 1
Run: jr2
Time and date: 18:11 4/30/2005
Yield per results

FMult	Fbar	CatchNos	Yield	StockNos	Biomass	SpwnNosJan	SSBJan	SpwnNosSpwn	SSBSpwn
0.0	0.0000	0.0000	0.0000	5.5167	9.1829	4.0700	8.2663	4.0700	8.2663
0.1	0.0325	0.1125	0.2259	4.9564	7.6342	3.5115	6.7194	3.5115	6.7194
0.2	0.0650	0.1938	0.3704	4.5520	6.5492	3.1087	5.6360	3.1087	5.6360
0.3	0.0975	0.2554	0.4663	4.2463	5.7538	2.8046	4.8423	2.8046	4.8423
0.4	0.1300	0.3036	0.5317	4.0070	5.1502	2.5669	4.2405	2.5669	4.2405
0.5	0.1625	0.3426	0.5773	3.8143	4.6794	2.3759	3.7713	2.3759	3.7713
0.6	0.1950	0.3747	0.6095	3.6557	4.3038	2.2188	3.3973	2.2188	3.3973
0.7	0.2275	0.4016	0.6324	3.5227	3.9983	2.0874	3.0934	2.0874	3.0934
0.8	0.2601	0.4247	0.6488	3.4094	3.7457	1.9756	2.8423	1.9756	2.8423
0.9	0.2926	0.4446	0.6606	3.3115	3.5338	1.8792	2.6320	1.8792	2.6320
1.0	0.3251	0.4620	0.6690	3.2260	3.3539	1.7952	2.4536	1.7952	2.4536
1.1	0.3576	0.4774	0.6750	3.1505	3.1993	1.7212	2.3005	1.7212	2.3005
1.2	0.3901	0.4912	0.6790	3.0833	3.0652	1.6554	2.1679	1.6554	2.1679
1.3	0.4226	0.5036	0.6818	3.0229	2.9477	1.5965	2.0519	1.5965	2.0519
1.4	0.4551	0.5148	0.6834	2.9683	2.8441	1.5433	1.9497	1.5433	1.9497
1.5	0.4876	0.5250	0.6843	2.9185	2.7518	1.4950	1.8589	1.4950	1.8589
1.6	0.5201	0.5344	0.6846	2.8730	2.6692	1.4509	1.7777	1.4509	1.7777
1.7	0.5526	0.5430	0.6845	2.8311	2.5948	1.4104	1.7046	1.4104	1.7046
1.8	0.5851	0.5510	0.6840	2.7924	2.5273	1.3731	1.6385	1.3731	1.6385
1.9	0.6176	0.5585	0.6832	2.7564	2.4658	1.3385	1.5783	1.3385	1.5783
2.0	0.6501	0.5654	0.6822	2.7229	2.4094	1.3063	1.5233	1.3063	1.5233

Reference point	F multiplier	Absolute F
Fbar(3-7)	1	0.3251
FMax	1.6103	0.5235
F0.1	0.5848	0.1901
F35%SPR	0.7782	0.2530
Flow	-99	
Fmed	0.9507	0.3091
Fhigh	4.4366	1.4422

Weights in kilograms

Table 2.4.18. Faroe haddock (Division Vb) standard graphs from the 2004 assessment.

Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-7
1961	51276	47797	20831	0.5624
1962	38537	51875	27151	0.6506
1963	47362	49547	27571	0.7002
1964	30111	44128	19490	0.4753
1965	22645	45556	18479	0.5260
1966	20206	43953	18766	0.5288
1967	25357	41960	13381	0.4030
1968	54849	45381	17852	0.4376
1969	31971	53425	23272	0.4853
1970	35589	59865	21361	0.4762
1971	15455	62918	19393	0.4563
1972	33183	61990	16485	0.3963
1973	23695	61599	17976	0.2893
1974	52351	64658	14773	0.2205
1975	70144	75442	20715	0.1798
1976	56050	89285	26211	0.2474
1977	26238	96488	25555	0.3869
1978	35180	97396	19200	0.2777
1979	2798	85582	12418	0.1547
1980	4956	82112	15016	0.1774
1981	3500	76089	12233	0.1807
1982	15901	57019	11937	0.3294
1983	19804	52063	12894	0.2639
1984	41191	54204	12378	0.2268
1985	40240	63214	15143	0.2733
1986	27050	66532	14477	0.2205
1987	9747	68612	14882	0.2589
1988	19285	63449	12178	0.1955
1989	16305	53393	14325	0.2750
1990	9688	45865	11726	0.2574
1991	3111	37351	8429	0.2537
1992	2723	29603	5476	0.1901
1993	1828	25843	4026	0.1702
1994	6513	24287	4252	0.1857
1995	104824	25570	4948	0.2184
1996	46561	56939	9642	0.3069
1997	9333	89175	17924	0.3568
1998	3666	89717	22210	0.5086
1999	15921	70377	18482	0.4218
2000	23964	60558	15821	0.2560
2001	126449	71418	15890	0.2687
2002	54798	102883	25011	0.2713
2003	35863	115100	26970	0.4043
2004	28964	100749	23811	0.3136
2005	8123	96932	28581	0.3251
Average	30073	63509	16879	0.3325

Yield and spawning biomass per Recruit
F-reference points:

	Fish Mort Ages 3-7	Yield/R	SSB/R
Average last 3 years	0.330	0.670	2.430
Fmax	0.523	0.685	1.770
F0.1	0.190	0.605	3.449
Fmed	0.299	0.662	2.597

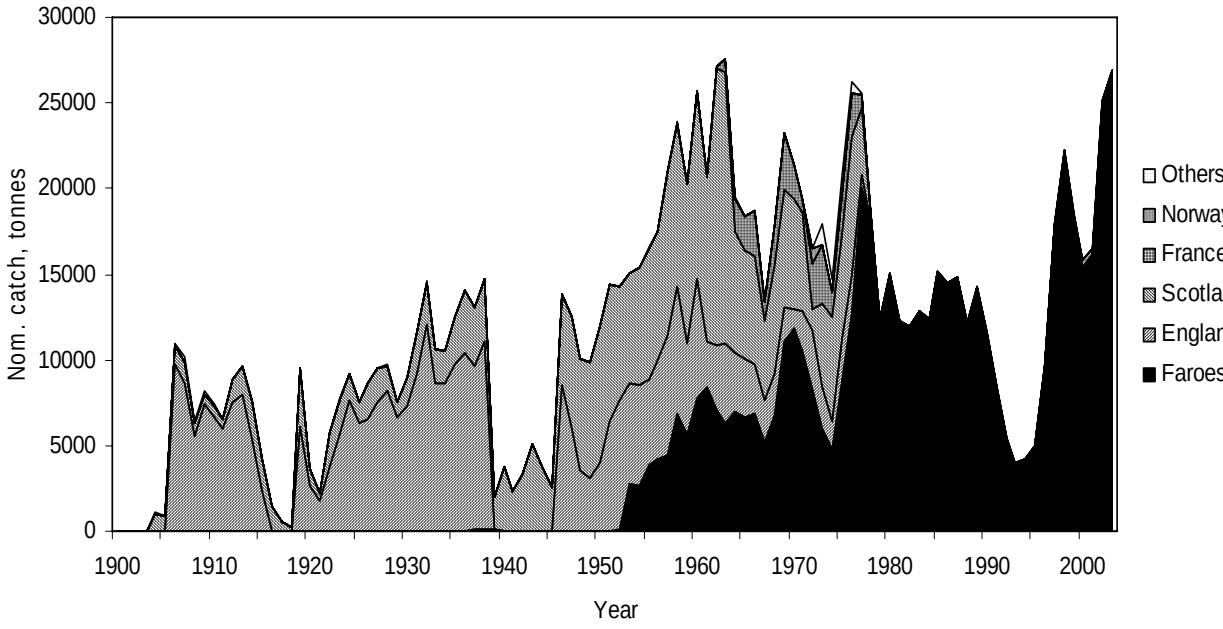


Figure 2.4.1. Haddock in ICES Division Vb. Landings by all nations 1903-2004.

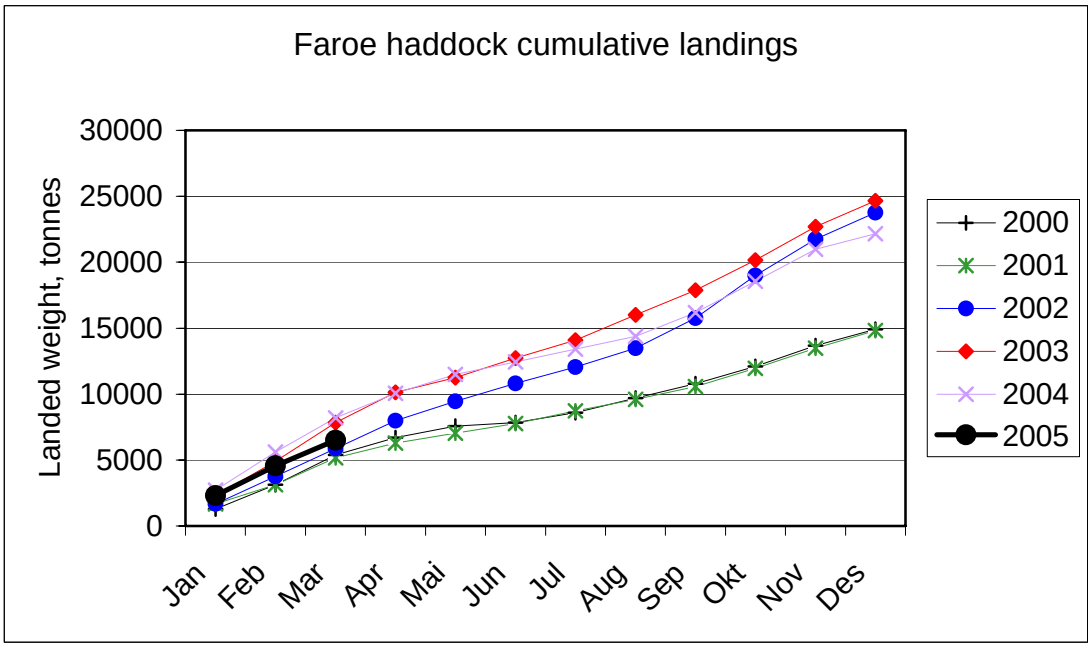


Figure 2.4.2. Faroe Haddock Cumulative Faroese Landings from Vb.

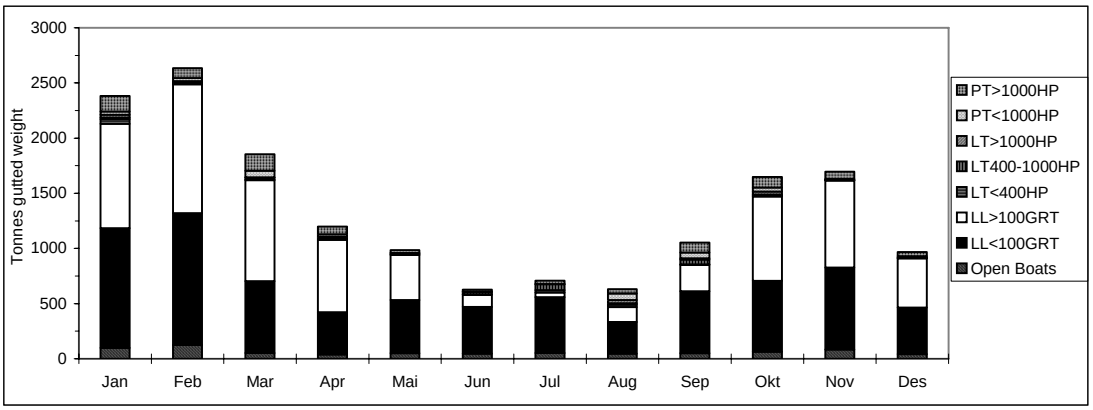


Figure 2.4.3.A. Faroese landings of haddock from Vb1 in 2004 by fleet. Tonnes ungutted weight.

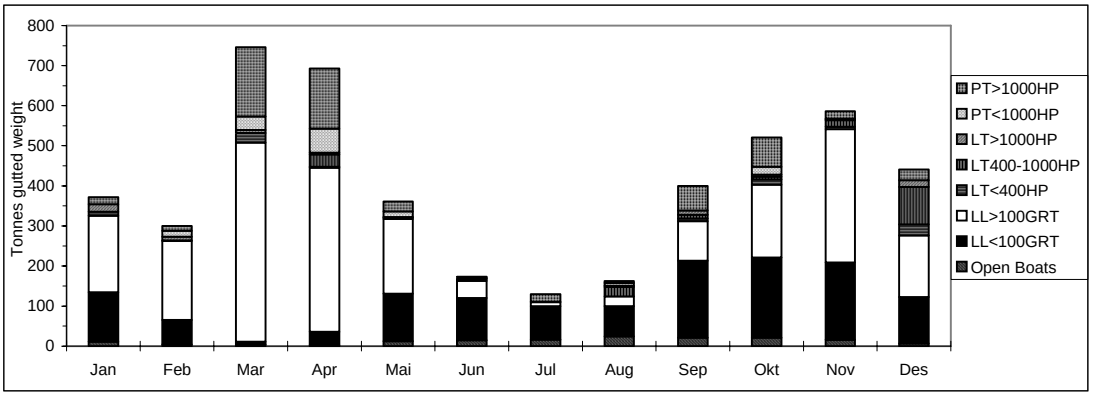


Figure 2.4.3.B. Faroese landings of haddock from Vb2 in 2004 by fleet. Tonnes ungutted weight.

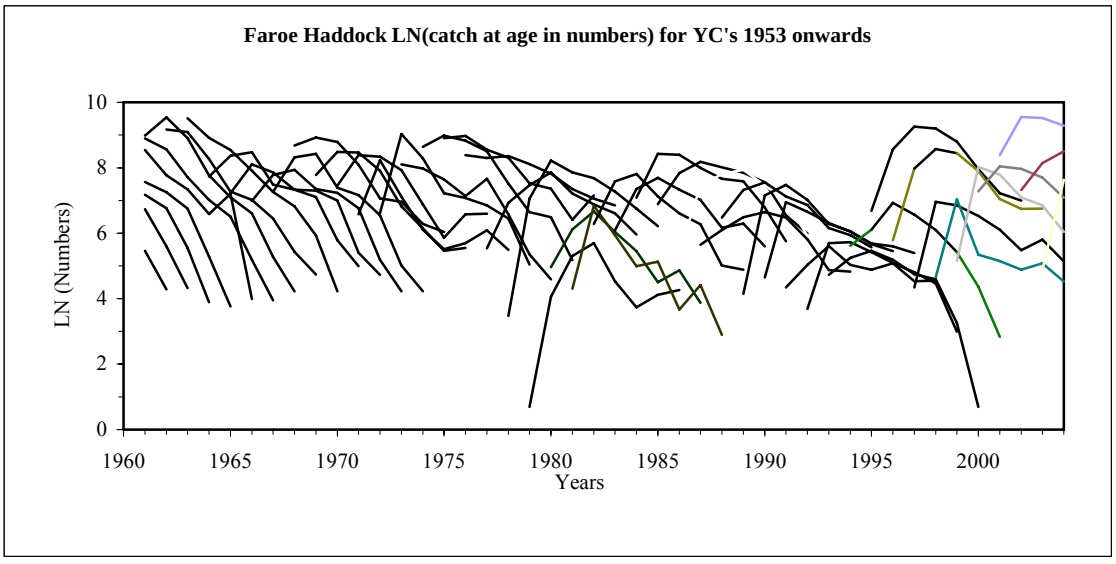


Figure 2.4.5.a Faroe Haddock. LN (catch-at-age in numbers) for YC's 1953 onwards.

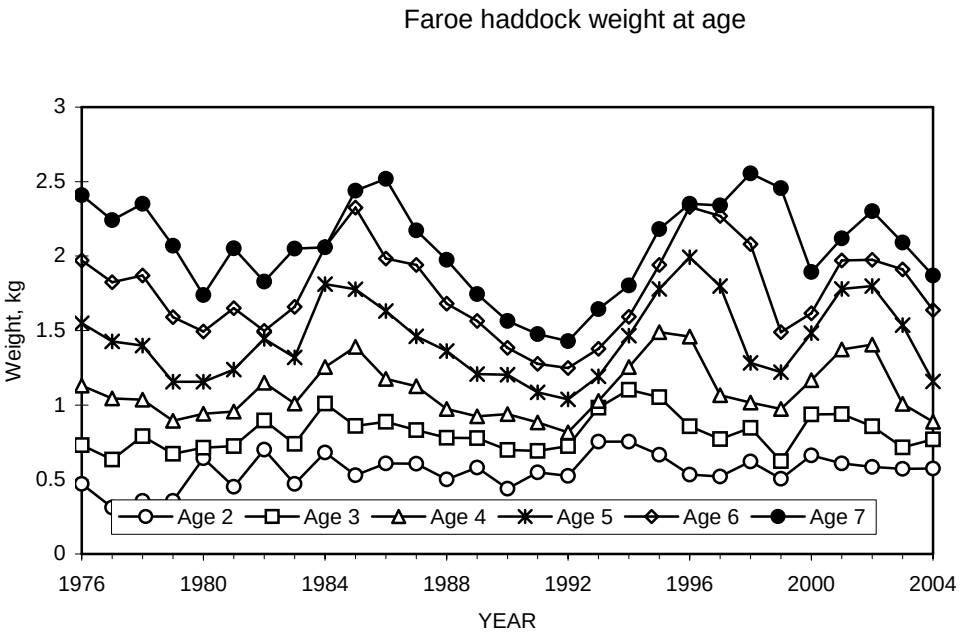


Figure 2.4.5A. Faroe Haddock. Mean weight at age (2-7).

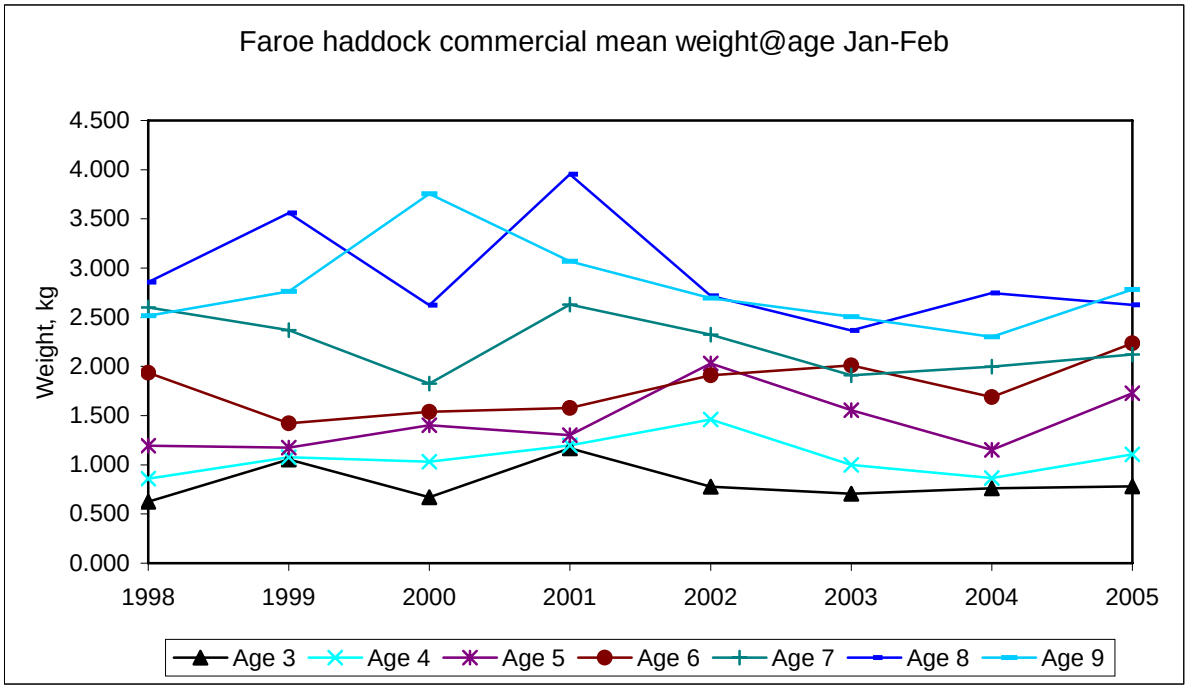
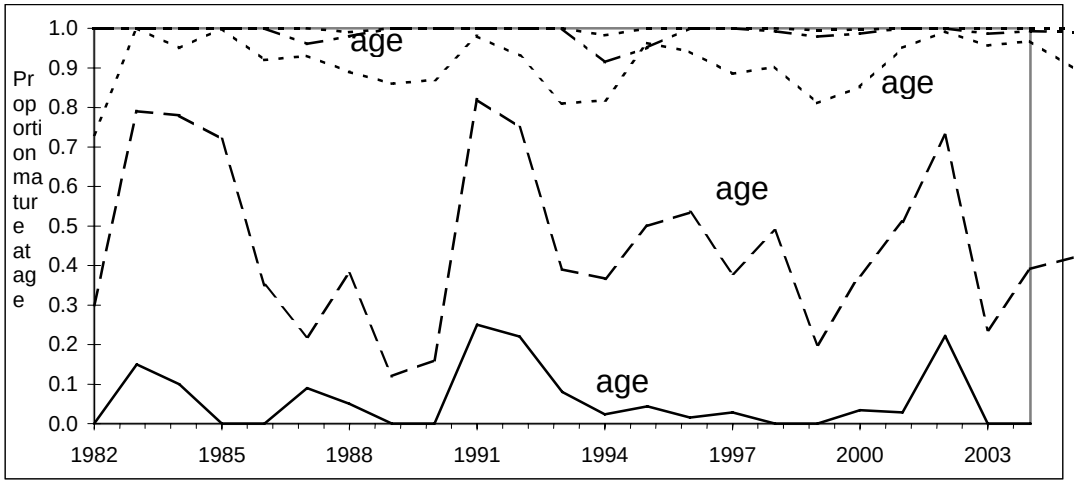
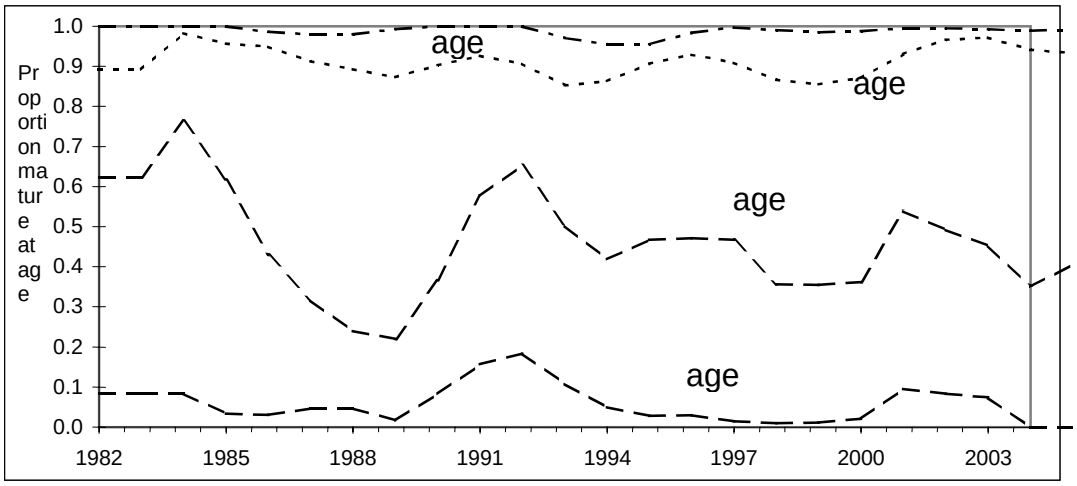


Figure 2.4.5.B. Faroe haddock. Mean weight at age in Jan-Feb.



A: Faroe haddock. Maturity ogives. Observed values from the spring survey.



B: Faroe haddock. Maturity ogives. Running 3 years average from spring survey

Figure 2.4.6. Haddock in ICES Division Vb. Maturity at age.

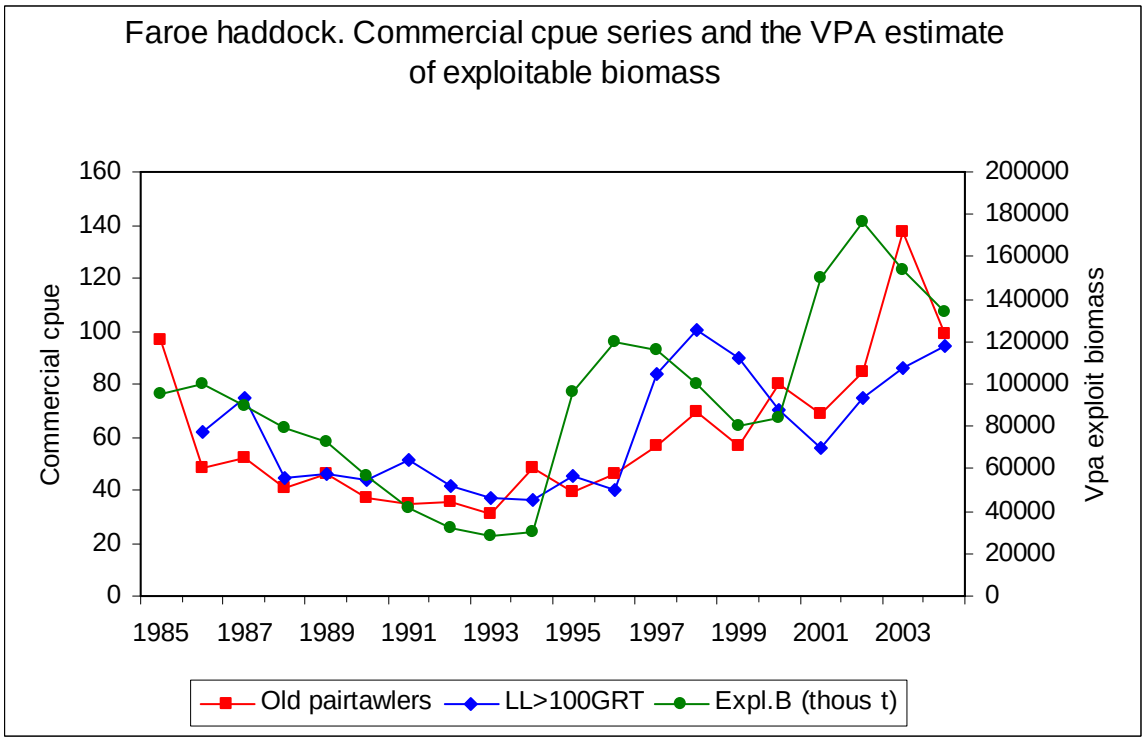


Figure 2.4.7.

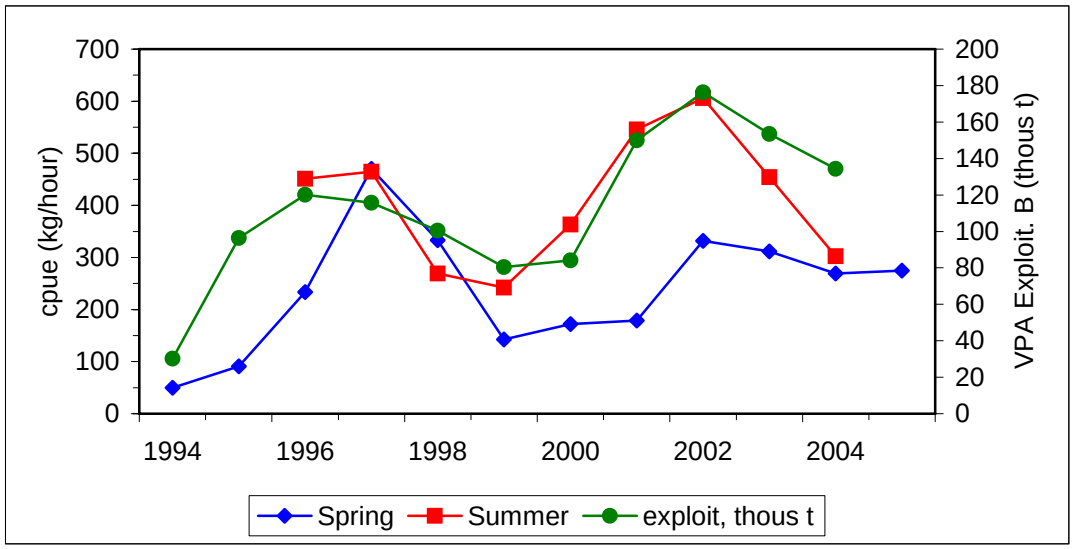


Figure 2.4.8. Faroe haddock. CPUE (kg/trawlhour) in the Faroese groundfish surveys

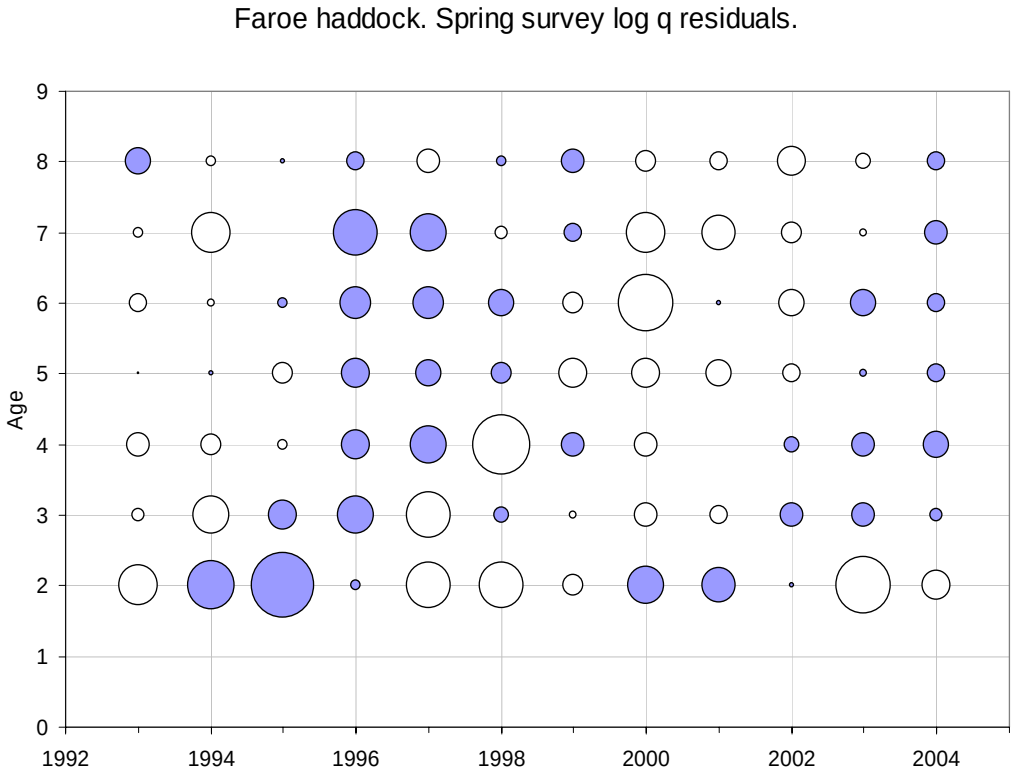


Figure 2.4.9. (Filled symbols positive, open symbols negative).

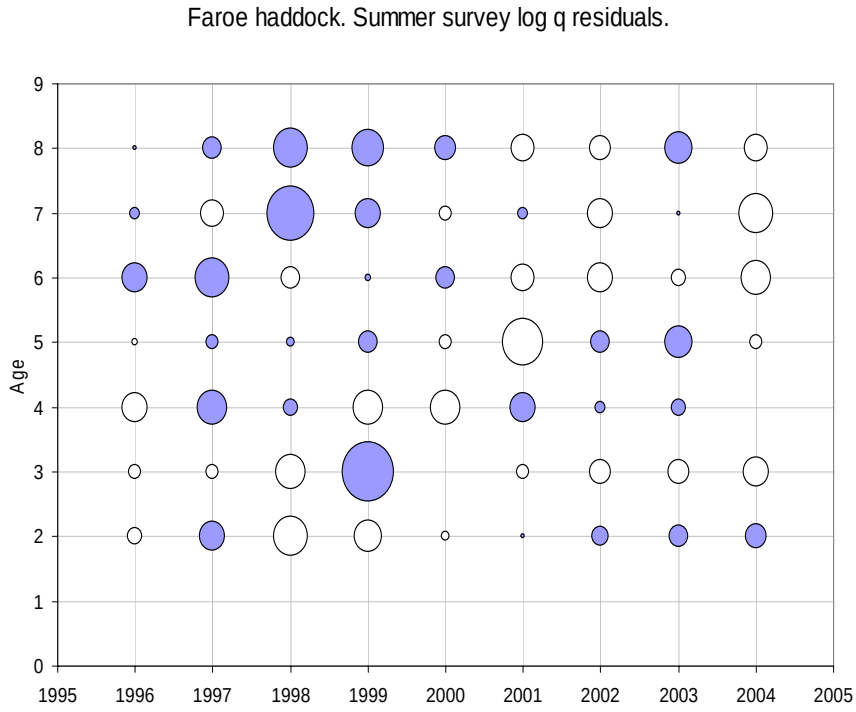


Figure 2.4.10. (Filled symbols positive, open symbols negative).

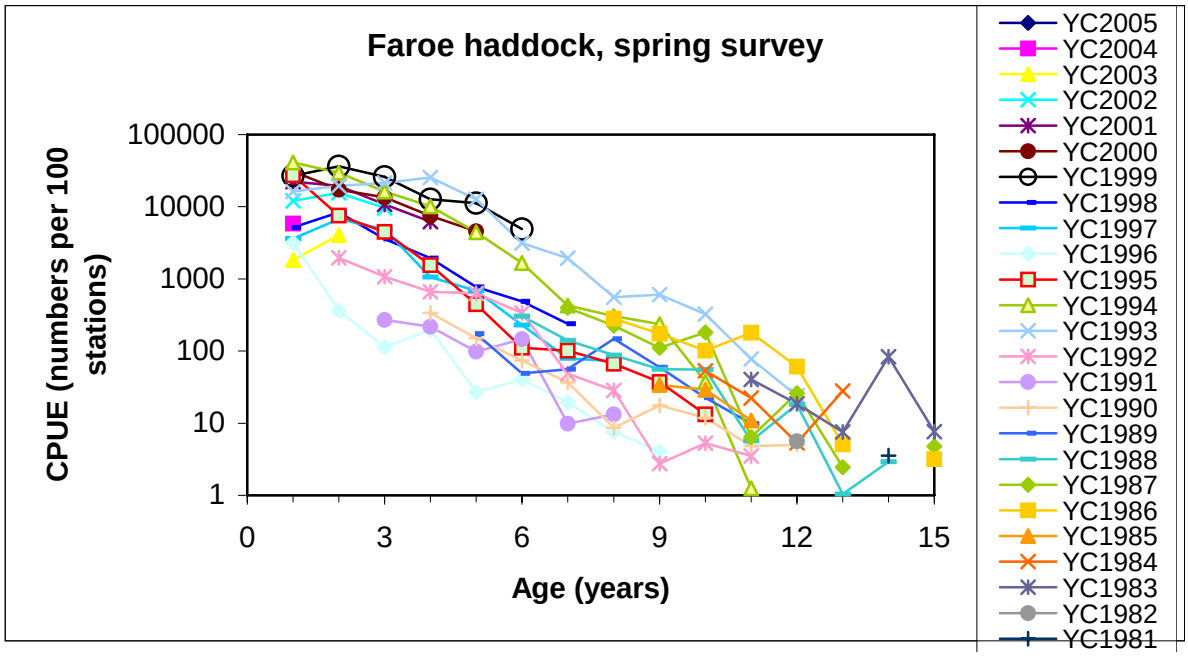


Figure 2.4.11. Faroe haddock. LN (c@age in numbers) in the spring survey.

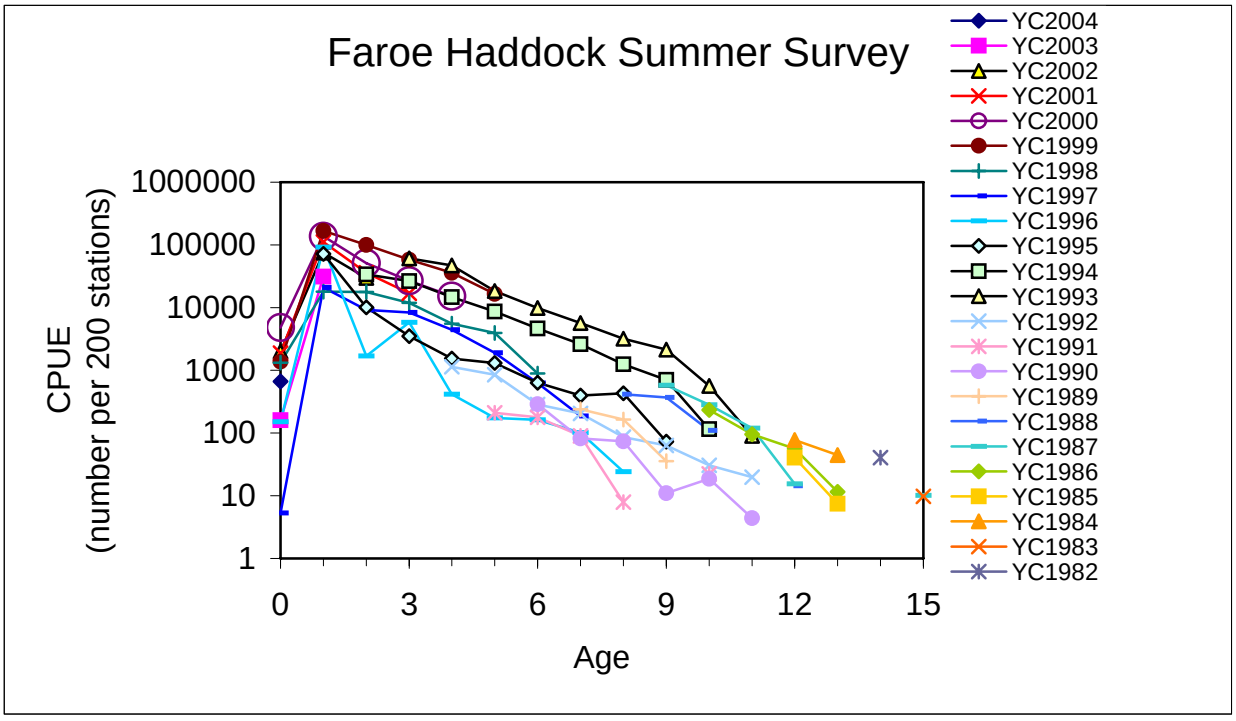


Figure 2.4.12. Faroe haddock. LN (c@age in numbers) in the summer survey.

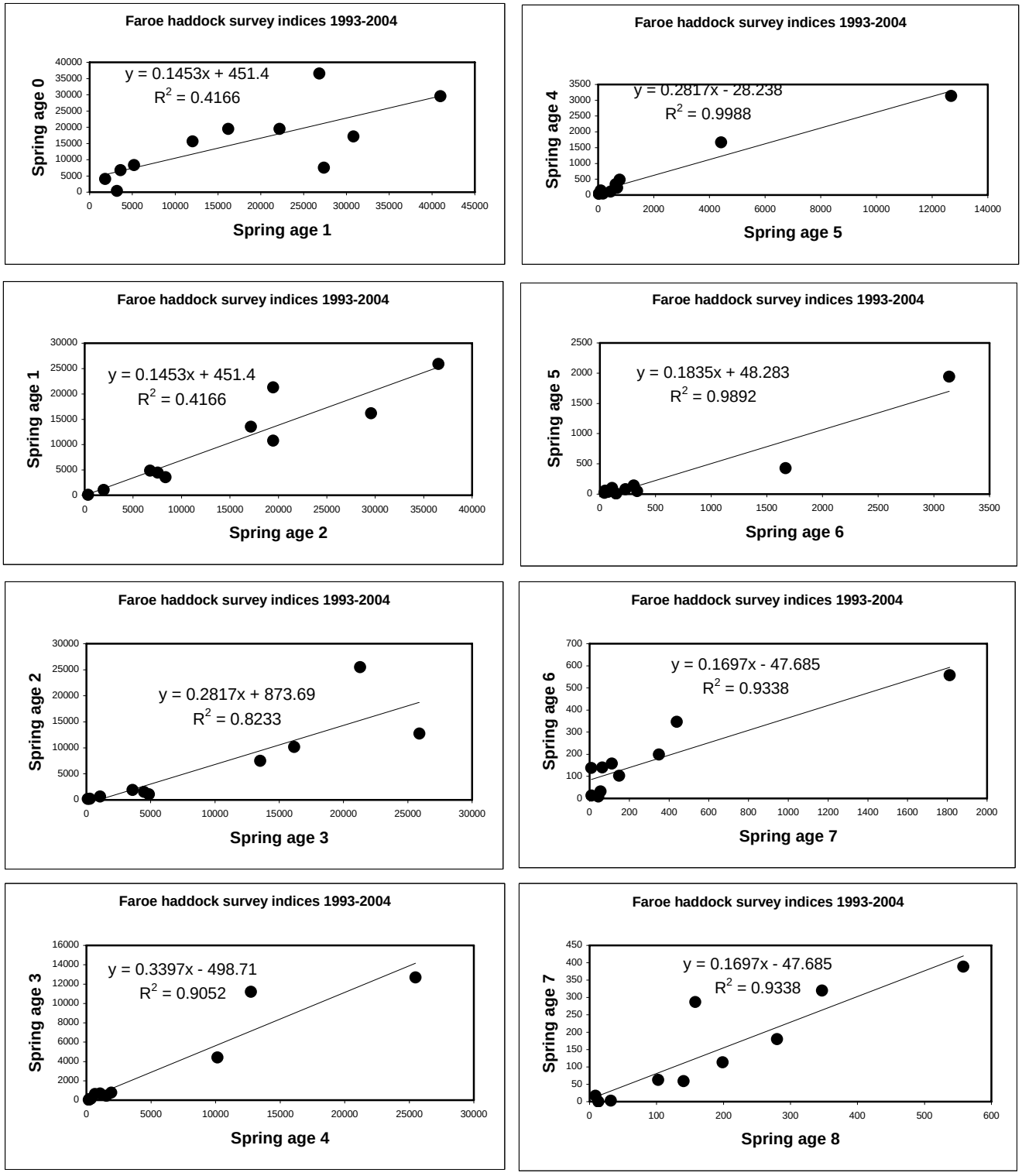


Figure 2.4. 13. Faroe haddock. Comparison between spring survey indices at age and the indices of the same YC one year later.

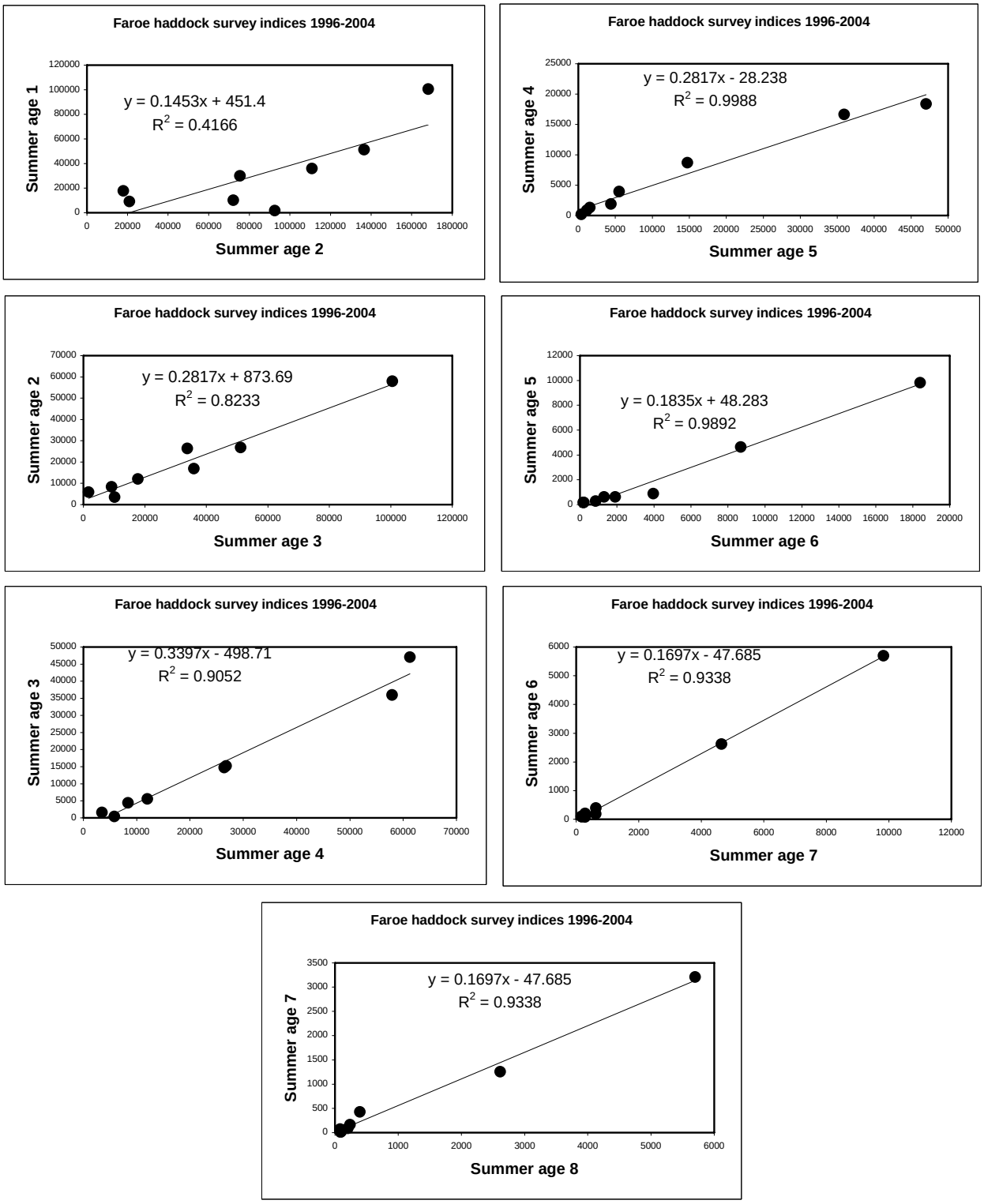


Figure 2.4. 14. Faroe haddock. Comparison between summer survey indices at age and the indices of the same YC one year later.

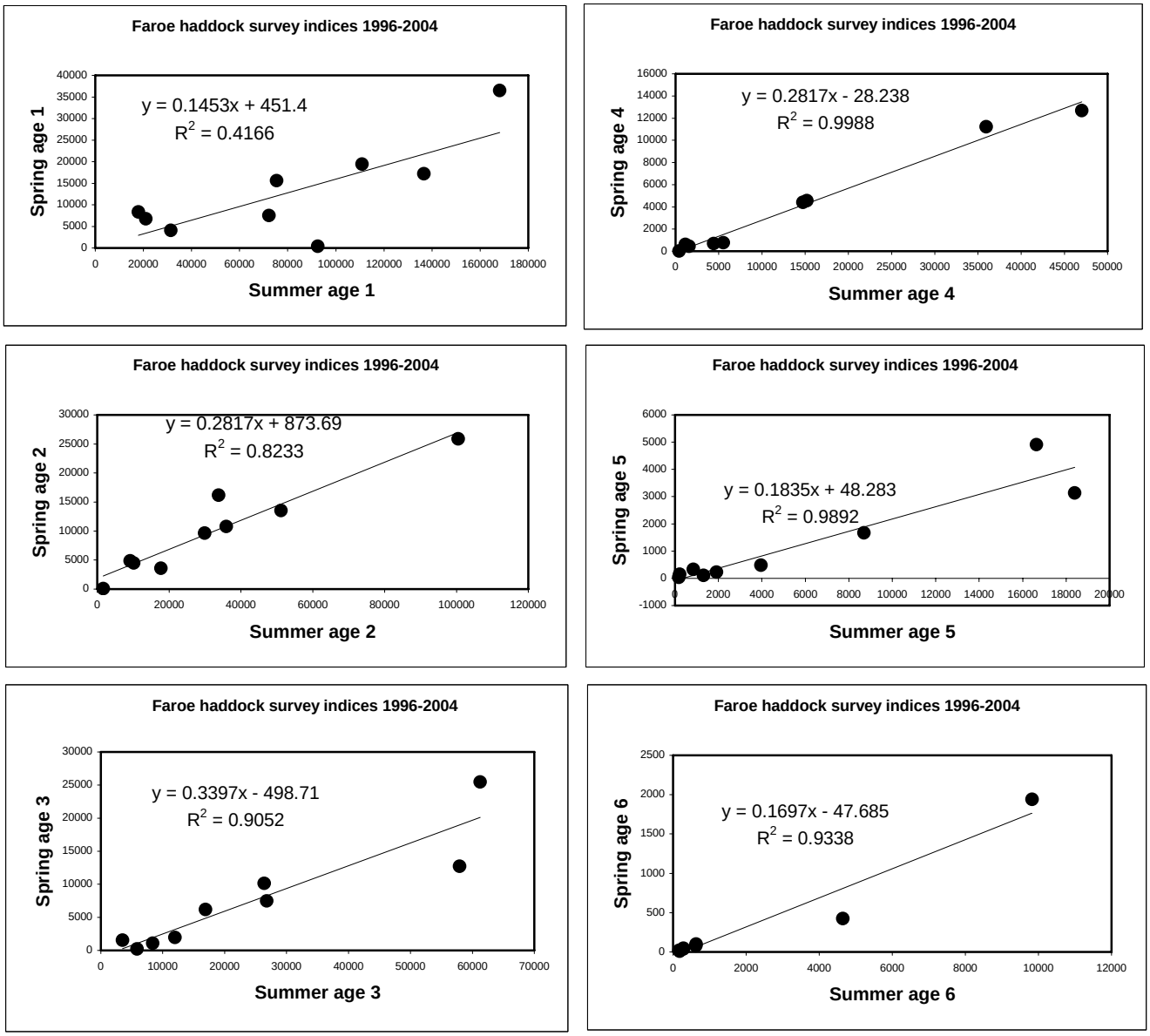


Figure 2.4. 15. Faroe haddock. Comparison between indices at age from the spring and summer surveys.

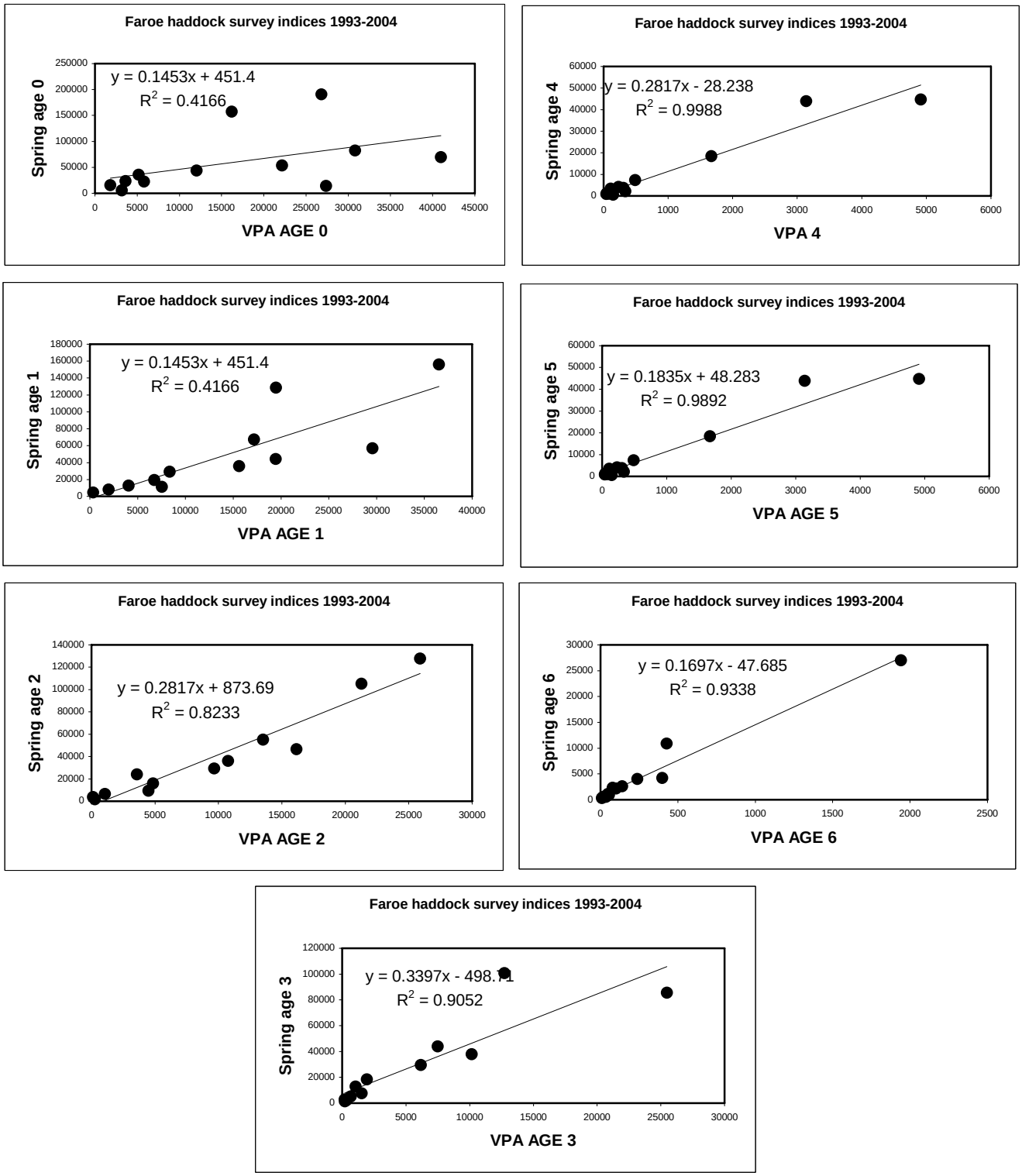


Figure 2.4. 16. Faroe haddock. Comparison between spring survey indices at age and the corresponding VPA estimates at age.

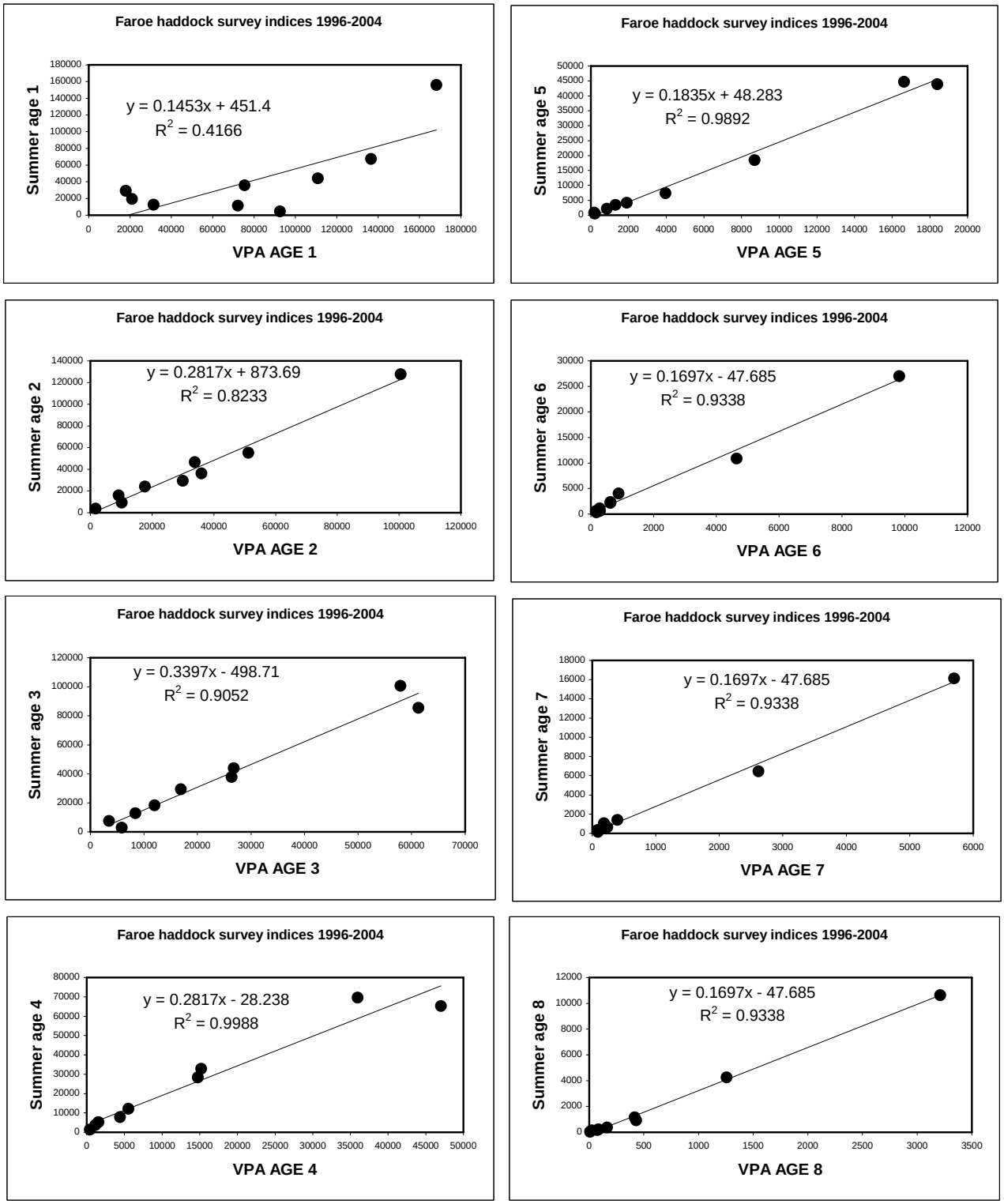


Figure 2.4. 17. Faroe haddock. Comparison between summer survey indices at age and the corresponding VPA estimates at age.

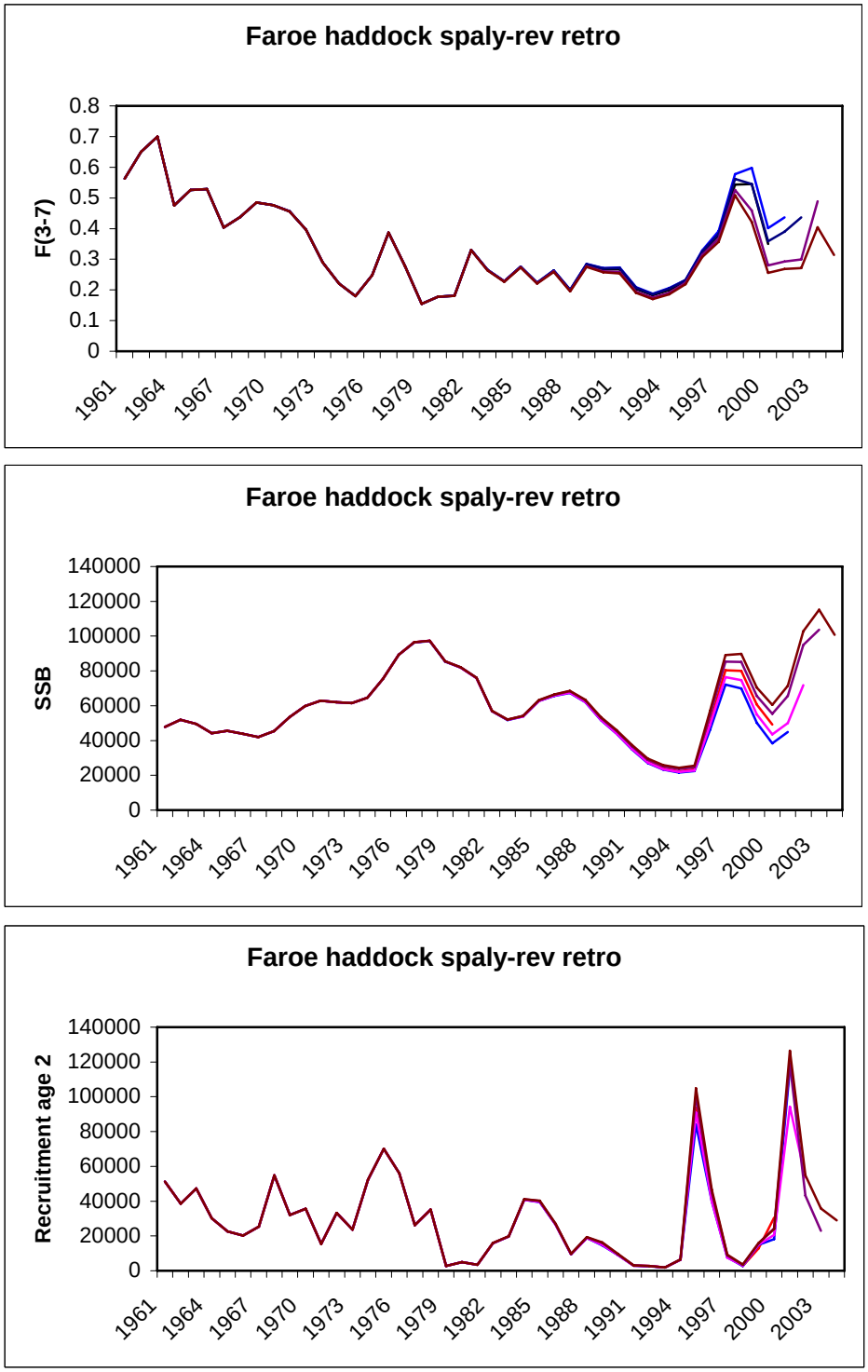


Figure 2.4.18. Faroe haddock. Retrospective analysis on the 2005 XSA (SPALY-REV run).

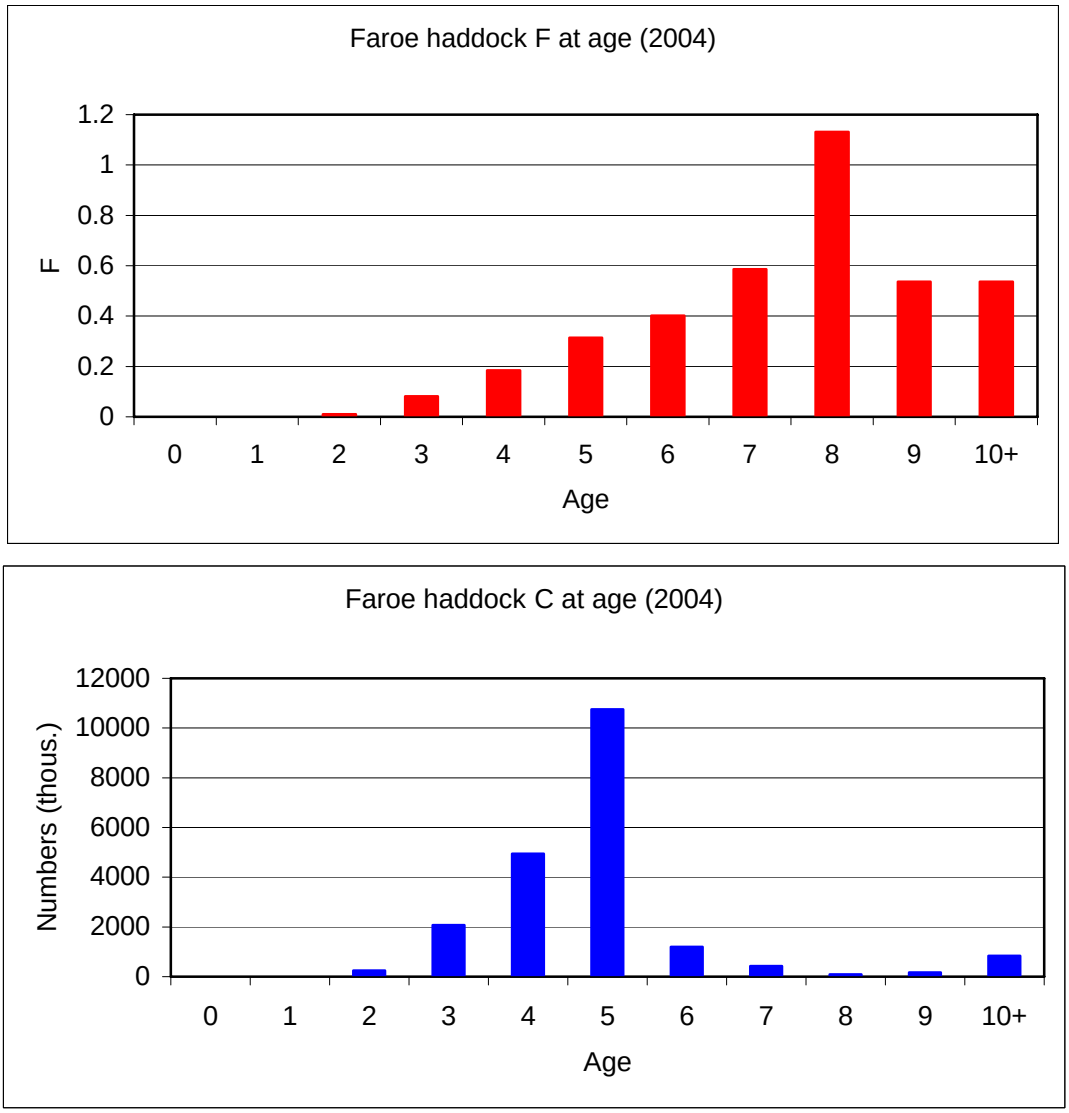


Figure 2.4.19. XSA 2005. The 2004 F@age and C@age.

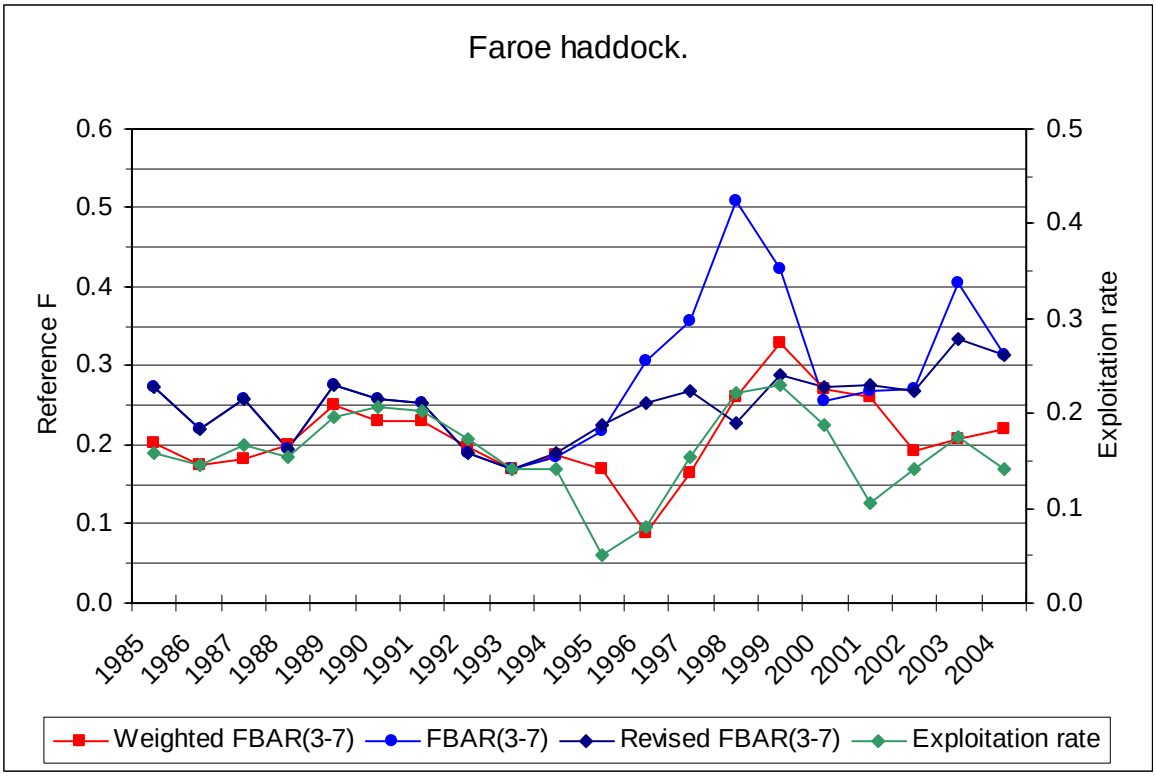


Figure 2.4.20. Different proxies for fishing mortality.

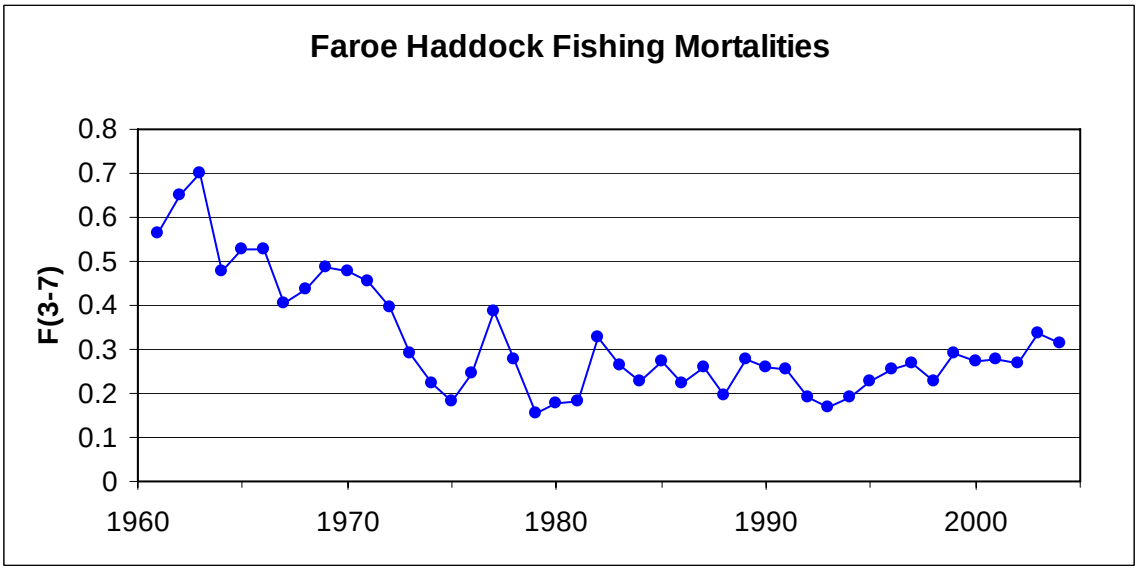


Figure 2.4.21. FBAR(3-7) with the 1992 and 1996 yea rclasses removed.

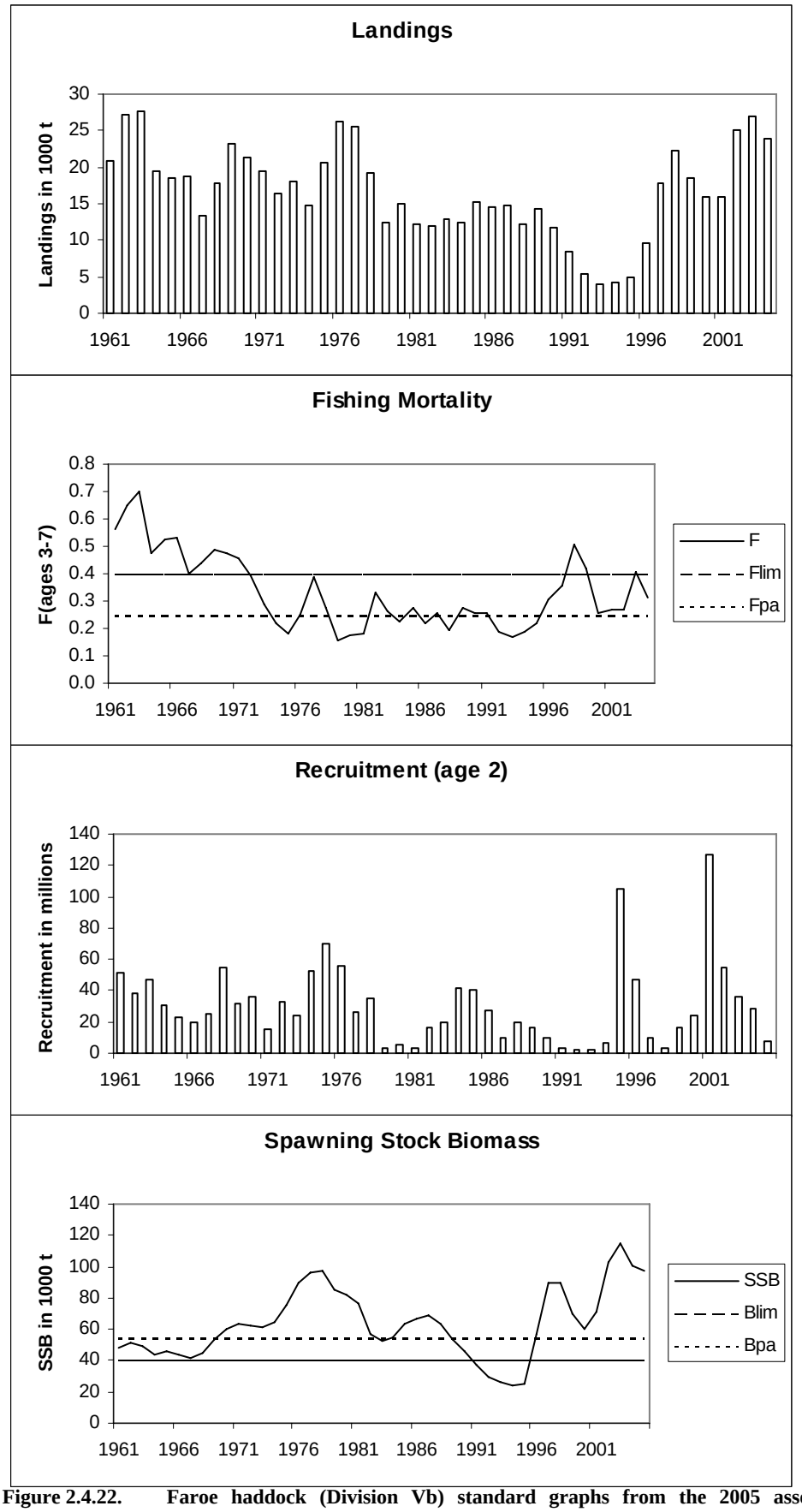
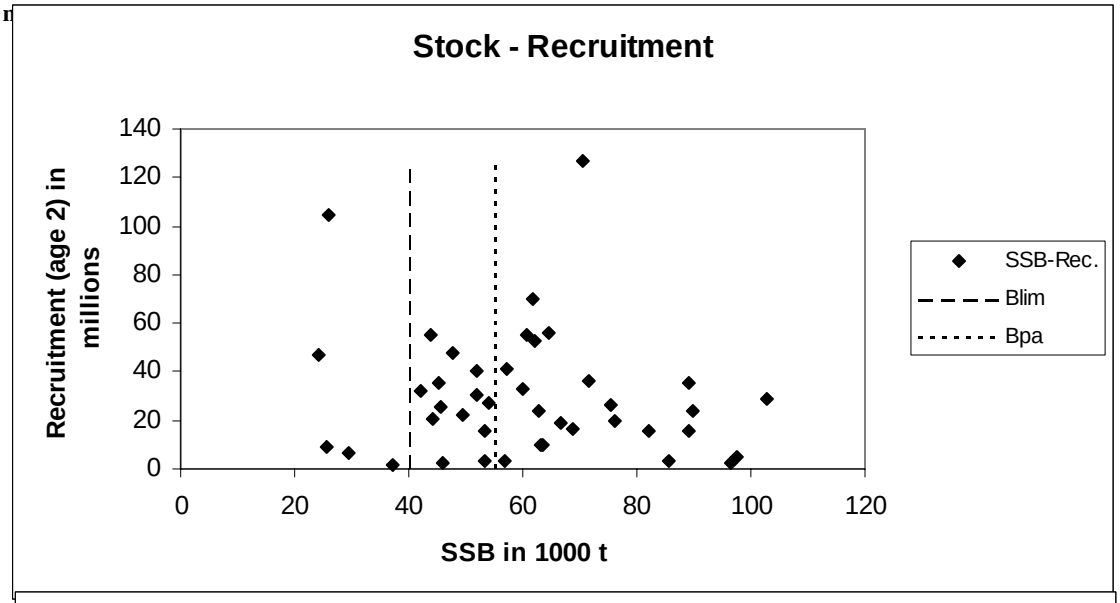
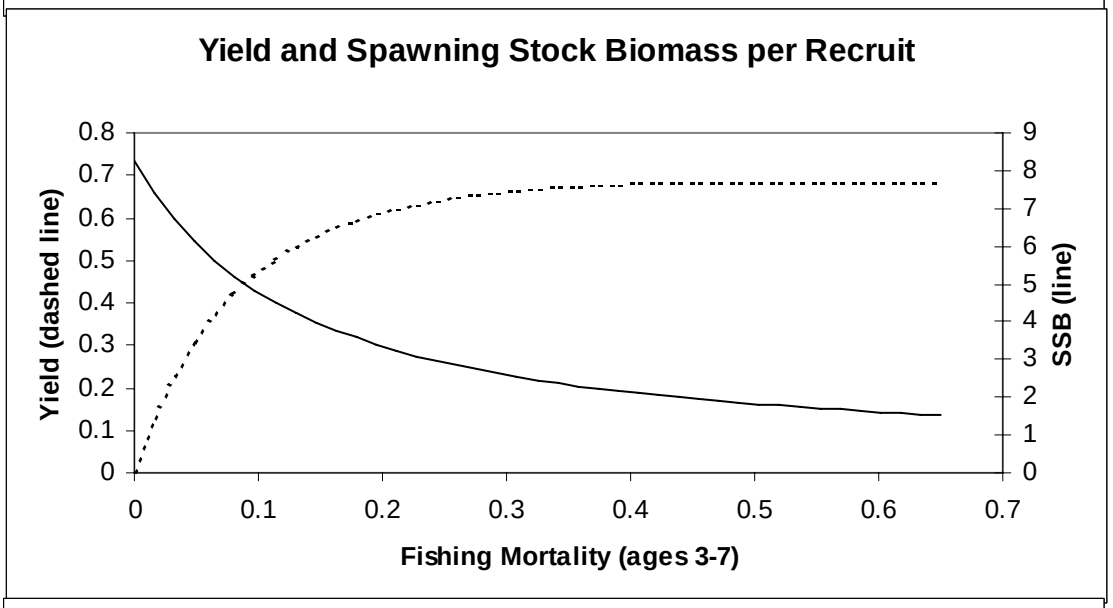
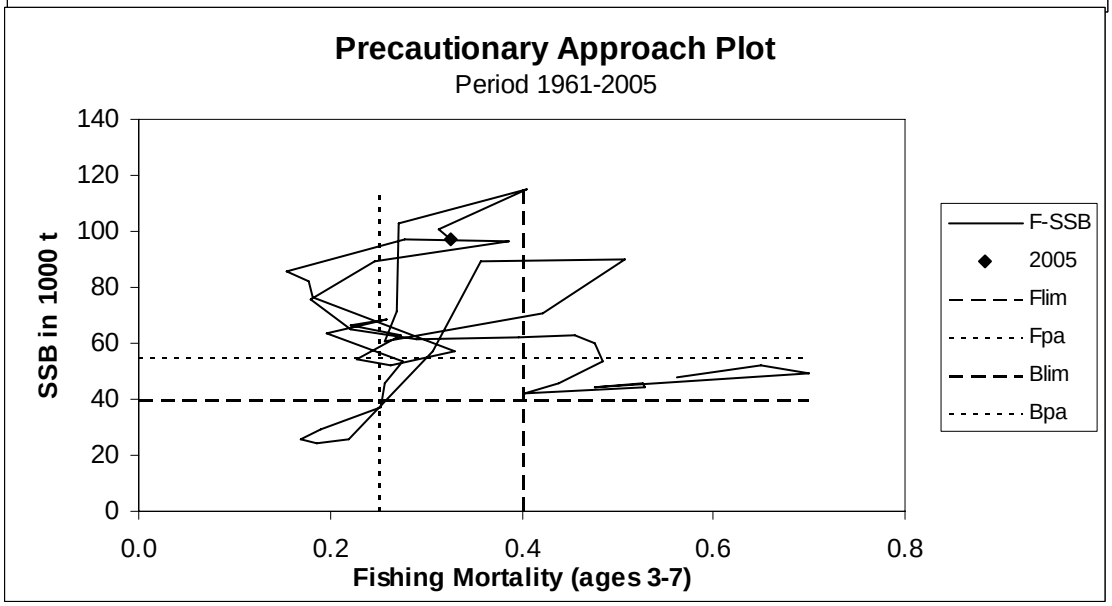


Figure 2.4.22. Faroe haddock (Division Vb) standard graphs from the 2005 assessment

Figure 2.4.22 (Cont.). Faroe haddock (Division Vb) standard graphs from the 2005 assess-







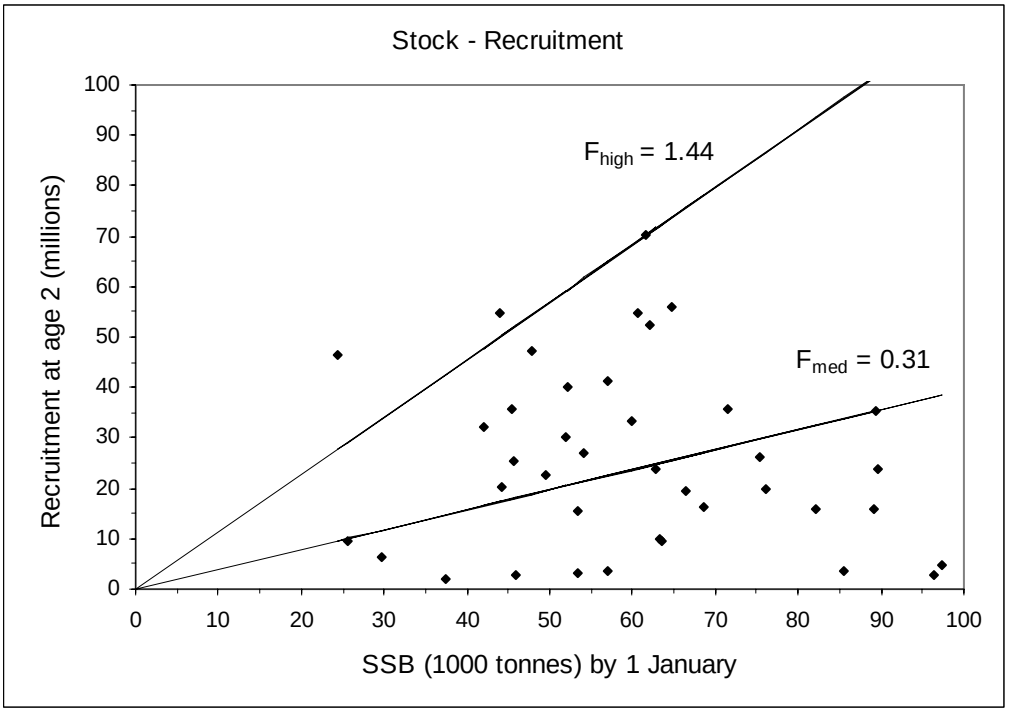
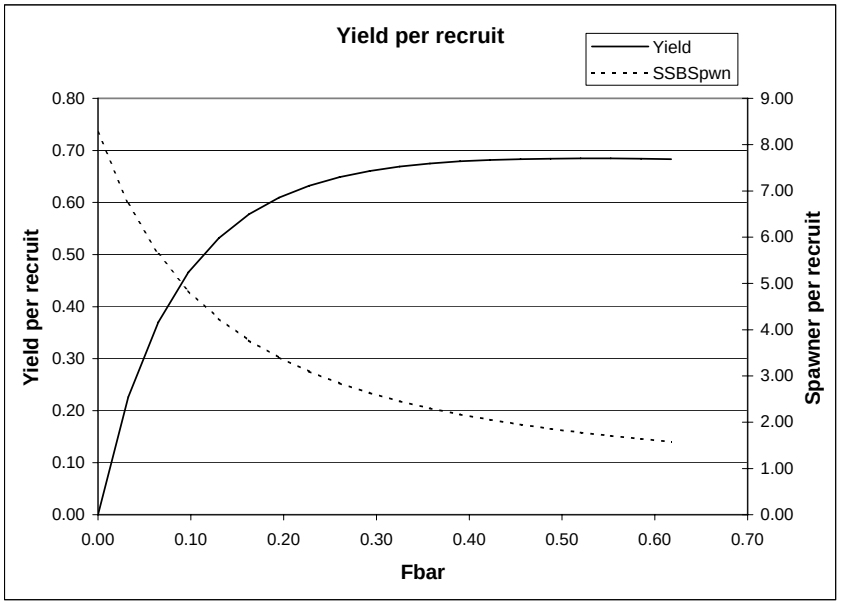


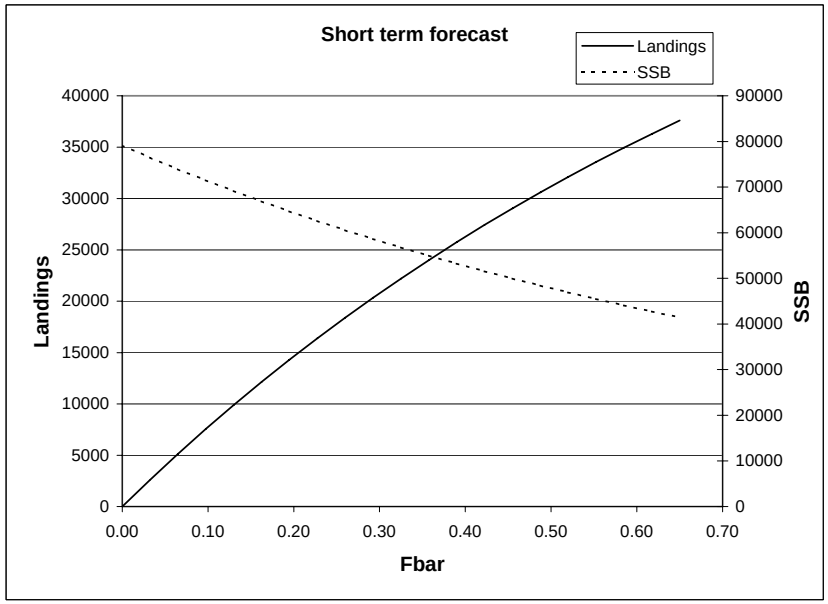
Figure 2.4.23. Faroe haddock. SSB-R plot.



MFYPR version 1
Run: jr2
Time and date: 18:11 4/30/2005

Reference point	F multiplier	Absolute F
Fbar(3-7)	1.0000	0.3251
FMax	1.6103	0.5235
F0.1	0.5848	0.1901
F35%SPR	0.9507	0.3091
Flow	-99.0000	
Fmed	0.9507	0.3091
Fhigh	4.4366	1.4422

Weights in kilograms



MFDP version 1
Run: jr1
Index file 02/05/2004
Time and date: 17:06 4/30/2005
Fbar age range: 3-7

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Figure 2.4.24. Faroe Haddock prediction outputs.

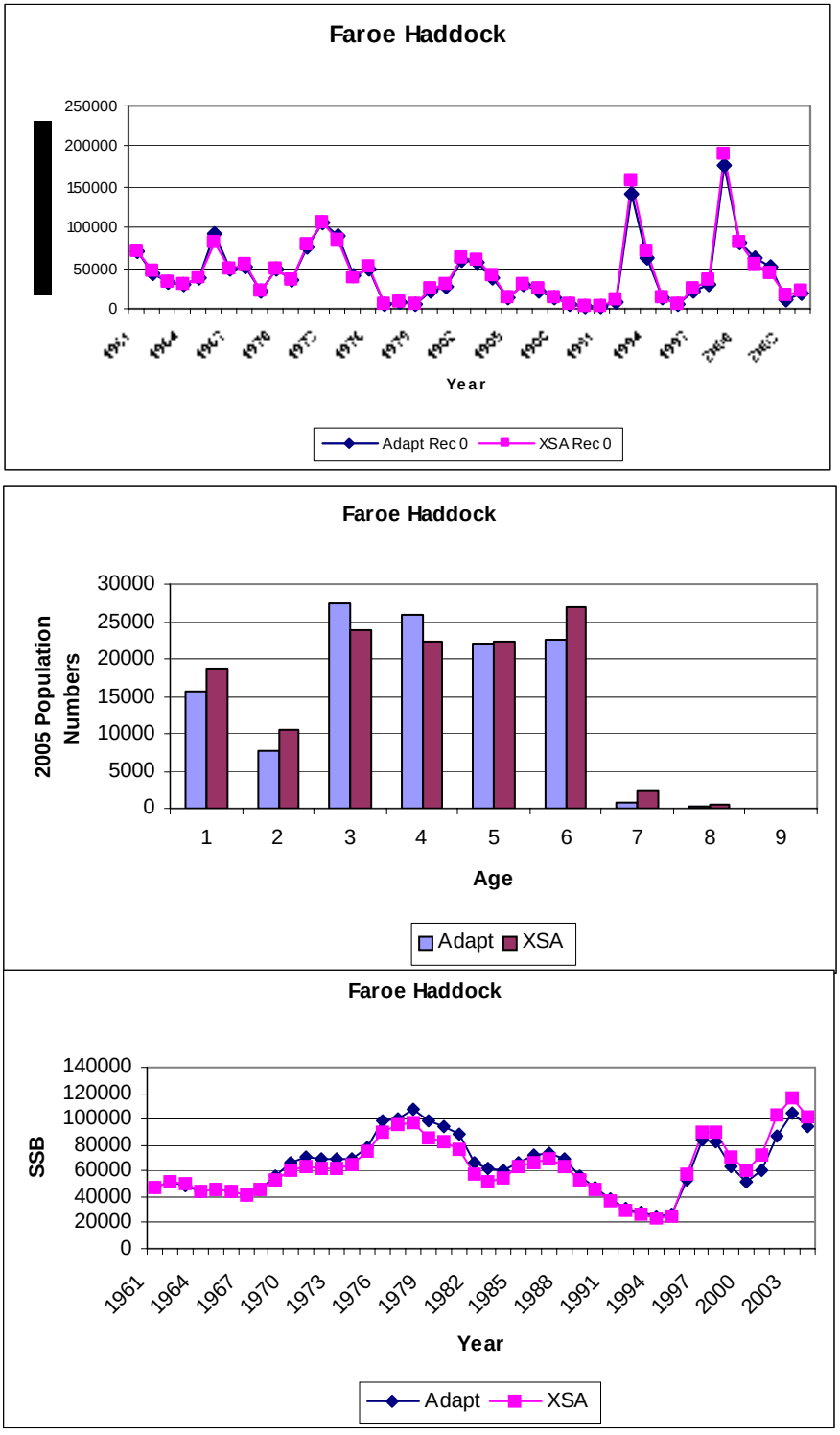

Figure 2.4.25. Comparisons of the 2005 ADAPT and XSA runs.

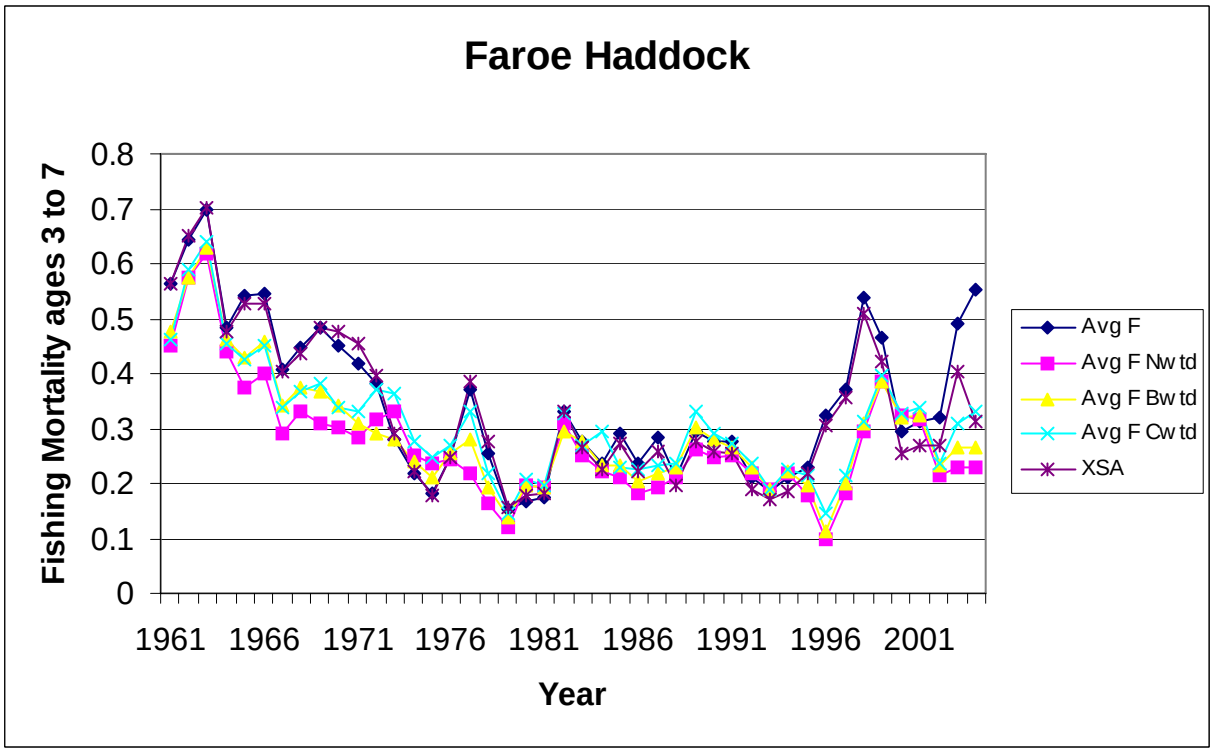

Figure 2.4.25 (cont.). Comparisons of the 2005 ADAPT and XSA runs.

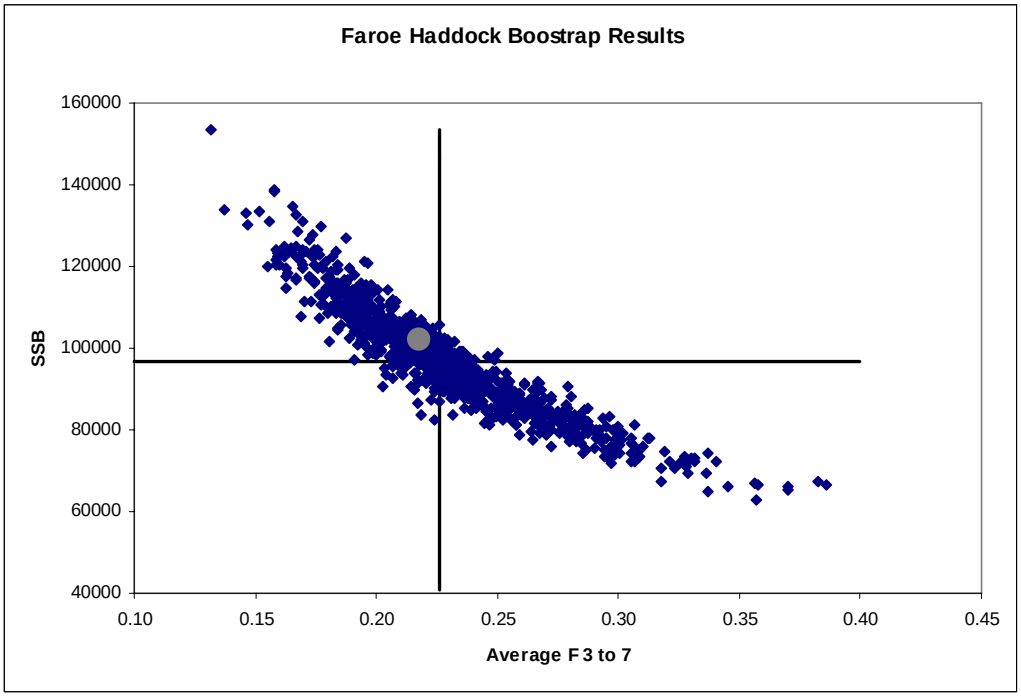

Figure 2.4.26. The f and SSB's from a 1000 bootstraps of the ADAPT. Inserted are the F and SSB from the accepted XSA

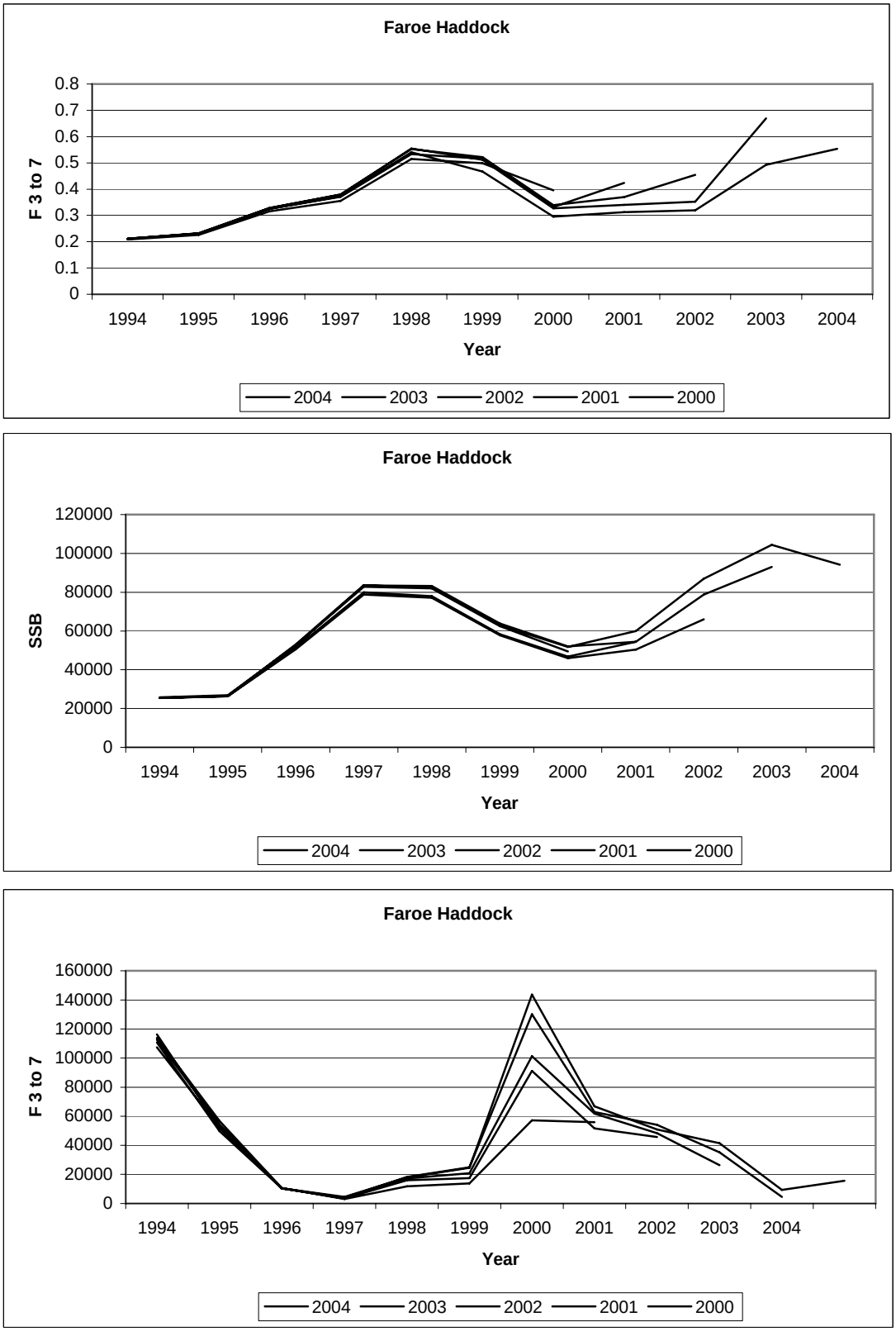

Figure 2.4.27. The ADAPT retrospective patterns

2.5 Faroe Saithe

2.5.1 Landings and trends in the fishery

Nominal landings of saithe from the Faroese grounds (Division Vb) have varied cyclically between 10 000 t and 60 000 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 steadily to 53 500 tonnes in 2002 (Table 2.5.1.1, Figure 2.5.1.1) and they have declined since to 46 100 t in 2004.

With the introduction of the 200 miles EEZ in 1977, mostly Faroese vessels have prosecuted the saithe fishery. The principal fleet consists of large pair trawlers (>1000 HP), which have a directed fishery for saithe, accounting for about 60% of the reported landings in 1993-2004 (Table 2.5.1.2). The smaller pair trawlers (<1000 HP) have a more mixed fishery and they account for about 10-20% of the total landings of saithe in 1993-2004. During the last decade the proportion of saithe in the catches has generally increased for larger pair trawlers and larger single trawlers (>1000 HP) but decreased for the smaller trawlers and jiggers. In 2003 and 2004 the saithe catches decreased for larger single trawlers and increased for smaller pair trawlers. Other vessel categories report only small catches of saithe as by-catch.

Catches used in the assessment are presented in Table 2.5.1.1. These include foreign catches that have been reported to the Faroese Authorities but not officially reported to ICES. Catches in that part of Subdivision IIa, which lies immediately north of the Faroes, have also been included. Little discarding is thought to occur in this fishery.

2.5.2 Catch at age

Catch at age is based on length and otolith samples from Faroese landings of small and large single and pair trawlers, and landing statistic 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 2.5.2.1 and 2.5.2.3). The sampling intensity in 2004 was similar to that in 2003 (Table 2.5.2.2).

2.5.3 Weight at age

Mean weights at age have varied by a factor of about 2 during 1961-2004. Mean weights at age were generally high during the early 1980s and they subsequently decreased from the mid 1980s to the early 1990s (Table 2.5.3.1 and Figure 2.5.3.1). The mean weights increased again in the period 1992-96 but have shown a general decreased since. Weights at age for 2004 are at their lowest since 1991. There appears to be a relationship between weight at age and catchability at age 3 (Figure 2.5.3.2). The SOP for 2004 was 100%.

2.5.4 Maturity at age

Maturity at age data from the spring survey are 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. A model has been used since 1993 (ICES C.M.1993/Assess:18), to predict maturity at age in order to reduce the year to year variability associated with small samples. The initial model used was a GLM with a Logit link function describing maturity at age as a function of age, year class strength, mean weight at age and a year effect (WD 12, 2005). Year class strength was not significant and was excluded from the model in this year's assessment. This model was applied to predict the maturity at age for 1983-2004 (Table 2.5.4.1 and Figure 2.5.4.1). For 1961 to 1982, fixed values are used.

2.5.5 Stock assessment

2.5.5.1 Tuning and estimation of fishing mortality

The 2005 Faroe saithe assessment is a benchmark assessment. Several different settings and combinations of tuning series were run in the XSA (WD 16, 2005). 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 Cuba Logbook series. The series extends back to 1985 and consists of data from 8 pair trawlers greater than 1000 HP (Cuba trawlers) which specialize in fishing on saithe and account for 5 000-10 000 t of saithe each year (described in annex). In 2002/2003, 4 of these trawlers left the fleet. The 4 remaining trawlers have larger CPUE, but they show the same trends. In 2004 a new pair of trawlers (>1000 HP) was introduced and they showed the same trends, but lower value in CPUE In 2005 a new pair of trawlers (>1000 HP) was introduced to this common fleet showing the same trend as the Cuba-trawlers during 1999-2003. In the pair trawler series, information for each haul was supplied and only those hauls where saithe contributed to more than 50% of the total catches of cod, haddock and saithe were used.

A systematic check of the age based indices from the different pairs of the commercial series showed that there were differences between the pairs (Fig. 2.5.5.1-3), especially in 2004. A GLM model was run using data from each haul to standardize the CPUE-data. The model fitted CPUE values have been estimated for the period from 1995 to 2004 including years, month, pair and geographical square (WD 37, 2005). The different pairs of trawlers are described in the appendix.

As the 2005 assessment is a benchmark assessment, various combinations of indices and XSA settings were explore. In addition, ADAPT was also run with various combination of indices. The indices were used independently as well as jointly in the same calibration as follows: SPALY – Cuba 4 Trawlers; GLM Pair Trawlers; Spring Survey; Summer Survey; GLM Pairs, Spring Survey, Summer Survey; GLM Pairs, Spring Survey. A SPALY run was not done with ADAPT.

The summer survey (1996-2004) showed large standard errors of log q and marked trend in residuals whether used alone or jointly with other indices. This may be related to the observation that the biomass estimates obtained using different stratification schemes vary greatly in absolute abundance. The calibrations with the summer survey alone also indicated unrealistically high stock sizes.

The spring survey (1994-2004) used alone does show some promises as a potential index of stock size, but here again the stratification scheme influences the absolute biomass estimate. The NWWG considered that the inclusion of the spring survey in the assessment would be useful, but it was concerned that the stratification scheme could be introducing trends. Pending the resolution of the best stratification to use, the NWWG decided to use the XSA with the GLM Pair Trawlers as a final assessment with catchability independent of stock size for all ages, catchability independent of age for ages ≥ 8, the shrinkage of the SE of the mean = 2.0, and no time tampered weighting. The CPUE series used are shown in table 2.5.5.1. The XSA diagnostics are in Table 2.5.5.2 and the output from the XSA is presented in Tables 2.5.5.3-5. Residual values in recent years are relatively random (Figure 2.5.5.4).

The ADAPT assessments gave results very similar to those of the XSA with a slight tendency to overestimate F and consequently underestimate SSB in the terminal year (Figure 2.5.5.5). The point estimator of the SSB historical time trajectory from the ADAPT and the XSA deviate only in the final year (Figure 2.5.5.6). The bootstrap probability profile (Figure 2.5.5.7) for the SSB and the reference F in 2004 show that the point estimator from the final XSA run does not differ significantly from the ADAPT results.

The exploitation pattern for the cuba trawlers shows an increasing trend from 1991 to 1996, but the estimates have been reasonably stable for the period 1997-2002 (ICES C:M: 2003/ACFM:24). The estimates, however, are calculated from an assessment calibrated with a GLM model run on all available data from the pair-trawlers during 1995-2004 (AllPairGLM3-11). Working Group accepted the XSA calibrated with the CPUE from this GLM-model.

Retrospective analysis of the average fishing mortality from the XSA for age groups 4-8 (Figure 2.5.5.8) shows a tendency to overestimate F in the last three years. This implies that biomass was correspondingly underestimated (Figure 2.5.5.9). With respect to recruitment, the analysis indicated an overestimate (Figure 2.5.5.10). The new stock size index and XSA settings appear to result in an improved retrospective. The fishing mortalities for 1961-2004 are presented in Table 2.5.5.3 and in Figure 2.5.5.11. The average fishing mortality for age groups 4-8 was 0.34 in 2004.

2.5.5.2 Stock estimates and recruitment

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 2.5.5.12). The 1998 year class is the largest ever (> 89 mill.) and can be seen in the modal length progression in the summer survey from 1999 to 2004 (Figure 2.5.5.13). 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 2.5.5.5 and Figure 2.5.5.14). The SSB has increased since 1996 to 2001 (91 000 tonnes) with the maturation of the 1992, 1994, 1996 and 1998 year-classes but in 2004 the SSB decreased to 74 000 t. The relation between stock and recruitment is showed in Figure 2.5.5.15.

2.5.6 Prediction of catch and biomass

2.5.6.1 Input data

Input data for prediction with management options are presented in Table 2.5.6.1 and input data for the yield per recruit calculations are given in Table 2.5.6.2.

Population numbers for the short term prediction up to the 2001 year class are from the final VPA run whereas values for the 2002-2004 year classes are the geometric mean of the 1977 to 2001 year classes. A simple linear model was fitted to the catch weight at age data (age groups 4-8) based on mean weights of the year classes in the previous year and year class strength for the period 1987-2004 (Table 2.5.6.1.), for the other ages the arithmetic mean for 2002-2004 were used. Catch weight at age for year 2005-2007 was predicted in the same way as the mean weight at age. In the long term prediction (yield per recruit) mean weights for 1961-2004 were used.

In the short term prediction the fitted proportion mature values from the model for 2005 were used for that year. For 2006 and 2007 the average of fitted values for 2003-2005 was used. In the long term prediction the average of fitted values for 1983-2005 was used.

For all three years in the short term prediction the average exploitation pattern in the final VPA for 2002-2004, unscaled to Fbar (ages 4-8) in 2004 in view of a retrospective problem (as suggested by ACFM, 2004), was used. In the long term prediction the exploitation pattern was set equal to the average of exploitation patterns for 2000-2004 (as suggested from ACFM, 2004).

2.5.6.2 Biological reference points

Yield per recruit and spawning stock biomass per recruit curves are presented in Figure 2.5.6.1. Compared to the 2004 average fishing mortality of 0.33 in age groups 4-8, $\mathbf{F}_{max}$ is 0.42, $\mathbf{F}_{0.1}$ is 0.12, $\mathbf{F}_{med}$ is 0.36 and $\mathbf{F}_{high}$ is 1.00 (Table 2.5.6.3, Figure 2.5.6.1 and Figure 2.5.6.2).

Yield and spawning biomass per Recruit F-reference points:

	FISH MORT	YIELD/R	SSB/R
	Ages 4-8		
Average last 3 years	0.459	1.530	3.088
Fmax	0.423	1.531	3.281
F0.1	0.119	1.323	7.773
Fmed	0.363	1.529	3.684

Medium term projections and reference points for Faroese stocks are discussed in the introductory section for the Faroese waters.

The history of the stock/fishery in relation to the existing four reference points can be seen in Figure 2.5.6.3.

2.5.6.3 Projection of catch and biomass

Results from predictions with management option are presented in Table 2.5.6.4. Catches at status quo F would be 44 600 t in 2005 and 35 700 t in 2006. The spawning stock biomass would be about $\mathbf{B}_{pa}$ in 2005 and 2006.

Results from the yield per recruit estimates are shown in Table 2.5.6.3 and Figure 2.5.6.1.

A projection of catch in number by year classes in 2005 and weight composition in SSB by year classes in 2006 is presented in Figure 2.5.6.4. The catch in 2005 is predicted to rely on the five most recent year classes (98%). In 2006 the 1998 year class are expected to contribute about 44% of the SSB, and 1999, 2000 year classes with 38%.

2.5.7 Management considerations

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

The spawning stock biomass has increased to above $\mathbf{B}_{pa}$ and is expected to remain above $\mathbf{B}_{pa}$ at status quo fishing mortality, due to good recruitment in the short term.

2.5.8 Comments on the assessment

The XSA settings have been changed. The tuning fleets had to be changed due to replacement of vessels in the commercial index tuning fleet. The cpue standardisation with GLM is considered an improvement.

The geometric mean is used at age 3 in the short term prediction. There are indications that the spring survey could be helpful as an index of age 2 or 3 in the terminal year. This question will be further investigated once an appropriate stratification scheme has been identified.

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.

The 2005 assessment indicates that the point estimator of biomass is lower than in the 2004 assessment (2004 SSB = 94 000t compared to 74 000t) and the fishing mortality is almost the same.

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 overlaps occur with other vessels. Nevertheless, the introduction of the spring survey as an index of stock size in the assessment would be an improvement (Table 2.5.8.1-5, Figure 2.5.8.1-3).

The ADAPT calibrations conducted appear to offer promises, but the results were not examined closely because ADAPT was intended mostly as a validation of the XSA results. The NMFS NFT ADAPT software does offer some advantages over the XSA however, particularly with regards to medium term predictions. Time permitting, the possibility of migrating the assessment to the NFT environment will be evaluated intersessionally.

Bycatch

In the last years concerns have been raised about the bycatch of saithe in the blue whiting fishery around the Faroes and Iceland (Pálsson 2005). The catch of blue whiting in ICES sub-area Vb was 468 thousand tonnes in 2003 (ICES, 2004) and only small percentages of by-catch may thus become important in absolute terms. There are indications that the bycatch of saithe is most important in Faroese waters whereas the bycatch of cod is restricted to Icelandic waters (Pálsson 2005). There are also indications that the by-catch may vary by year (was higher in 2004 than in 2003) (Pálsson *et al.* 2005).

Sampling the by-catch of saithe in Faroese and Icelandic waters indicate a high variability between hauls, but the overall percentage in 2003 was 0.32% and in 2004 0.69% (Pálsson et al. 2005). Sampling on a Faroese vessel in November 2004 indicated an average by-catch of saithe of 3.2% (Lamhauge, 2004).

The length distribution of saithe in the blue whiting fishery is variable. Icelandic samples indicate and average length of about 64 cm (Pálsson, 2005) whereas Faroese samples indicate about 75 cm (Lamhauge, 2004).There are also indications that the by-catch varies by season (Pálsson 2005, Pálsson *et al.* 2005).

An attempt is made to estimate the by-catch of saithe in Faroese waters in 2004, see table below. It was assumed that the catch in 2004 was on the same level as in 2003. In Scenario 1, the mean overall percentage in Pálsson *et al.* 2005 is used (0.69%). The length measurements in Lamhauge (2005) were used as basis and the age-length key for the Faroese pair trawlers. In Scenario 2, the mean overall percentage in Lamhauge (2004) is used (3.2%). In Scenario 1, the by-catch is estimated to 3231 tonnes and in Scenario 2 to 10770 tonnes. In order to account for the by-catch of saithe in the blue whiting fishery, the catch-at-age should be scaled up by a factor of 1.0-1.7 in Scenario 1 and 1.0-3.2 in Scenario 2.

The exercise shows that it is important to get more information about the by-catch of saithe in the blue whiting fishery and that the by-catch may affect the stock assessment of saithe in Vb. The exercise is on a very broad scale and the result should be taken as illustrative rather than quantitative. In order to get more precise estimates of the by-catch of saithe in Faroese waters it is necessary to sample the blue whiting fishery representatively by area, season and by year.

Estimating by-catch of saithe in Vb in the blue whiting fishery.

	SCENARIO 1	SCENARIO 2
Total blue whiting catch in Vb (tonnes)	468269	468269
By-catch of saithe (%)	0.69	3.2
By-catch of saithe (tonnes)	3231	14985
Relative change in catch at age in 2004		

Age		
3	1.0	1.0
4	1.0	1.0
5	1.0	1.0
6	1.0	1.1
7	1.1	1.5
8	1.1	1.6
9	1.1	1.4
10	1.1	1.4
11	1.5	3.5
12+	1.7	4.1

2.5.9 Annex

Stock definition

Saithe are widely distributed around the Faroes, from the shallow inshore waters to depths of 500 m. The main spawning areas are found at 150-250 meters depth east and north of the Faroes. Spawning takes place from January to April, with the main spawning in the second-half of February. The pelagic eggs and larvae drift with the anti-clockwise current around the islands until May/June, when the juveniles, at lengths of 2.5-3.5 cm, migrate inshore. The nursery areas during the first two years of life are in very shallow waters in the littoral zone. Young saithe are also distributed in shallow depths, but at increasing depths with increasing age. Saithe enter the adult stock at the age of 3 or 4 years (Jákupsstovu 1999). Tagging experiments of saithe has demonstrated migrations between the Faroes, Iceland, Norway, west of Scotland and the North Sea (Jákupsstovu 1999).

Description of the pair trawlers

The tuning fleet consists of several pair of trawlers (>1000 HP). For all of the vessels the mesh size of the trawl is 135 mm. The catch is stored on ice on board the trawlers and landed as fresh fish.

Four of the pairs were built in East Germany in 1970 as part of a help-programme for Cuba (called Cuba trawlers). In 1973 "Faroe Ship" bought 8 of these trawlers and brought them to Faroe Islands. Today, the Runavik Trawl Company "Beta" keeps them, which is the company that has operated the trawlers during all these years and has registered the catches. During 1977-1978 the trawlers were altered and adjusted for fishing saithe, cod and haddock in Faroese waters. The vessels were equipped with new gear and other equipment. Engine, Winch and equipment for the navigating bridge were replaced principally by Norwegian equipment. Except for the fact that 4 of the trawlers are equipped with bigger winches (to be able to fish at deep waters) the 8 trawlers are identical. The gears used are mainly from the same producers and the vessels are similar with respect to construction. However, improvements have been carried out when needed (*e.g.* winch and engines). Engine power is more than 1 000 HP. Total length is about 37-38m. Loading capacity is approximately. 100 tons catch per vessel. The Cuba-trawlers started as single trawlers. However, since 1983 the trawlers have operated as pair-trawlers to reduce costs (meaning a reduction of *ca.* 45% with respect to fuel and *ca*. 15% with respect to fishing gear).

The new tuning fleet called J&A consists of two identical trawlers, "Jaspis" and "Ametyst", built at the same shipyard in the Faroe Islands in 1986. They have been operating as pair-trawlers in Faroe waters since the 1986 fishing cod, haddock and saithe, but have in later years been mainly targeting for saithe.. The vessels have been stationed at the village of "Saltangará", the same place as the Cuba trawlers, since origin, but have been in the property and administrated by various companies, the present being "Snaraløkur" Ltd. The engine

power is 1350 HP. The engines of both boats were overhauled in 2000. Improvements have been carried out when needed (*e.g.* winch and engines). Both vessels were equipped with new gear and other equipment in 2002 replaced principally by Norwegian equipment. Total length is about 30 m. Loading capacity is approximately 2 500 boxes of fish corresponding to *ca*. 125 tons catch per vessel.

The new tuning fleet introduced in the assessment in 2005, called SV&PV, consists of two trawlers > 1000 HK, operating as a pair. The pair ”Vestursøki” and ”Vesturleiki” consists of identical vessels (renamed from ”Stjørnan” and ”Polarhav” when they switched owner in 2003) built in Poland in 1990 and presently owned by P/F Rávan in Sandavágur. The vessels are 36 m long and cargo 265 BRT.

The data on which the tuning series are based origin from all available log-books from the above mentioned trawlers since 1995. The data are stored in the database on the Faroese Fisheries Laboratory in Torshavn, and they are corrected and quality controlled.

The effort obtained from the logbooks is estimated as number of fishing (trawling) hours, which is the time 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).

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Table 2.5.1.1. Saithe in the Faroes (Division Vb). Nominal catches (tonnes) by countries, 1989-2004, as officially reported to ICES.

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

Country	1997	1998	1999	2000	2001	2002	2003	2004 [1]
Estonia	16	-	-	-	-	-	-	-
Faroe Islands	21,721	25,995	32,439		49,676	55,165	47,933	47,866
France	9	17	-	273	934	607	370	
Germany	5	-	100	230	667	422	281	186
Greenland	-	-	-	-		442		426
Irland	-	-	-	-	5	-	-	-
Norway	67	53	160	72	60	77	94	82
Portugal	-	-	-	-	-	-	-	3
Russia	28	-	-	20	1	10	32	
UK (E/W/NI)	-	19	67	32	80	58	89	
UK (Scotland)	460	337	441	534	708	540	610	
United Kingdom								829
Total	22,306	26,421	33,207	1,161	52,131	57,321	49,409	49,392
Working Group estimate [4,5,6,7]	22,306	26,421	33,207	39,020	51,786	53,546	46,555	46,115

[1] Preliminary.

[2] As from 1991.

[3] Quantity unknown 1989-91.

[4] Includes catches from Sub-division Vb2 and Division IIa in Faroese waters.

[5] Includes French, Greenlandic, Russian catches from Division Vb, as reported to the Faroese coastal guard service.

[6] Includes Faroese, French, Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service.

[7] The 2001-2004 catches from Faroe Islands, as stated from Faroese coastal guard service, are recalculeted because of discrepancy in converting gutted weight to round weight (factor 1.2 agains 1.11).

Table 2.5.1.2. Saithe in the Faroes (Division Vb). Total Faroese landings (rightmost column) and the contribution (%) by each fleet category. Averages for 1985-2004 are given at the bottom.

Year	Open boats	Long-liners <100 GRT	Single trawl <400 HP	Gill-nets	Jiggers	Single trawl 400-1000 HP	Single trawl >1000 HP	Pair trawl <1000 HP	Pair trawl >1000HP	Long-liners >100 GRT	Indust-rial trawlers	Others	Total round weight (tonnes)
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	44547
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	60740
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	54290
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	34934
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	32313
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	32405
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	26915
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	19262
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	21713
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	25993
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	33057
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	37450
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	49395
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	53698
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	46555
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	46115
Average	0.3	0.2	0.4	0.1	6.5	2.2	16.1	20.2	53.2	0.2	0.6	0.1	39283

Table 2.5.2.1. Saithe in the Faroes (Division Vb). Catch in number at age by fleet categories (calculated from gutted weigths).

Age	Jiggers	ST>1000 Hp	PT<1000 Hp	PT>1000Hp	Others	Tot. Faroe	Foreign	Total
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	1	1	10	43	11	75	0	75
4	35	49	267	1200	163	1985	15	2000
5	133	295	1170	5089	570	8406	94	8500
6	150	670	1047	5116	360	8505	212	8717
7	38	390	215	1035	40	1990	124	2114
8	29	434	182	762	26	1659	138	1797
9	6	58	31	113	2	244	19	263
10	6	76	31	116	2	267	24	291
11	4	44	10	53	1	132	14	146
12	2	30	8	36	1	90	9	99
13	0	5	0	1	0	8	2	10
14	0	0	0	2	0	3	0	3
15	0	0	0	0	0	0	0	0
Total No.	405	2053	2972	13566	1177	23362	651	24013
Catch, t.	785	5806	5477	24434	1729	44276	1839	46115

Notes: Numbers in 1000'
Catch, round weight in tonnes
ST- single trawlers and PT- pair trawlers
Others includes longliners, small single trawlers, industrial trawlers and catches not otherwise accounted for

Table 2.5.2.2. Saithe in the Faroes (Division Vb). Sampling intensity in 2004.

FLEET	SAMPLES	LENGTHS	OTOLITHS	WEIGHTS
Jiggers	4	916	180	180
Single trawlers 400 – 999 HP	9	1 781	240	1 364
Single trawlers 1500 - 1999 HP	8	1 759	120	60
Single trawlers > 2000 HP	4	906	60	60
Pair trawlers 700 – 999 HP	16	3 455	240	120
Pair trawlers 1000 – 1499 HP	154	35 609	3 537	3 357
Total	195	44 426	4 377	5 141

Table 2.5.2.3. Saithe in the Faroes (Division Vb). Catch numbers at age (Thousands).

Table 1 Catch numbers at age										Numbers*10**-3
YEAR	1961	1962	1963	1964						
AGE										
3	183	562	614	684						
4	379	542	340	1908						
5	483	617	340	1506						
6	403	495	415	617						
7	216	286	406	572						
8	129	131	202	424						
9	116	129	174	179						
10	82	113	158	150						
11	45	71	94	100						
+gp	82	105	274	174						
TOTALNUM	2118	3051	3017	6314						
TONSLAND	9592	10454	12693	21893						
SOPCOF %	108	93	96	99						

YEAR	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
AGE										
3	996	488	595	614	1191	1445	2857	2714	2515	3504
4	850	1540	796	1689	2086	6577	3316	1774	6253	4126
5	1708	1201	1364	1116	2294	1558	5585	2588	7075	4011
6	965	1686	792	1095	1414	1478	1005	2742	3478	2784
7	510	806	1192	548	1118	899	828	1529	1634	1401
8	407	377	473	655	589	730	469	1305	693	640
9	306	294	217	254	580	316	326	1017	550	368
10	201	205	190	128	239	241	164	743	403	340
11	156	156	97	89	115	86	100	330	215	197
+gp	285	225	140	187	190	132	100	210	186	265
TOTALNUM	6384	6978	5856	6375	9816	13462	14750	14952	23002	17636
TONSLAND	22181	25563	21319	20387	27437	29110	32706	42663	57431	47188
SOPCOF %	92	98	104	102	97	96	109	100	120	113

YEAR	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
AGE										
3	2062	3178	1609	611	287	996	411	387	2483	368
4	3361	3217	2937	1743	933	877	1804	4076	1103	11067
5	3801	1720	2034	1736	1341	720	769	994	5052	2359
6	1939	1250	1288	548	1033	673	932	1114	1343	4093
7	1045	877	767	373	584	726	908	380	575	875
8	714	641	708	479	414	284	734	417	339	273
9	302	468	498	466	247	212	343	296	273	161
10	192	223	338	473	473	171	192	105	98	52
11	193	141	272	407	368	196	92	88	98	65
+gp	298	287	330	535	691	786	1021	902	540	253
TOTALNUM	13907	12002	10781	7371	6371	5641	7206	8759	11904	19566
TONSLAND	41576	33065	34835	28138	27246	25230	30103	30964	39176	54665
SOPCOF %	116	107	104	100	102	99	96	96	100	100

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
AGE										
3	1224	1167	1581	866	451	294	1030	521	1316	690
4	3990	1997	5793	2950	5981	3833	5125	4067	2611	3961
5	5583	4473	3827	9555	5300	10120	7452	3667	4689	2663
6	1182	3730	2785	2784	7136	9219	5544	2679	1665	2368
7	1898	953	990	1300	793	5070	3487	1373	858	746
8	273	1077	532	621	546	477	1630	894	492	500
9	103	245	333	363	185	123	405	613	448	307
10	38	104	81	159	83	61	238	123	245	303
11	26	67	43	27	55	60	128	63	54	150
+gp	275	158	97	60	39	79	118	108	52	49
TOTALNUM	14592	13971	16062	18685	20569	29336	25157	14108	12430	11737
TONSLAND	44605	41716	40020	45285	44477	61628	54858	36487	33543	33182
SOPCOF %	94	94	96	99	97	98	99	105	102	102

YEAR	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AGE										
3	398	297	344	163	322	811	1125	302	330	75
4	1019	1087	832	1689	655	2830	2452	8399	2432	2000
5	3468	1146	2440	1934	3096	1484	8437	5962	11152	8500
6	1836	1449	1767	3475	2551	4369	2155	9786	3994	8717
7	1177	1156	1335	1379	4113	2226	3680	862	4287	2114
8	345	521	624	683	915	2725	1539	1280	417	1798
9	241	132	165	368	380	348	1334	465	419	263
10	192	77	71	77	147	186	293	362	304	291
11	104	64	29	32	24	56	90	33	91	145
+gp	117	82	100	73	69	25	56	45	43	111
TOTALNUM	8897	6011	7707	9873	12272	15060	21161	27496	23469	24014
TONSLAND	27209	20029	22306	26421	33207	39020	51786	53546	46555	46115
SOPCOF %	102	103	100	102	102	102	100	100	100	100

Table 2.5.3.1. Saithe in the Faroes (Division Vb). Catch weights at age (kg).

Table 2 Catch weights at age (kg)				
YEAR	1961	1962	1963	1964
AGE				
3	1.4300	1.2730	1.2800	1.1750
4	2.3020	2.0450	2.1970	2.0550
5	3.3480	3.2930	3.2120	3.2660
6	4.2870	4.1910	4.5680	4.2550
7	5.1280	5.1460	5.0560	5.0380
8	6.1550	5.6550	5.9320	5.6940
9	7.0600	6.4690	6.2590	6.6620
10	7.2650	6.7060	8.0000	6.8370
11	7.4970	7.1500	7.2650	7.6860
+gp	9.3399	9.0237	8.8589	8.5591
SOPCOFAC	1.0779	.9342	.9590	.9933

YEAR	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
AGE										
3	1.1810	1.3610	1.2730	1.3020	1.1880	1.2440	1.1010	1.0430	1.0880	1.4300
4	2.1250	2.0260	1.7800	1.7370	1.6670	1.4450	1.3160	1.4850	1.4610	1.5250
5	2.9410	3.0550	2.5340	2.0360	2.3020	2.2490	1.8180	2.0550	1.5820	2.2070
6	4.0960	3.6580	3.5720	3.1200	2.8530	2.8530	2.9780	2.8290	2.2490	2.5000
7	4.8780	4.5850	4.3680	4.0490	3.6730	3.5150	3.7020	3.7910	3.6870	3.1200
8	5.9320	5.5200	5.3130	5.1830	5.0020	4.4180	4.2710	4.1750	4.3850	4.6010
9	6.3210	6.8370	5.8120	6.2380	5.7140	5.4440	5.3880	4.8080	5.1280	5.5590
10	7.2880	7.2650	6.5540	7.5200	6.4050	5.7330	5.9720	5.2940	5.2760	5.7140
11	8.0740	7.6620	7.8060	8.0490	6.5540	6.6620	6.4900	6.9480	6.7270	6.2590
+gp	8.9035	9.2233	8.1494	9.0925	8.0870	8.5844	8.0047	7.5146	8.0307	8.0104
SOPCOFAC	.9220	.9769	1.0357	1.0194	.9663	.9634	1.0935	1.0043	1.2006	1.1296

YEAR	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
AGE										
3	1.1140	1.0880	1.2230	1.4930	1.2200	1.2300	1.3100	1.3370	1.2080	1.4310
4	1.6580	1.6760	1.6410	2.3240	1.8800	2.1200	2.1300	1.8510	2.0290	1.9530
5	2.2600	2.8780	2.6600	3.0680	2.6200	3.3200	3.0000	2.9510	2.9650	2.4700
6	3.1200	3.0810	3.7900	3.7460	3.4000	4.2800	3.8100	3.5770	4.1430	3.8500
7	3.5570	4.2870	4.2390	4.9130	4.1800	5.1600	4.7500	4.9270	4.7240	5.1770
8	4.0960	4.3520	5.5970	4.3680	4.9500	6.4200	5.2500	6.2430	5.9010	6.3470
9	5.1280	4.7900	5.3500	5.2760	5.6900	6.8700	5.9500	7.2320	6.8110	7.8250
10	6.0940	5.9120	5.9120	5.8320	6.3800	7.0900	6.4300	7.2390	7.0510	6.7460
11	7.1960	6.6190	6.8370	6.0530	7.0200	7.9300	7.0000	8.3460	7.2480	8.6360
+gp	8.5982	7.8941	7.7085	7.5756	8.6262	9.2153	8.9618	10.0411	10.0547	10.0976
SOPCOFAC	1.1607	1.0680	1.0442	1.0049	1.0248	.9937	.9564	.9632	.9997	.9991

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
AGE										
3	1.4010	1.7180	1.6090	1.5000	1.3090	1.2230	1.2400	1.2640	1.4080	1.5030
4	2.0320	1.9860	1.8350	1.9750	1.7350	1.6330	1.5680	1.6020	1.8600	1.9510
5	2.9650	2.6180	2.3950	1.9780	1.9070	1.8300	1.8640	2.0690	2.3230	2.2670
6	3.5960	3.2770	3.1820	2.9370	2.3730	2.0520	2.2110	2.5540	3.1310	2.9360
7	5.3360	4.1860	4.0670	3.7980	3.8100	2.8660	2.6480	3.0570	3.7300	4.2140
8	7.2020	5.5890	5.1490	4.4190	4.6670	4.4740	3.3800	4.0780	4.3940	4.9710

9	6.9660	6.0500	5.5010	5.1150	5.5090	5.4240	4.8160	5.0120	5.2090
5.6570									
10	9.8620	6.1500	6.6260	6.7120	5.9720	6.4690	5.5160	6.7680	6.5400
5.9500									
11	10.6700	9.5360	6.3430	9.0400	6.9390	6.3430	6.4070	7.7540	8.4030
6.8910									
+gp	11.9501	10.2181	10.2439	9.3369	9.9364	8.2869	7.7285	8.2297	8.0501
9.1086									
SOPCOFAC	.9415	.9419	.9620	.9928	.9698	.9811	.9938	1.0506	1.0169
1.0240									

YEAR	1995	1996	1997	1998	1999	2000	2001	2002	2003
2004									
AGE									
3	1.4560	1.4320	1.4760	1.3880	1.3740	1.4770	1.3300	1.1420	1.1230
1.1430									
4	2.1770	1.8750	1.7830	1.7110	1.7120	1.6060	1.5900	1.4600	1.3040
1.3330									
5	2.4200	2.4960	2.0320	1.9540	1.9050	2.0770	1.7850	1.6520	1.6140
1.4500									
6	2.8950	3.2290	2.7780	2.4050	2.3960	2.3600	2.5860	1.9690	1.9770
1.7890									
7	3.6510	3.7440	3.5980	3.3000	2.8450	2.9770	3.0590	3.1300	2.5320
2.5600									
8	5.0640	4.9640	4.7660	4.2200	4.1240	3.4800	3.8710	3.5890	3.9700
3.1590									
9	5.4400	6.3750	5.9820	4.9990	5.2560	4.8510	4.3740	4.5130	4.8340
4.1540									
10	6.1670	6.7450	7.6580	6.3910	5.5260	5.2680	5.5650	5.1380	5.4990
5.1670									
11	7.0800	7.4660	7.8820	6.6650	6.9560	6.5230	6.7030	6.4220	6.0990
6.0150									
+gp	7.5392	7.9806	9.2453	8.4847	8.5237	5.9024	6.9076	7.5192	6.9154
6.3221									
SOPCOFAC	1.0205	1.0319	.9994	1.0221	1.0182	1.0154	1.0017	1.0004	1.0012
1.0040									

Table 2.5.4.1. Saithe in the Faroes (Division Vb). Proportion mature at age.

Table 5 Proportion mature at age

YEAR	1961	1962	1963	1964
AGE				
3	.0400	.0400	.0400	.0400
4	.2600	.2600	.2600	.2600
5	.5700	.5700	.5700	.5700
6	.8200	.8200	.8200	.8200
7	.9100	.9100	.9100	.9100
8	.9800	.9800	.9800	.9800
9	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000
11	1.0000	1.0000	1.0000	1.0000
+gp	1.0000	1.0000	1.0000	1.0000

YEAR	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
AGE										
3	.0400	.0400	.0400	.0400	.0400	.0400	.0400	.0400	.0400	.0400
4	.2600	.2600	.2600	.2600	.2600	.2600	.2600	.2600	.2600	.2600
5	.5700	.5700	.5700	.5700	.5700	.5700	.5700	.5700	.5700	.5700
6	.8200	.8200	.8200	.8200	.8200	.8200	.8200	.8200	.8200	.8200
7	.9100	.9100	.9100	.9100	.9100	.9100	.9100	.9100	.9100	.9100
8	.9800	.9800	.9800	.9800	.9800	.9800	.9800	.9800	.9800	.9800
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
+gp	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

YEAR	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
AGE										
3	.0400	.0400	.0400	.0400	.0400	.0400	.0400	.0400	.0200	.0300
4	.2600	.2600	.2600	.2600	.2600	.2600	.2600	.2600	.2300	.2500
5	.5700	.5700	.5700	.5700	.5700	.5700	.5700	.5700	.7500	.5800
6	.8200	.8200	.8200	.8200	.8200	.8200	.8200	.8200	.9500	.9300
7	.9100	.9100	.9100	.9100	.9100	.9100	.9100	.9100	.9700	.9900
8	.9800	.9800	.9800	.9800	.9800	.9800	.9800	.9800	1.0000	1.0000
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
+gp	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
AGE										
3	.0300	.0500	.0400	.0400	.0300	.0200	.0200	.0200	.0300	.0300
4	.2500	.2300	.2400	.2600	.2000	.1600	.1400	.1500	.2000	.2300
5	.7600	.6400	.5600	.4800	.4400	.4100	.3900	.4500	.5400	.5100
6	.9000	.8700	.8400	.7800	.6800	.5600	.6100	.6900	.8200	.7900
7	.9900	.9500	.9500	.9200	.9200	.7900	.7200	.8200	.9100	.9500
8	1.0000	.9900	.9900	.9700	.9800	.9700	.9000	.9600	.9700	.9900
9	1.0000	1.0000	1.0000	.9900	1.0000	1.0000	.9900	.9900	.9900	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

+gp	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000									
YEAR	1995	1996	1997	1998	1999	2000	2001	2002	2003
2004									
AGE									
3	.0300	.0300	.0300	.0300	.0300	.0300	.0400	.0200	.0200
.0200									
4	.2700	.2200	.1900	.1800	.1600	.1900	.1600	.2000	.1100
.1100									
5	.5700	.5900	.4700	.4200	.4100	.4400	.4200	.3400	.4300
.2800									
6	.7700	.8500	.7400	.6600	.6400	.6400	.6800	.5600	.5200
.5600									
7	.9000	.9100	.8900	.8400	.7600	.7800	.8000	.8000	.7100
.6800									
8	.9900	.9800	.9800	.9600	.9500	.9000	.9300	.9100	.9400
.8700									
9	1.0000	1.0000	1.0000	.9900	.9900	.9900	.9800	.9800	.9900
.9700									
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000									
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000									
+gp	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0000									

Table 2.5.5.1. Saithe in the Faroes (Division Vb). Effort (hours) and catch in number at age for commercial pair trawlers.

```
Faroe Saithe (ICES Div. Vb)    AllpairGLM3-11.dat
101
All pair (GLM) >1000 HP
1995 2004
1 1 0 1
3 11
10338 90    343   1101  450   278   93    46    36    27
6116  99    306   262   358   161   90    43    41    22
7369  76    205   571   389   295   128   28    13    4
8283  46    281   492   637   313   139   73    17    5
12250 89    249   794   1031  1035  418   97    42    6
11156 205   741   432   1278  631   759   91    50    15
13121 315   742   2554  602   958   386   319   66    15
11110 58    1741  1736  3016  228   299   108   77    11
7900  50    528   2321  839   800   70    75    44    13
7931  14    381   1618  1627  329   242   36    37    17
```

Table 2.5.5.2. Saithe in the Faroes (Division Vb). Diagnostics from XSA with commercial pair trawler tuning series.

```
Lowestoft VPA Version 3.1
    3/05/2005  16:41

 Extended Survivors Analysis

 FAROE SAITHE (ICES Division Vb)                SAI_IND

 CPUE data from file D:\Stovnsmeting\Ices2005\Xsa\allpairGLM3-11.DAT

 Catch data for  44 years. 1961 to 2004. Ages  3 to  12.

      Fleet             First  Last  First  Last  Alpha   Beta
                         year  year   age    age
 All pair (GLM) >1000    1995  2004    3     11    .000   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 >=    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   30 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   1995   1996   1997   1998   1999   2000   2001   2002   2003   2004

      3   .011   .014   .012   .014   .006   .026   .014   .007   .012   .013
      4   .090   .039   .049   .073   .073   .069   .102   .138   .074   .091
      5   .414   .139   .116   .152   .186   .235   .299   .384   .274   .398
      6   .408   .303   .328   .241   .307   .433   .635   .680   .483   .359
      7   .716   .490   .508   .462   .501   .484   .815   .567   .736   .513
      8   .646   .834   .539   .534   .647   .747   .746   .766   .600   .815
      9   .857   .552   .701   .724   .654   .550  1.091   .526   .616  1.003
     10   .523   .754   .662   .865   .730   .803  1.399  1.066   .804  1.282
     11   .655   .328   .729   .728   .741   .694  1.302   .545   .878  1.272

 XSA population numbers (Thousands)
                                AGE
 YEAR         3         4         5         6         7         8         9        10        11
 1995        3.86E+04  1.31E+04  1.13E+04  6.06E+03  2.54E+03  8.01E+02  4.63E+02  5.21E+02
2.39E+02
 1996        2.40E+04  3.12E+04  9.79E+03  6.12E+03  3.30E+03  1.02E+03  3.44E+02  1.61E+02
2.53E+02
 1997        3.28E+04  1.94E+04  2.46E+04  6.98E+03  3.70E+03  1.65E+03  3.62E+02  1.62E+02
6.19E+01
 1998        1.27E+04  2.65E+04  1.51E+04  1.79E+04  4.12E+03  1.82E+03  7.90E+02  1.47E+02
6.84E+01
 1999        5.80E+04  1.03E+04  2.02E+04  1.07E+04  1.15E+04  2.12E+03  8.75E+02  3.14E+02
5.07E+01
 2000        3.50E+04  4.72E+04  7.83E+03  1.37E+04  6.41E+03  5.72E+03  9.10E+02  3.72E+02
1.24E+02
 2001        8.92E+04  2.80E+04  3.61E+04  5.07E+03  7.30E+03  3.24E+03  2.22E+03  4.30E+02
1.37E+02
```

2002	4.63E+04	7.20E+04	2.07E+04	2.19E+04	2.20E+03	2.64E+03	1.26E+03	6.10E+02
8.69E+01								
2003	3.13E+04	3.76E+04	5.14E+04	1.15E+04	9.09E+03	1.02E+03	1.01E+03	6.08E+02
1.72E+02								
2004	6.46E+03	2.53E+04	2.86E+04	3.20E+04	5.82E+03	3.57E+03	4.59E+02	4.45E+02
2.23E+02								

Table 2.5.5.2. (Continued)

Estimated population abundance at 1st Jan 2005

0.00E+00 5.22E+03 1.89E+04 1.57E+04 1.83E+04 2.85E+03 1.29E+03 1.38E+02
1.01E+02

Taper weighted geometric mean of the VPA populations:

2.39E+04 1.87E+04 1.26E+04 7.38E+03 3.94E+03 2.12E+03 1.14E+03 6.30E+02
3.36E+02

Standard error of the weighted Log(VPA populations) :

.5626 .5605 .5878 .5725 .5247 .5515 .6539 .7999
.9882

Log catchability residuals.

Fleet : All pair (GLM) >1000

Age	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
3	-.19	.90	.14	.47	-.78	.66	-.01	-.89	-.30	.00
4	.36	-.12	-.23	-.33	.11	-.24	.14	.23	.00	.07
5	.67	-.22	-.56	-.32	-.51	-.05	.06	.44	.11	.39
6	-.10	.14	-.09	-.69	-.05	.06	.23	.56	.18	-.24
7	.21	-.17	.14	-.04	-.25	-.08	.19	.02	.27	-.28
8	.03	.36	-.09	-.22	.39	.13	-.14	-.02	-.25	-.17
9	-.04	.59	-.02	.05	-.19	-.24	.19	-.40	-.16	.05
10	-.55	1.38	.00	.34	.04	.16	.37	.21	-.11	.22
11	.00	.12	-.19	-.18	-.08	.01	.00	.00	-.04	.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	-15.0097	-13.1065	-11.9537	-11.4537	-11.2405	-11.0300	-11.0300	-11.0300	-11.0300
S.E(Log q)	.5788	.2246	.4138	.3301	.1969	.2273	.2710	.5370	.1087

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	1.41	-1.145	16.93	.50	10	.80	-15.01
4	1.07	-.507	13.32	.85	10	.25	-13.11
5	.97	.113	11.90	.69	10	.43	-11.95
6	1.11	-.533	11.69	.75	10	.38	-11.45
7	1.06	-.456	11.41	.88	10	.22	-11.24
8	1.02	-.175	11.11	.88	10	.25	-11.03
9	1.22	-1.222	12.02	.80	10	.32	-11.05
10	1.85	-1.735	15.08	.34	10	.82	-10.82
11	.87	3.915	10.26	.99	10	.06	-11.05

Terminal year survivor and F summaries :

Age 3 Catchability constant w.r.t. time and dependent on age
Year class = 2001

Fleet	Estimated Survivors	Int s.e	Ext s.e	Var Ratio	N	Scaled Weights	Estimated F
All pair (GLM) >1000	5229.	.607	.000	.00	1	.915	.013
F shrinkage mean	5172.	2.00				.085	.013

Weighted prediction :

Survivors at end of year	Int s.e	Ext s.e	N	Var Ratio	F
5224.	.58	.00	2	.005	.013

Table 2.5.5.2. (Continued)

```
Age  4   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) >1000      18938.    .269        .148     .55    2   .981      .091

  F shrinkage mean        18910.    2.00                           .019      .091

Weighted prediction :

Survivors         Int       Ext     N     Var      F
at end of year    s.e       s.e           Ratio
    18938.        .27       .10     3     .388    .091

Age  5   Catchability constant w.r.t. time and dependent on age
Year class = 1999
Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                      Survivors     s.e        s.e    Ratio       Weights     F
All pair (GLM) >1000      15579.    .229        .276    1.21    3   .980      .401

  F shrinkage mean        24095.    2.00                           .020      .277

Weighted prediction :

Survivors         Int       Ext     N     Var      F
at end of year    s.e       s.e           Ratio
    15716.        .23       .23     4     .992    .398

Age  6   Catchability constant w.r.t. time and dependent on age
Year class = 1998
Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                      Survivors     s.e        s.e    Ratio       Weights     F
All pair (GLM) >1000      18420.    .194        .119     .61    4   .984      .356

  F shrinkage mean        11809.    2.00                           .016      .512

Weighted prediction :

Survivors         Int       Ext     N     Var      F
at end of year    s.e       s.e           Ratio
    18287.        .19       .11     5     .547    .359

Age  7   Catchability constant w.r.t. time and dependent on age
Year class = 1997
Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                      Survivors     s.e        s.e    Ratio       Weights     F
All pair (GLM) >1000       2867.    .175        .144     .82    5   .983      .511

  F shrinkage mean         2197.    2.00                           .017      .626

Weighted prediction :

Survivors         Int       Ext     N     Var      F
at end of year    s.e       s.e           Ratio
     2854.        .18       .13     6     .734    .513

Age  8   Catchability constant w.r.t. time and dependent on age
Year class = 1996
Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                      Survivors     s.e        s.e    Ratio       Weights     F
All pair (GLM) >1000       1286.    .176        .127     .72    6   .975      .817

  F shrinkage mean         1580.    2.00                           .025      .708
Weighted prediction :

Survivors         Int       Ext     N     Var      F
at end of year    s.e       s.e           Ratio
     1293.        .18       .11     7     .641    .815
```

Table 2.5.5.2. (Continued)

```
Age  9   Catchability constant w.r.t. time and age (fixed at the value for age)  8
Year class = 1995

Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                      Survivors     s.e        s.e    Ratio       Weights     F
All pair (GLM) >1000        136.    .164        .062     .38    7   .973     1.013

  F shrinkage mean          238.    2.00                            .027      .694

Weighted prediction :

Survivors         Int       Ext     N     Var      F
at end of year    s.e       s.e           Ratio
      138.        .17       .07     8     .395   1.003

Age 10   Catchability constant w.r.t. time and age (fixed at the value for age)  8
Year class = 1994

Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                      Survivors     s.e        s.e    Ratio       Weights     F
All pair (GLM) >1000         98.    .182        .069     .38    8   .943     1.303

  F shrinkage mean          160.    2.00                            .057      .971

Weighted prediction :

Survivors         Int       Ext     N     Var      F
at end of year    s.e       s.e           Ratio
      101.        .21       .07     9     .363   1.282


Age 11   Catchability constant w.r.t. time and age (fixed at the value for age)  8
Year class = 1993

Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                      Survivors     s.e        s.e    Ratio       Weights     F
All pair (GLM) >1000         50.    .188        .074     .40    9   .955     1.283

  F shrinkage mean           71.    2.00                            .045     1.045

Weighted prediction :

Survivors         Int       Ext     N     Var      F
at end of year    s.e       s.e           Ratio
       51.        .20       .07    10     .364   1.272
```

Table 2.5.5.3. Saithe in the Faroes (Division Vb). Fishing mortality (F) at age.

```
    Run title : FAROE SAITHE (ICES Division Vb)                SAI_IND

    At  3/05/2005  16:43

                  Terminal Fs derived using XSA (With F shrinkage)

       Table  8    Fishing mortality (F) at age
       YEAR        1961     1962     1963     1964
       AGE
         3         .0226    .0465    .0307    .0478
         4         .0556    .0863    .0358    .1260
         5         .0994    .1208    .0716    .2198
         6         .1219    .1401    .1115    .1797
         7         .0933    .1192    .1634    .2213
         8         .0852    .0752    .1157    .2566
         9         .0972    .1150    .1355    .1424
        10         .0915    .1295    .2012    .1658
        11         .0916    .1069    .1514    .1891
       +gp         .0916    .1069    .1514    .1891
   FBAR  4- 8      .0911    .1083    .0996    .2007

       YEAR         1965      1966      1967      1968      1969      1970      1971      1972      1973
1974
       AGE
         3          .0495     .0250     .0248     .0320     .0328     .0479     .0885     .0935     .1271
.2293
         4          .0772     .1007     .0518     .0910     .1452     .2547     .1480     .0728     .3227
.3170
         5          .1588     .1492     .1217     .0954     .1719     .1538     .3579     .1649     .4582
.3543
         6          .2137     .2326     .1388     .1357     .1684     .1597     .1404     .2985     .3486
.3276
         7          .2216     .2784     .2564     .1345     .2000     .1536     .1262     .3286     .2919
.2297
         8          .2424     .2536     .2615     .2183     .2094     .1943     .1118     .2995     .2425
.1770
         9          .2983     .2770     .2269     .2182     .3063     .1656     .1244     .3759     .1982
.1960
        10          .2355     .3346     .2903     .2027     .3289     .2008     .1213     .4600     .2496
.1809
        11          .2601     .2900     .2609     .2141     .2831     .1877     .1196     .3810     .2312
.1854
       +gp          .2601     .2900     .2609     .2141     .2831     .1877     .1196     .3810     .2312
.1854
   FBAR  4- 8       .1827     .2029     .1660     .1350     .1790     .1832     .1769     .2329     .3328
.2811

       YEAR         1975      1976      1977      1978      1979      1980      1981      1982      1983
1984
       AGE
         3          .1505     .2055     .1478     .0837     .0374     .0926     .0137     .0285     .0693
.0158
         4          .3595     .3705     .2977     .2367     .1776     .1536     .2415     .1832     .1061
.4955
         5          .5442     .3153     .4251     .2881     .2890     .2024     .1958     .2031     .3629
.3460
         6          .2891     .3432     .4140     .1915     .2780     .2299     .4379     .4823     .4648
.5672
         7          .1957     .2048     .3665     .2001     .3213     .3217     .5551     .3197     .4954
.6364
         8          .1752     .1767     .2537     .4119     .3572     .2550     .6322     .5384     .5284
.4650
         9          .1183     .1664     .2026     .2642     .3872     .3127     .5593     .5698     .8446
.5173
        10          .1485     .1202     .1740     .3018     .4698     .5105     .5211     .3288     .3718
.3693
        11          .1479     .1550     .2111     .3279     .4075     .3617     .5757     .4826     .5866
.4539
       +gp          .1479     .1550     .2111     .3279     .4075     .3617     .5757     .4826     .5866
.4539
   FBAR  4- 8       .3127     .2821     .3514     .2657     .2846     .2325     .4125     .3453     .3915
.5020

       YEAR         1985      1986      1987      1988      1989      1990      1991      1992      1993
1994
       AGE
         3          .0629     .0211     .0367     .0215     .0176     .0159     .0470     .0299     .0634
.0466
         4          .2367     .1385     .1386     .0891     .2026     .2043     .4160     .2641     .2058
.2752
         5          .5028     .4552     .4274     .3560     .2287     .6240     .7726     .5993     .5546
.3349
```

```
         6          .2917     .7618     .5769     .6420     .4944     .7892     .8669     .7168     .6074
.6110
         7          .5662     .4057     .4624     .5887     .3758     .8096     .8101     .5400     .5275
.6112
         8          .4141     .7505     .4173     .5987     .5298     .4081     .6726     .4956     .3760
.6820
         9          .3185     .8262     .5485     .5648     .3542     .2135     .7394     .5811     .4987
.4275
        10          .2173     .6211     .7314     .5554     .2383     .1877     .8264     .5210     .4855
.7638
        11          .3185     .7397     .5705     .5778     .3765     .2712     .7535     .5369     .4568
.6300
       +gp          .3185     .7397     .5705     .5778     .3765     .2712     .7535     .5369     .4568
.6300
   FBAR  4- 8       .4023     .5023     .4045     .4549     .3662     .5670     .7076     .5232     .4542
.5029
```

YEAR	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	FBAR **-**
AGE											
3	.0115	.0137	.0117	.0142	.0062	.0259	.0140	.0072	.0117	.0129	.0106
4	.0900	.0392	.0485	.0729	.0730	.0685	.1020	.1380	.0742	.0913	.1011
5	.4137	.1385	.1161	.1521	.1855	.2350	.2988	.3839	.2743	.3984	.3522
6	.4080	.3031	.3282	.2410	.3075	.4329	.6346	.6799	.4829	.3586	.5071
7	.7160	.4900	.5083	.4624	.5010	.4840	.8151	.5673	.7360	.5130	.6054
8	.6461	.8340	.5394	.5344	.6472	.7471	.7459	.7657	.6000	.8146	.7267
9	.8574	.5523	.7009	.7237	.6540	.5495	1.0912	.5260	.6162	1.0031	.7151
10	.5233	.7540	.6623	.8647	.7301	.8028	1.3993	1.0658	.8045	1.2823	1.0509
11	.6551	.3284	.7293	.7279	.7407	.6938	1.3018	.5445	.8778	1.2722	.8982
+gp	.6551	.3284	.7293	.7279	.7407	.6938	1.3018	.5445	.8778	1.2722	
FBAR 4- 8	.4548	.3610	.3081	.2926	.3428	.3935	.5193	.5070	.4335	.4351	

Table 2.5.5.4. Saithe in the Faroes (Division Vb). Stock number at age (start of year) (Thousands).

Run title : FAROE SAITHE (ICES Division Vb) SAI_IND

At 3/05/2005 16:43

Terminal Fs derived using XSA (With F shrinkage)

Table 10 Stock number at age (start of year) Numbers*10**-3

YEAR	1961	1962	1963	1964
AGE				
3	9047	13663	22431	16192
4	7739	7241	10678	17809
5	5643	5993	5438	8435
6	3881	4183	4349	4145
7	2680	2813	2977	3185
8	1746	1999	2044	2070
9	1384	1313	1518	1491
10	1036	1028	958	1085
11	568	774	740	641
+gp	1032	1141	2147	1111
TOTAL	34757	40149	53279	56164

YEAR	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
AGE										
3	22803	21830	26879	21514	40798	34135	37285	33607	23282	18897
4	12638	17769	17432	21468	17059	32325	26640	27941	25059	16786
5	12854	9578	13154	13551	16048	12079	20514	18811	21271	14859
6	5543	8979	6755	9536	10085	11064	8480	11742	13059	11013
7	2835	3665	5826	4814	6816	6978	7721	6033	7132	7545
8	2090	1860	2272	3691	3445	4569	4899	5572	3556	4361
9	1311	1343	1182	1432	2429	2288	3080	3587	3381	2285
10	1059	797	833	771	942	1464	1587	2227	2016	2271
11	753	685	467	510	515	555	981	1151	1151	1286
+gp	1367	981	670	1067	846	848	977	727	990	1722
TOTAL	63253	67486	75468	78354	98985	106305	112164	111397	100898	81024

YEAR	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
AGE										
3	16306	18910	12940	8414	8632	12450	33326	15215	40976	25961
4	12301	11484	12607	9138	6336	6808	9292	26913	12107	31301
5	10010	7030	6492	7664	5905	4343	4780	5975	18346	8914
6	8536	4756	4199	3475	4704	3621	2905	3218	3993	10449
7	6498	5234	2763	2273	2349	2917	2356	1535	1626	2054
8	4910	4375	3492	1568	1523	1395	1731	1107	913	811
9	2991	3374	3002	2218	850	872	885	753	529	441
10	1537	2176	2339	2007	1394	473	522	414	349	186
11	1551	1085	1580	1609	1215	714	232	254	244	197
+gp	2385	2199	1907	2100	2262	2840	2549	2579	1330	759
TOTAL	67026	60623	51319	40466	35171	36433	58578	57963	80412	81075

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
AGE										
3	22191	61704	48481	44973	28502	20654	24789	19528	23677	16747
4	20922	17061	49463	38262	36037	22927	16644	19364	15517	18194
5	15614	13520	12162	35255	28657	24093	15303	8990	12174	10341
6	5164	7732	7022	6494	20219	18667	10569	5786	4042	5724
7	4852	3158	2955	3229	2798	10097	6942	3637	2313	1803
8	890	2255	1723	1524	1467	1573	3679	2528	1735	1118
9	417	482	872	930	686	707	856	1537	1261	975
10	215	248	173	412	433	394	468	335	704	627
11	105	142	109	68	194	279	267	168	163	355
+gp	1106	329	244	149	136	365	243	284	155	114
TOTAL	71477	106631	123203	131297	119129	99757	79761	62156	61741	55999

YEAR	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	GMST 61-**	AMST 61-**
AGE													
3	38600	24047	32802	12747	58032	35036	89219	46268	31316	6463	0	24476	28178
4	13087	31243	19419	26544	10289	47221	27951	72029	37608	25341	5224	18309	21406
5	11312	9792	24596	15146	20204	7831	36101	20666	51372	28590	18938	11951	13796
6	6057	6124	6980	17930	10651	13741	5069	21923	11525	31969	15716	7055	8156
7	2544	3298	3703	4116	11535	6412	7297	2200	9094	5822	18287	3823	4369
8	801	1018	1654	1823	2122	5723	3235	2644	1021	3566	2854	2131	2465
9	463	344	362	790	875	910	2220	1256	1007	459	1293	1164	1426
10	521	161	162	147	314	372	430	610	608	445	138	635	862
11	239	253	62	68	51	124	137	87	172	223	101	345	532
+gp	266	321	211	154	144	55	83	117	80	167	89		
TOTAL	73890	76600	89950	79467	114217	117424	171742	167800	143804	103046	62640		

Table 2.5.5.5. Saithe in the Faroes (Division Vb). Summary table.

Run title : FAROE SAITHE (ICES Division Vb) SAI_IND

At 3/05/2005 16:43

Table 16 Summary (without SOP correction)

Terminal Fs derived using XSA (With F shrinkage)

	RECRUITS Age 3	TOTALBIO	TOTSPBIO	LANDINGS	YIELD/SSB	FBAR 4- 8
1961	9047	121972	83798	9592	.1145	.0911
1962	13663	126462	85635	10454	.1221	.1083
1963	22431	158238	100631	12693	.1261	.0996
1964	16192	160429	98383	21893	.2225	.2007
1965	22803	174777	107215	22181	.2069	.1827
1966	21830	184152	108779	25563	.2350	.2029
1967	26879	181651	104635	21319	.2037	.1660
1968	21514	189804	115962	20387	.1758	.1350
1969	40798	215030	123795	27437	.2216	.1790
1970	34135	224447	129143	29110	.2254	.1832
1971	37285	228425	139500	32706	.2345	.1769
1972	33607	237048	147569	42663	.2891	.2329
1973	23282	210526	136682	57431	.4202	.3328
1974	18897	204072	137611	47188	.3429	.2811
1975	16306	187420	137886	41576	.3015	.3127
1976	18910	169750	122017	33065	.2710	.2821
1977	12940	156334	114098	34835	.3053	.3514
1978	8414	137397	96026	28138	.2930	.2657
1979	8632	113047	83557	27246	.3261	.2846
1980	12450	124847	88942	25230	.2837	.2325
1981	33326	142230	76327	30103	.3944	.4125
1982	15215	150234	83368	30964	.3714	.3453
1983	40976	179272	97192	39176	.4031	.3915
1984	25961	190385	96330	54665	.5675	.5020
1985	22191	190138	114869	44605	.3883	.4023
1986	61704	235603	91983	41716	.4535	.5023
1987	48481	250262	89315	40020	.4481	.4045
1988	44973	260365	97994	45285	.4621	.4549
1989	28502	229029	95873	44477	.4639	.3662
1990	20654	192253	86893	61628	.7092	.5670
1991	24789	149841	64327	54858	.8528	.7076
1992	19528	124118	56259	36487	.6485	.5232
1993	23677	133177	61393	33543	.5464	.4542
1994	16747	126806	59606	33182	.5567	.5029
1995	38600	152373	60285	27209	.4513	.4548
1996	24047	162358	69064	20029	.2900	.3610
1997	32802	179456	71294	22306	.3129	.3081
1998	12747	163755	75003	26421	.3523	.2926
1999	58032	210839	78443	33207	.4233	.3428
2000	35036	222786	84144	39020	.4637	.3935
2001	89219	289089	90737	51786	.5707	.5193
2002	46268	261927	82146	53546	.6518	.5070
2003	31316	226803	83524	46555	.5574	.4335
2004	6463	172586	73978	46115	.6234	.4351
Arith. Mean	27756	184125	95505	34718	.3837	.3383
Units	(Thousands)	(Tonnes)	(Tonnes)	(Tonnes)		

Table 2.5.6.1. Saithe in the Faroes (Division Vb). Input data for prediction with management options.

MFDP VERSION 1A								
Run: sai1								
Time and date: 09:11 04/05/2005								
Fbar age range: 4-8								
2005								
Age	**N**	**M**	**Mat**	**PF**	**PM**	**SWt**	**Sel**	**CWt**
3	27988	0.2	0.02	0	0	1.136	0.011	1.136
4	5224	0.2	0.14	0	0	1.411	0.101	1.411
5	18938	0.2	0.35	0	0	1.647	0.352	1.647
6	15716	0.2	0.48	0	0	1.792	0.507	1.792
7	18287	0.2	0.68	0	0	2.214	0.605	2.214
8	2854	0.2	0.87	0	0	3.172	0.727	3.172
9	1293	0.2	0.98	0	0	4.500	0.715	4.500
10	138	0.2	1.00	0	0	5.268	1.051	5.268
11	101	0.2	1.00	0	0	6.179	0.898	6.179
12	89	0.2	1.00	0	0	6.919	0.898	6.919
2006								
Age	**N**	**M**	**Mat**	**PF**	**PM**	**SWt**	**Sel**	**CWt**
3	27988	0.2	0.02	0	0	1.136	0.011	1.136
4	.	0.2	0.20	0	0	1.411	0.101	1.411
5	.	0.2	0.39	0	0	1.647	0.352	1.647
6	.	0.2	0.63	0	0	1.792	0.507	1.792
7	.	0.2	0.72	0	0	2.214	0.605	2.214
8	.	0.2	0.88	0	0	3.172	0.727	3.172
9	.	0.2	0.97	0	0	4.500	0.715	4.500
10	.	0.2	1.00	0	0	5.268	1.051	5.268
11	.	0.2	1.00	0	0	6.179	0.898	6.179
12	.	0.2	1.00	0	0	6.919	0.898	6.919
2007								
Age	**N**	**M**	**Mat**	**PF**	**PM**	**SWt**	**Sel**	**CWt**
3	27988	0.2	0.02	0	0	1.136	0.011	1.136
4	.	0.2	0.20	0	0	1.411	0.101	1.411
5	.	0.2	0.39	0	0	1.647	0.352	1.647
6	.	0.2	0.63	0	0	1.792	0.507	1.792
7	.	0.2	0.72	0	0	2.214	0.605	2.214
8	.	0.2	0.88	0	0	3.172	0.727	3.172
9	.	0.2	0.97	0	0	4.500	0.715	4.500
10	.	0.2	1.00	0	0	5.268	1.051	5.268
11	.	0.2	1.00	0	0	6.179	0.898	6.179
12	.	0.2	1.00	0	0	6.919	0.898	6.919
Input units are thousands and kg - output in tonnes								

Table 2.5.6.2. Saithe in the Faroes (Division Vb). Yield per recruit input data.

MFYPR VERSION 2A							
Run: sai10							
Index file 4/5/2005							
Time and date: 09:29 04/05/2005							
Fbar age range: 4-8							
Age	**M**	**Mat**	**PF**	**PM**	**SWt**	**Sel**	**CWt**
3	0.2	0.029	0	0	1.308	0.014	1.308
4	0.2	0.197	0	0	1.799	0.095	1.799
5	0.2	0.495	0	0	2.402	0.318	2.402
6	0.2	0.729	0	0	3.124	0.518	3.124
7	0.2	0.861	0	0	3.972	0.623	3.972
8	0.2	0.960	0	0	4.893	0.735	4.893
9	0.2	0.993	0	0	5.697	0.757	5.697
10	0.2	1.000	0	0	6.414	1.071	6.414
11	0.2	1.000	0	0	7.269	0.938	7.269
12	0.2	1.000	0	0	8.559	0.938	8.559
Weights in kilograms							

Table 2.5.6.3. Saithe in the Faroes (Division Vb). Yield per recruit, summary table.

MFYPR version 2a
Run: sai10
Time and date: 09:29 04/05/2005
Yield per results

FMult	Fbar	CatchNos	Yield	StockNos	Biomass	SpwnNosJan	SSBJan	SpwnNosSpwn	SSBSpwn
0.0000	0.0000	0.0000	0.0000	5.5167	22.2595	3.3218	18.1982	3.3218	18.1982
0.1000	0.0458	0.1690	0.8712	4.6753	16.0224	2.4994	12.0261	2.4994	12.0261
0.2000	0.0915	0.2616	1.2146	4.2157	12.8987	2.0576	8.9625	2.0576	8.9625
0.3000	0.1373	0.3219	1.3718	3.9174	11.0350	1.7760	7.1546	1.7760	7.1546
0.4000	0.1831	0.3652	1.4500	3.7036	9.7979	1.5779	5.9692	1.5779	5.9692
0.5000	0.2288	0.3984	1.4909	3.5401	8.9148	1.4292	5.1344	1.4292	5.1344
0.6000	0.2746	0.4250	1.5125	3.4094	8.2504	1.3126	4.5152	1.3126	4.5152
0.7000	0.3204	0.4470	1.5238	3.3017	7.7306	1.2182	4.0376	1.2182	4.0376
0.8000	0.3661	0.4656	1.5290	3.2106	7.3112	1.1398	3.6580	1.1398	3.6580
0.9000	0.4119	0.4817	1.5308	3.1323	6.9647	1.0735	3.3488	1.0735	3.3488
1.0000	0.4577	0.4958	1.5304	3.0639	6.6728	1.0165	3.0922	1.0165	3.0922
1.1000	0.5034	0.5082	1.5286	3.0034	6.4229	0.9669	2.8756	0.9669	2.8756
1.2000	0.5492	0.5194	1.5261	2.9493	6.2062	0.9234	2.6905	0.9234	2.6905
1.3000	0.5950	0.5295	1.5231	2.9006	6.0161	0.8847	2.5303	0.8847	2.5303
1.4000	0.6408	0.5386	1.5198	2.8564	5.8477	0.8501	2.3904	0.8501	2.3904
1.5000	0.6865	0.5470	1.5163	2.8160	5.6974	0.8189	2.2671	0.8189	2.2671
1.6000	0.7323	0.5547	1.5128	2.7789	5.5621	0.7907	2.1577	0.7907	2.1577
1.7000	0.7781	0.5619	1.5093	2.7446	5.4395	0.7650	2.0599	0.7650	2.0599
1.8000	0.8238	0.5685	1.5058	2.7128	5.3279	0.7415	1.9719	0.7415	1.9719
1.9000	0.8696	0.5747	1.5024	2.6832	5.2257	0.7198	1.8923	0.7198	1.8923
2.0000	0.9154	0.5805	1.4991	2.6555	5.1317	0.6999	1.8200	0.6999	1.8200

Reference point	F multiplier	Absolute F
Fbar(4-8)	1.0000	0.4577
FMax	0.9249	0.4233
F0.1	0.2604	0.1192
F35%SPR	0.3619	0.1656
Flow	0.1913	0.0876
Fmed	0.7925	0.3627
Fhigh	2.1967	1.0054

Weights in kilograms

Table 2.5.6.4. Saithe in the Faroes (Division Vb). Prediction with management option

MFDP VERSION 1A						
Run: sai1						
Index file 4/5/2005						
Time and date: 09:11 04/05/2005						
Fbar age range: 4-8						
2005						
Biomass	**SSB**	**FMult**	**FBar**	**Landings**		
155845	69180	1.0000	0.4585	44588		
2006					**2007**	
Biomass	**SSB**	**FMult**	**FBar**	**Landings**	**Biomass**	**SSB**
141262	65332	0.0000	0.0000	0	178444	91820
.	65332	0.1000	0.0459	4581	172988	87130
.	65332	0.2000	0.0917	8897	167861	82739
.	65332	0.3000	0.1376	12965	163042	78626
.	65332	0.4000	0.1834	16802	158510	74773
.	65332	0.5000	0.2293	20423	154246	71163
.	65332	0.6000	0.2751	23840	150234	67778
.	65332	0.7000	0.3210	27068	146457	64605
.	65332	0.8000	0.3668	30118	142899	61629
.	65332	0.9000	0.4127	33001	139546	58836
.	65332	1.0000	0.4585	35729	136386	56216
.	65332	1.1000	0.5044	38310	133405	53756
.	65332	1.2000	0.5502	40753	130593	51446
.	65332	1.3000	0.5961	43068	127938	49276
.	65332	1.4000	0.6420	45263	125431	47238
.	65332	1.5000	0.6878	47344	123063	45322
.	65332	1.6000	0.7337	49318	120824	43520
.	65332	1.7000	0.7795	51193	118707	41826
.	65332	1.8000	0.8254	52974	116703	40232
.	65332	1.9000	0.8712	54667	114806	38732
.	65332	2.0000	0.9171	56276	113010	37319
Input units are thousands and kg - output in tonnes						

Table 2.5.8.1. Saithe in the Faroes (Division Vb). Effort (hours) and catch in number at age for commercial pair trawlers and spring survey combined.

```
Faroe Saithe (ICES Div. Vb)  (springsurvandtrawl.dat)
102
Spring survey org shifted
1993 2004
1 1 0.95 1.0
2  8
100     127     843     469     426     110      70      52
100     152     510     925     938     381      89      60
100      62     270     117     134     107      58      35
100      79     106     251     133      97      66      24
100     332     921     809    1394     340     150     108
100     218     207     697     557     664      90      40
100     212     379     309    1256     507     574      28
100     785     364    1122     299     437     165     132
100     320    8109    3430    3569     255     229      82
100     824     919    3317     979     604      77      49
100     526    5296    7982    4811     301     121      13
100    1410    1201    2768    4600    1516     223      86
All pair (GLM) >1000 HP
1995 2004
1 1 0 1
3 11
10338 90    343   1101  450   278   93    46    36    27
6116  99    306   262   358   161   90    43    41    22
7369  76    205   571   389   295   128   28    13    4
8283  46    281   492   637   313   139   73    17    5
12250 89    249   794   1031  1035  418   97    42    6
11156 205   741   432   1278  631   759   91    50    15
13121 315   742   2554  602   958   386   319   66    15
11110 58    1741  1736  3016  228   299   108   77    11
7900  50    528   2321  839   800   70    75    44    13
7931  14    381   1618  1627  329   242   36    37    17
```

Table 2.5.8.2. Saithe in the Faroes (Division Vb). Diagnostics from XSA with some commercial tuning series.

```
Lowestoft VPA Version 3.1
    3/05/2005  16:01
 Extended Survivors Analysis
 FAROE SAITHE (ICES Division Vb)                SAI_IND
 CPUE data from file D:\Stovnsmeting\Ices2005\Xsa\divxsa\springsurvandtrawl.DAT

 Catch data for  44 years. 1961 to 2004. Ages  2 to  12.

      Fleet             First  Last  First  Last  Alpha   Beta
                         year  year   age    age
 Spring survey org sh    1993  2004    2      8    .950   1.000
 All pair (GLM) >1000    1995  2004    3     11    .000   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 >=    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   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   1995   1996   1997   1998   1999   2000   2001   2002   2003   2004
      2   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000
      3   .011   .014   .012   .014   .006   .025   .012   .006   .008   .003
      4   .090   .039   .049   .073   .073   .069   .100   .121   .057   .060
      5   .414   .139   .116   .152   .186   .236   .302   .375   .233   .286
      6   .408   .303   .329   .241   .308   .433   .639   .692   .466   .289
      7   .716   .490   .509   .463   .501   .485   .817   .574   .763   .484
      8   .643   .835   .540   .536   .649   .747   .748   .769   .612   .882
      9   .855   .548   .702   .725   .657   .553  1.092   .529   .621  1.052
     10   .532   .750   .652   .868   .734   .811  1.423  1.069   .813  1.310
     11   .662   .336   .720   .706   .747   .701  1.343   .568   .885  1.311

XSA population numbers (Thousands)

                              AGE
 YEAR         2         3         4         5         6         7         8         9        10        11
 1995      2.94E+04  3.86E+04  1.31E+04  1.13E+04  6.05E+03  2.54E+03  8.04E+02  4.63E+02  5.15E+02  2.37E+02
 1996      4.00E+04  2.40E+04  3.12E+04  9.78E+03  6.12E+03  3.30E+03  1.02E+03  3.46E+02  1.61E+02  2.48E+02
 1997      1.55E+04  3.28E+04  1.94E+04  2.46E+04  6.97E+03  3.70E+03  1.65E+03  3.61E+02  1.64E+02  6.24E+01
 1998      7.03E+04  1.27E+04  2.65E+04  1.51E+04  1.79E+04  4.11E+03  1.82E+03  7.88E+02  1.47E+02  6.99E+01
 1999      4.35E+04  5.76E+04  1.03E+04  2.02E+04  1.06E+04  1.15E+04  2.12E+03  8.72E+02  3.12E+02  5.04E+01
 2000      1.23E+05  3.56E+04  4.68E+04  7.80E+03  1.37E+04  6.40E+03  5.72E+03  9.06E+02  3.70E+02  1.23E+02
 2001      7.33E+04  1.01E+05  2.84E+04  3.58E+04  5.05E+03  7.29E+03  3.23E+03  2.22E+03  4.27E+02  1.35E+02
 2002      5.71E+04  6.00E+04  8.16E+04  2.11E+04  2.17E+04  2.18E+03  2.64E+03  1.25E+03  6.09E+02  8.42E+01
 2003      3.49E+04  4.68E+04  4.89E+04  5.92E+04  1.18E+04  8.88E+03  1.01E+03  1.00E+03  6.04E+02  1.71E+02
 2004      2.53E+05  2.86E+04  3.80E+04  3.78E+04  3.84E+04  6.09E+03  3.39E+03  4.47E+02  4.40E+02  2.19E+02

 Estimated population abundance at 1st Jan 2005

          0.00E+00  2.07E+05  2.34E+04  2.93E+04  2.33E+04  2.36E+04  3.07E+03  1.15E+03  1.28E+02  9.72E+01

 Taper weighted geometric mean of the VPA populations:

          3.30E+04  2.51E+04  1.91E+04  1.27E+04  7.42E+03  3.94E+03  2.12E+03  1.13E+03  6.29E+02  3.35E+02

 Standard error of the weighted Log(VPA populations) :
             .6124     .5488     .5845     .6064     .5839     .5247     .5507     .6547     .7999     .9893
```

Table 2.5.8.2. (Continued)

```
Log catchability residuals.
 Fleet : Spring survey org sh
```

Age	1993	1994
2	.11	-.55
3	.59	.42
4	-.08	.51
5	-.02	.71
6	-.05	.85
7	-.02	.54
8	-.15	.72
9	No data for this fleet at this age	
10	No data for this fleet at this age	
11	No data for this fleet at this age	

Age	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
2	-.97	-1.04	1.34	-.59	-.14	.13	-.25	.95	.99	.00
3	-1.09	-1.55	.30	-.24	-1.16	-.70	1.35	-.31	1.69	.69
4	-1.41	-1.57	.09	-.35	-.21	-.44	1.20	.13	1.46	.66
5	-1.24	-1.38	.03	-.37	.19	-.24	.78	.08	.50	.96
6	-.67	-.88	.26	-.10	.22	-.06	.60	.06	-.25	.01
7	-.12	-.47	.25	-.41	.45	-.23	.30	.18	-.59	.13
8	.48	.05	.78	-.31	-.71	-.06	.04	-.25	-.77	.17
9	No data for this fleet at this age									
10	No data for this fleet at this age									
11	No data for this fleet at this age									

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

Age	2	3	4	5	6	7	8
Mean Log q	-9.5990	-8.2719	-7.6298	-7.1971	-7.3753	-7.3708	-7.3945
S.E(Log q)	.7670	1.0154	.9102	.7365	.4789	.3696	.4930

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	1.25	-.640	9.29	.40	12	.99	-9.60
3	.75	.595	8.80	.37	12	.79	-8.27
4	.68	1.026	8.44	.51	12	.62	-7.63
5	.58	2.538	8.30	.78	12	.35	-7.20
6	1.04	-.181	7.30	.65	12	.52	-7.38
7	1.08	-.366	7.30	.70	12	.41	-7.37
8	1.16	-.524	7.37	.52	12	.59	-7.39

Fleet : All pair (GLM) >1000

Age	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
2	No data for this fleet at this age									
3	.04	1.13	.37	.70	-.55	.87	.09	-.92	-.48	-1.26
4	.45	-.04	-.14	-.25	.19	-.15	.21	.18	-.19	-.26
5	.72	-.17	-.51	-.27	-.46	.00	.12	.47	.00	.11
6	-.08	.16	-.06	-.67	-.03	.08	.26	.60	.17	-.43
7	.21	-.17	.14	-.04	-.25	-.07	.20	.03	.30	-.33
8	.01	.35	-.10	-.23	.38	.12	-.15	-.03	-.24	-.11
9	-.05	.57	-.03	.04	-.19	-.25	.18	-.40	-.16	.08
10	-.54	1.37	-.02	.33	.03	.16	.37	.20	-.11	.23
11	.00	.14	-.21	-.22	-.09	.01	.02	.03	-.04	.14

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	-15.2382	-13.1892	-12.0034	-11.4759	-11.2408	-11.0190	-11.0190	-11.0190	-11.0190
S.E(Log q)	.7917	.2407	.3859	.3551	.2121	.2194	.2690	.5317	.1256

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	2.41	-1.306	21.85	.10	10	1.84	-15.24
4	1.18	-1.204	13.70	.85	10	.28	-13.19
5	1.04	-.205	12.10	.72	10	.43	-12.00
6	1.20	-.921	11.91	.72	10	.43	-11.48
7	1.07	-.478	11.43	.86	10	.24	-11.24
8	1.01	-.072	11.05	.89	10	.23	-11.02
9	1.22	-1.241	12.02	.80	10	.32	-11.04
10	1.82	-1.680	14.91	.35	10	.81	-10.82
11	.86	3.350	10.17	.99	10	.07	-11.04

Terminal year survivor and F summaries :

Table 2.5.8.2. (Continued)

Age 2 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
Spring survey org sh	206932.	.798	.000	.00	1	1.000	.000
All pair (GLM) >1000	1.	.000	.000	.00	0	.000	.000
F shrinkage mean	0.	2.00				.000	.000

Weighted prediction :

```
 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
    206932.        .80       .00     1     .000    .000

Age  3   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
 Spring survey org sh     56541.    .637        .144     .23    2   .592      .001
 All pair (GLM) >1000      6605.    .830        .000     .00    1   .348      .010

   F shrinkage mean        5858.    2.00                            .060      .012
 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
     23356.        .49       .62     4    1.265    .003

Age  4   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
 Spring survey org sh     83200.    .529        .278     .53    3   .217      .022
 All pair (GLM) >1000     21949.    .282        .067     .24    2   .766      .079

   F shrinkage mean       20600.    2.00                            .016      .084
 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
     29293.        .25       .26     6    1.055    .060

 Age  5   Catchability constant w.r.t. time and dependent on age
Year class = 1999
 Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                       Survivors     s.e        s.e    Ratio       Weights     F
 Spring survey org sh     38452.    .435        .422     .97    4   .217      .182
 All pair (GLM) >1000     20161.    .232        .184     .80    3   .769      .323

   F shrinkage mean       25042.    2.00                            .014      .268
 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
     23264.        .20       .18     8     .907    .286

Age  6   Catchability constant w.r.t. time and dependent on age
Year class = 1998
 Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                       Survivors     s.e        s.e    Ratio       Weights     F
 Spring survey org sh     29711.    .332        .186     .56    5   .271      .235
 All pair (GLM) >1000     21819.    .199        .154     .77    4   .718      .309

   F shrinkage mean       11811.    2.00                            .011      .512

 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
     23554.        .17       .11    10     .656    .289

Age  7   Catchability constant w.r.t. time and dependent on age
Year class = 1997
 Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                       Survivors     s.e        s.e    Ratio       Weights     F
 Spring survey org sh      3202.    .266        .136     .51    6   .326      .468
 All pair (GLM) >1000      3027.    .178        .165     .93    5   .663      .490
```

Table 2.5.8.2. (Continued)

```
   F shrinkage mean         2164.    2.00                           .012      .633

 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
      3071.        .15       .10    12     .659    .484

Age  8   Catchability constant w.r.t. time and dependent on age

 Year class = 1996
Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                       Survivors     s.e        s.e     Ratio      Weights     F
 Spring survey org sh        987.    .271        .169     .62    7   .288      .974
 All pair (GLM) >1000       1213.    .180        .110     .61    6   .692      .851

   F shrinkage mean         1568.    2.00                           .020      .712

 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
      1149.        .15       .09    14     .580    .882

Age  9   Catchability constant w.r.t. time and age (fixed at the value for age)  8
Year class = 1995

 Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                       Survivors     s.e        s.e     Ratio      Weights     F
 Spring survey org sh        112.    .257        .234     .91    7   .180     1.137
 All pair (GLM) >1000        129.    .166        .067     .40    7   .796     1.046

   F shrinkage mean          236.    2.00                           .024      .697

 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
       128.        .15       .08    15     .549   1.052

Age 10   Catchability constant w.r.t. time and age (fixed at the value for age)  8
Year class = 1994

 Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                       Survivors     s.e        s.e     Ratio      Weights     F
 Spring survey org sh         93.    .262        .130     .49    7   .127     1.346
 All pair (GLM) >1000         95.    .184        .069     .38    8   .822     1.327

   F shrinkage mean          158.    2.00                           .052      .981

 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
        97.        .19       .06    16     .322   1.310

Age 11   Catchability constant w.r.t. time and age (fixed at the value for age)  8
Year class = 1993

 Fleet                 Estimated     Int        Ext     Var     N  Scaled   Estimated
                       Survivors     s.e        s.e     Ratio      Weights     F
 Spring survey org sh         42.    .239        .145     .61    7   .068     1.415
 All pair (GLM) >1000         48.    .189        .076     .40    9   .888     1.314

   F shrinkage mean           66.    2.00                           .043     1.094

 Weighted prediction :

 Survivors         Int       Ext     N     Var      F
 at end of year    s.e       s.e           Ratio
        48.        .19       .06    17     .311   1.311
```

Table 2.5.8.3. Saithe in the Faroes (Division Vb). Fishing mortality (F) at age.

```
    Run title : FAROE SAITHE (ICES Division Vb)                SAI_IND
    At  3/05/2005  16:02
                  Terminal Fs derived using XSA (With F shrinkage)

       Table  8    Fishing mortality (F) at age
       YEAR        1961     1962     1963     1964
       AGE
         2         .0000    .0000    .0000    .0000
         3         .0226    .0465    .0307    .0478
         4         .0556    .0863    .0358    .1260
         5         .0994    .1208    .0716    .2198
         6         .1219    .1401    .1115    .1797
         7         .0933    .1192    .1634    .2213
         8         .0852    .0752    .1157    .2566
         9         .0972    .1150    .1355    .1424
        10         .0915    .1295    .2012    .1658
        11         .0916    .1069    .1514    .1891
       +gp         .0916    .1069    .1514    .1891
0  FBAR  4- 8      .0911    .1083    .0996    .2007

       YEAR         1965     1966     1967     1968     1969     1970     1971     1972     1973
1974
       AGE
         2          .0000    .0000    .0000    .0000    .0000    .0000    .0000    .0000    .0000
.0000
         3          .0495    .0250    .0248    .0320    .0328    .0479    .0885    .0935    .1271
.2293
         4          .0772    .1007    .0518    .0910    .1452    .2547    .1480    .0728    .3227
.3170
         5          .1588    .1492    .1217    .0954    .1719    .1538    .3579    .1649    .4582
.3543
         6          .2137    .2326    .1388    .1357    .1684    .1597    .1404    .2985    .3486
.3276
         7          .2216    .2784    .2564    .1345    .2000    .1536    .1262    .3286    .2919
.2297
         8          .2424    .2536    .2615    .2183    .2094    .1943    .1118    .2995    .2425
.1770
         9          .2983    .2770    .2269    .2182    .3063    .1656    .1244    .3759    .1982
.1960
        10          .2355    .3346    .2903    .2027    .3289    .2008    .1213    .4600    .2496
.1809
        11          .2601    .2900    .2609    .2141    .2831    .1877    .1196    .3810    .2312
.1854
       +gp          .2601    .2900    .2609    .2141    .2831    .1877    .1196    .3810    .2312
.1854
0  FBAR  4- 8       .1827    .2029    .1660    .1350    .1790    .1832    .1769    .2329    .3328
.2811

       YEAR         1975     1976     1977     1978     1979     1980     1981     1982     1983
1984
       AGE
         2          .0000    .0000    .0000    .0000    .0000    .0000    .0000    .0000    .0000
.0000
         3          .1505    .2055    .1478    .0837    .0374    .0926    .0137    .0285    .0693
.0158
         4          .3595    .3705    .2977    .2367    .1776    .1536    .2415    .1832    .1061
.4955
         5          .5442    .3153    .4251    .2881    .2890    .2024    .1958    .2031    .3629
.3460
         6          .2891    .3432    .4140    .1915    .2780    .2299    .4379    .4823    .4648
.5672
         7          .1957    .2048    .3665    .2001    .3213    .3217    .5551    .3197    .4955
.6364
         8          .1752    .1767    .2537    .4119    .3572    .2550    .6322    .5384    .5285
.4650
         9          .1183    .1664    .2026    .2642    .3872    .3127    .5593    .5698    .8447
.5174
        10          .1485    .1202    .1740    .3018    .4698    .5105    .5211    .3288    .3718
.3693
        11          .1479    .1550    .2111    .3279    .4075    .3617    .5757    .4826    .5866
.4539
       +gp          .1479    .1550    .2111    .3279    .4075    .3617    .5757    .4826    .5866
.4539
0  FBAR  4- 8       .3127    .2821    .3514    .2657    .2846    .2325    .4125    .3453    .3915
.5020

       YEAR         1985     1986     1987     1988     1989     1990     1991     1992     1993
1994
       AGE
         2          .0000    .0000    .0000    .0000    .0000    .0000    .0000    .0000    .0000
.0000
         3          .0629    .0211    .0367    .0215    .0176    .0159    .0470    .0299    .0634
.0466
```

```
         4          .2367     .1385     .1386     .0891     .2028     .2043     .4158     .2641     .2058
.2754
         5          .5028     .4552     .4274     .3560     .2287     .6246     .7724     .5988     .5546
.3350
         6          .2917     .7619     .5769     .6422     .4945     .7895     .8686     .7165     .6065
.6111
         7          .5663     .4057     .4625     .5889     .3759     .8098     .8108     .5422     .5271
.6096
         8          .4141     .7505     .4173     .5988     .5300     .4084     .6731     .4965     .3784
.6812
         9          .3186     .8263     .5486     .5650     .3543     .2136     .7403     .5818     .5000
.4316
        10          .2173     .6211     .7315     .5555     .2384     .1878     .8271     .5222     .4866
.7678
        11          .3185     .7398     .5706     .5780     .3767     .2714     .7542     .5378     .4584
.6325
       +gp          .3185     .7398     .5706     .5780     .3767     .2714     .7542     .5378     .4584
.6325
0  FBAR  4- 8       .4023     .5024     .4046     .4550     .3664     .5673     .7081     .5236     .4545
.5025

       YEAR        1995     1996     1997     1998     1999     2000     2001     2002     2003     2004        FBAR
**-**
       AGE
         2          .0000     .0000     .0000     .0000     .0000     .0000     .0000     .0000     .0000     .0000
.0000
         3          .0115     .0138     .0117     .0143     .0062     .0255     .0124     .0056     .0078     .0029
.0054
         4          .0901     .0392     .0485     .0730     .0732     .0691     .1002     .1207     .0566     .0599
.0791
         5          .4140     .1386     .1161     .1522     .1857     .2359     .3019     .3752     .2333     .2856
.2980
         6          .4081     .3035     .3286     .2411     .3078     .4334     .6386     .6918     .4660     .2888
.4822
         7          .7163     .4904     .5091     .4633     .5011     .4847     .8165     .5739     .7627     .4842
.6069
         8          .6431     .8347     .5401     .5358     .6493     .7474     .7479     .7688     .6125     .8822
.7545
         9          .8551     .5476     .7021     .7254     .6572     .5528    1.0924     .5287     .6211    1.0525
.7341
        10          .5315     .7496     .6521     .8680     .7337     .8111    1.4228    1.0692     .8126    1.3104
1.0640
        11          .6620     .3364     .7204     .7056     .7469     .7009    1.3431     .5677     .8851    1.3109
.9212
       +gp         .6620     .3364     .7204     .7056     .7469     .7009    1.3431     .5677     .8851    1.3109
0  FBAR  4- 8      .4543     .3613     .3085     .2931     .3434     .3941     .5210     .5061     .4262     .4001
```

Table 2.5.8.4. Saithe in the Faroes (Division Vb). Stock number at age (start of year) (Thousands).

```
   Run title : FAROE SAITHE (ICES Division Vb)                SAI_IND
    At  3/05/2005  16:02
                   Terminal Fs derived using XSA (With F shrinkage)

       Table 10    Stock number at age (start of year)              Numbers*10**-3
       YEAR        1961     1962     1963     1964
       AGE
         2         16689    27397    19777    27852
         3          9047    13663    22431    16192
         4          7739     7241    10678    17809
         5          5643     5993     5438     8435
         6          3881     4183     4349     4145
         7          2680     2813     2977     3185
         8          1746     1999     2044     2070
         9          1384     1313     1518     1491
        10          1036     1028      958     1085
        11           568      774      740      641
       +gp          1032     1141     2147     1111
0       TOTAL       51445    67545    73056    84016

       YEAR        1965     1966     1967     1968     1969     1970     1971     1972     1973     1974
       AGE
         2         26663    32830    26278    49830    41693    45540    41047    28436    23080    19916
         3         22803    21830    26879    21514    40798    34135    37285    33607    23282    18897
         4         12638    17769    17431    21468    17059    32325    26640    27941    25059    16786
         5         12854     9578    13154    13551    16048    12079    20514    18811    21271    14859
         6          5543     8979     6755     9536    10085    11064     8480    11742    13059    11013
         7          2835     3665     5826     4814     6816     6978     7721     6033     7132     7545
         8          2090     1860     2272     3691     3445     4569     4899     5572     3556     4361
         9          1311     1343     1182     1432     2429     2288     3080     3587     3381     2285
        10          1059      797      833      771      942     1464     1587     2227     2016     2271
        11           753      685      467      510      515      555      981     1151     1151     1286
       +gp          1367      981      670     1067      846      848      977      727      990     1722
0       TOTAL       89917   100316   101746   128185   140678   151845   153211   139834   123979   100940

       YEAR        1975     1976     1977     1978     1979     1980     1981     1982     1983     1984
       AGE
         2         23097    15805    10277    10543    15207    40704    18583    50047    31708    27102
         3         16306    18910    12940     8414     8632    12450    33325    15214    40975    25960
         4         12301    11484    12607     9138     6336     6808     9292    26913    12106    31301
         5         10010     7030     6492     7664     5905     4343     4780     5975    18346     8914
         6          8536     4756     4199     3475     4704     3621     2905     3218     3993    10449
         7          6498     5234     2763     2273     2349     2917     2356     1535     1626     2054
         8          4910     4375     3492     1568     1523     1395     1731     1107      913      811
         9          2991     3374     3002     2218      850      872      885      753      529      441
        10          1537     2176     2339     2007     1394      473      522      414      349      186
        11          1551     1085     1580     1609     1215      714      232      254      244      197
       +gp          2385     2199     1907     2100     2262     2840     2549     2579     1330      759
0       TOTAL       90123    76428    61596    51009    50378    77136    77160   108009   112119   108174

       YEAR        1985     1986     1987     1988     1989     1990     1991     1992     1993     1994
       AGE
         2         75360    59204    54900    34816    25236    30276    23846    28907    20438    47141
         3         22189    61699    48472    44948    28505    20662    24788    19523    23667    16733
         4         20922    17059    49459    38255    36017    22929    16650    19363    15513    18186
         5         15613    13519    12160    35252    28651    24076    15305     8995    12173    10338
         6          5163     7731     7021     6493    20216    18662    10555     5788     4046     5723
         7          4852     3158     2955     3228     2797    10095     6938     3625     2314     1806
         8           890     2255     1723     1523     1467     1572     3677     2525     1726     1119
         9           417      482      872      929      685      707      856     1536     1258      968
        10           215      248      173      412      432      394      467      334      703      625
        11           105      142      109       68      194      279      267      167      162      354
       +gp          1106      329      244      149      136      365      243      284      155      114
0       TOTAL      146832   165826   178088   166075   144337   130017   103592    91047    82156   103108

       YEAR        1995     1996     1997     1998     1999     2000     2001     2002     2003     2004     2005  GMST 61-** AMST 61-**
       AGE
         2         29351    40041    15519    70295    43515   123291    73310    57119    34945   252747        0    31373
36254
         3         38596    24031    32783    12706    57553    35627   100942    60021    46765    28611   206932    24701
28784
         4         13076    31239    19406    26529    10255    46829    28435    81626    48868    37989    23356    18365
21634
         5         11305     9784    24593    15136    20192     7804    35780    21062    59230    37809    29293    11951
13796
         6          6055     6118     6973    17927    10642    13730     5046    21660    11849    38403    23264     7051
8148
         7          2543     3296     3698     4110    11533     6405     7288     2182     8879     6088    23554     3822
4368
         8           804     1017     1653     1820     2117     5721     3230     2637     1006     3390     3071     2131
2464
         9           463      346      361      788      872      906     2218     1252     1001      447     1149     1163
1425
        10           515      161      164      147      312      370      427      609      604      440      128      635
861
        11           237      248       62       70       50      123      135       84      171      219       97      344
531
       +gp           264      315      212      157      143       54       82      114       80      164       85
```

0	TOTAL	103210	116596	105425	149685	157185	240859	256893	248366	213399	406308	310930

Table 2.5.8.5. Saithe in the Faroes (Division Vb). Summary table.

Run title : FAROE SAITHE (ICES Division Vb) SAI_IND

At 3/05/2005 16:02

Table 16 Summary (without SOP correction)

Terminal Fs derived using XSA (With F shrinkage)

	RECRUITS Age 3	TOTALBIO	TOTSPBIO	LANDINGS	YIELD/SSB	FBAR 4- 8
1961	9047	121972	83798	9592	.1145	.0911
1962	13663	126462	85635	10454	.1221	.1083
1963	22431	158238	100631	12693	.1261	.0996
1964	16192	160429	98383	21893	.2225	.2007
1965	22803	174777	107215	22181	.2069	.1827
1966	32830	184152	108779	25563	.2350	.2029
1967	26879	181651	104635	21319	.2037	.1660
1968	21514	189804	115962	20387	.1758	.1350
1969	40798	215030	123795	27437	.2216	.1790
1970	34135	224447	129142	29110	.2254	.1832
1971	37285	228425	139500	32706	.2345	.1769
1972	33607	237048	147569	42663	.2891	.2329
1973	23282	210526	136682	57431	.4202	.3328
1974	18897	204072	137611	47188	.3429	.2811
1975	16306	187420	137886	41576	.3015	.3127
1976	18910	169750	122017	33065	.2710	.2821
1977	12940	156334	114097	34835	.3053	.3514
1978	8414	137397	96026	28138	.2930	.2657
1979	8632	113047	83557	27246	.3261	.2846
1980	12450	124846	88941	25230	.2837	.2325
1981	33325	142229	76326	30103	.3944	.4125
1982	15214	150232	83368	30964	.3714	.3453
1983	40975	179269	97190	39176	.4031	.3915
1984	25960	190380	96328	54665	.5675	.5020
1985	22189	190128	114864	44605	.3883	.4023
1986	61699	235585	91977	41716	.4536	.5024
1987	48472	250231	89305	40020	.4481	.4046
1988	44948	260298	97977	45285	.4622	.4550
1989	28505	228971	95848	44477	.4640	.3664
1990	20662	192210	86861	61628	.7095	.5673
1991	24788	149798	64291	54858	.8533	.7081
1992	19523	124061	56209	36487	.6491	.5236
1993	23667	133101	61336	33543	.5469	.4545
1994	16733	126715	59549	33182	.5572	.5025
1995	38596	152270	60214	27209	.4519	.4543
1996	24031	162208	68953	20029	.2905	.3613
1997	32783	179387	71281	22306	.3129	.3085
1998	12706	163639	74982	26421	.3524	.2931
1999	57553	210021	78337	33207	.4239	.3434
2000	35627	222879	83948	39020	.4648	.3941
2001	100942	304722	91115	51786	.5684	.5210
2002	60021	291628	85055	53546	.6295	.5061
2003	46765	271496	90772	46555	.5129	.4262
2004	28611	239650	86396	46115	.5338	.4001
Arith. Mean	41144	187658	96008	34718	.3802	.3374
0 Units	(Thousands)	(Tonnes)	(Tonnes)	(Tonnes)		

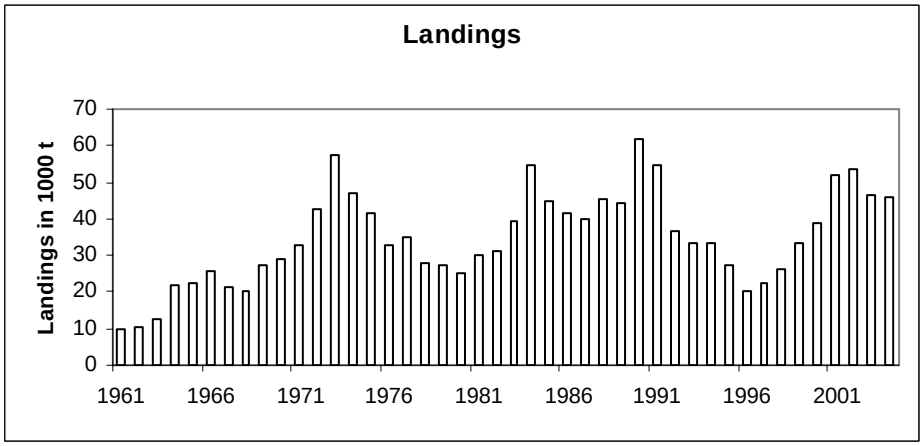


Figure 2.5.1.1. Saithe in the Faroes (Division Vb). Landings in 1000 tonnes.

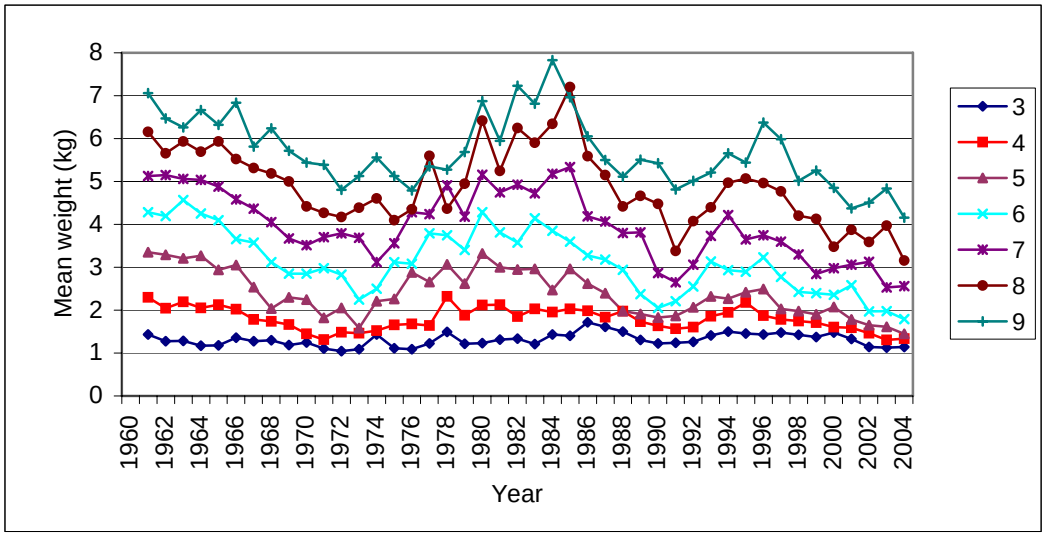


Figure 2.5.3.1. Saithe in the Faroes (Division Vb). Mean weight (kg) at age in the catches in 1961-2004.

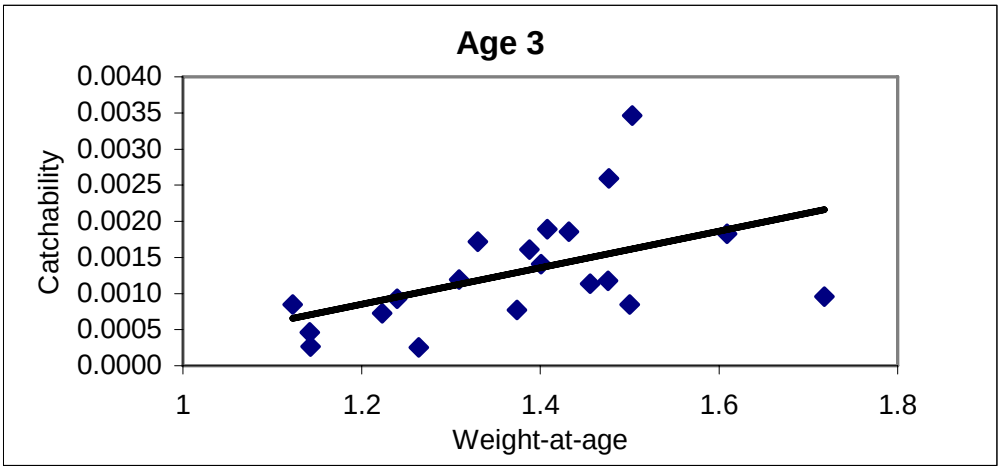


Figure 2.5.3.2. Saithe in the Faroes (Division Vb). Relation between weight at age and catchability for age 3.

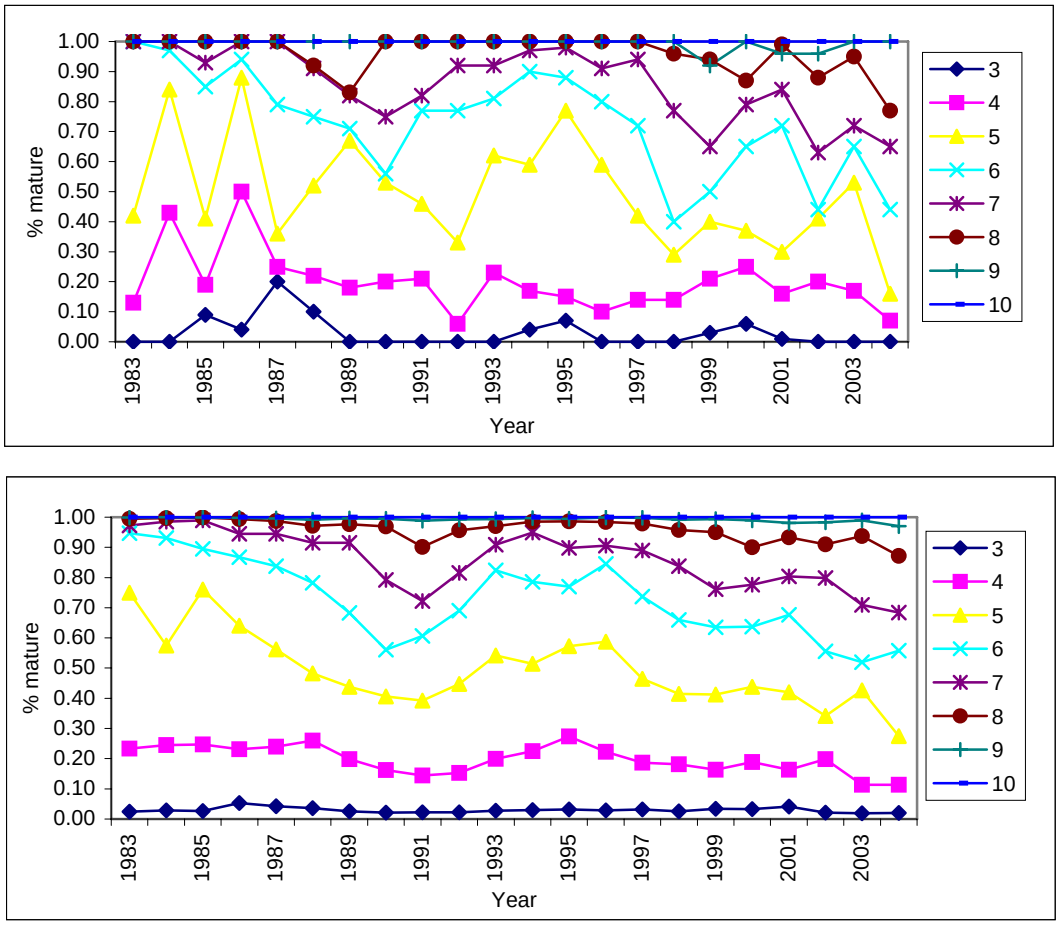


Figure 2.5.4.1. Saithe in the Faroes (Division Vb). Observed (upper figure) and fitted values (lower figure) proportion mature at age for the period 1983-2004.

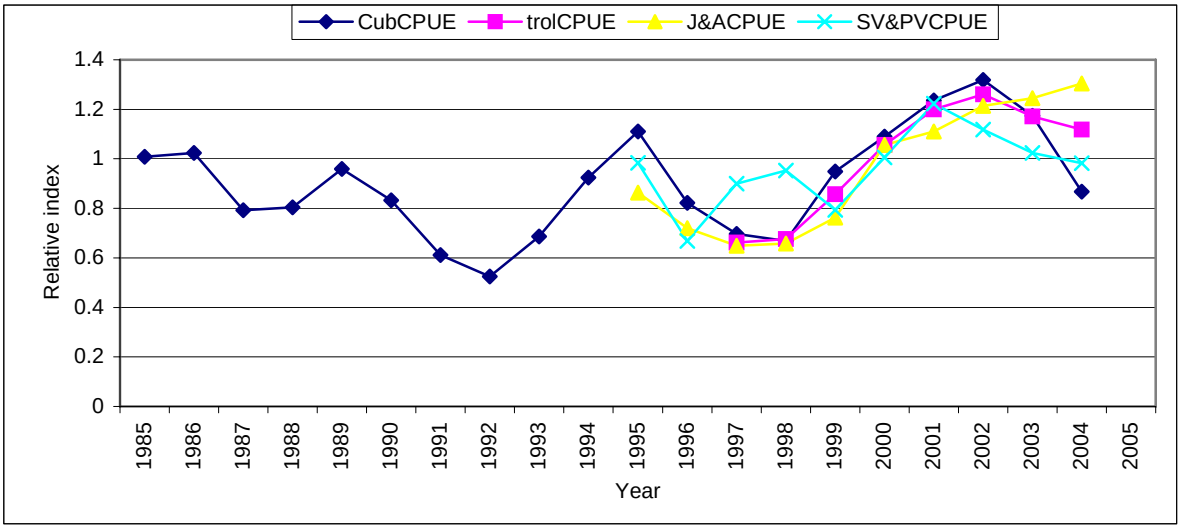


Figure 2.5.5.1. Saithe in the Faroes (Division Vb). Relative CPUE index for the different trawlers.

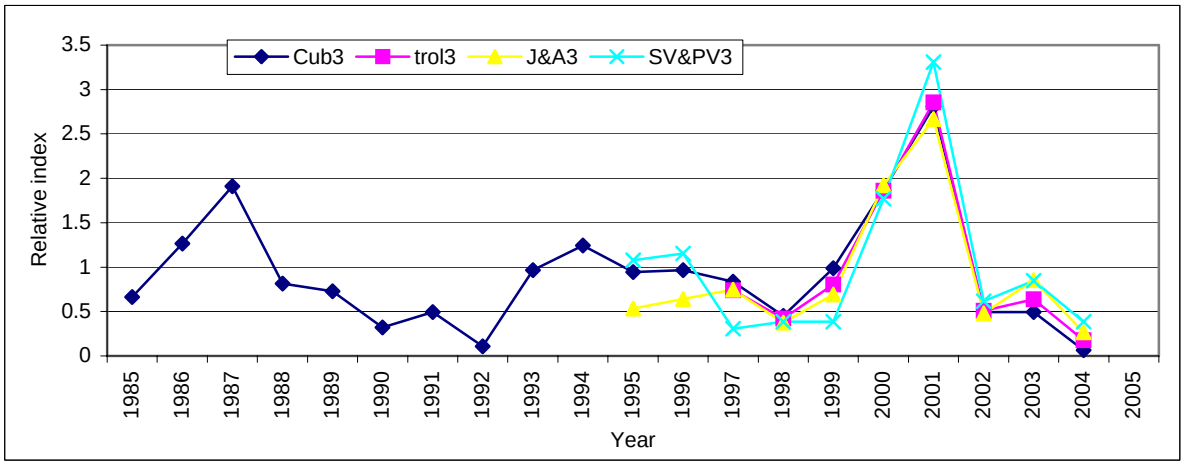


Figure 2.5.5.2. Saithe in the Faroes (Division Vb). Relative index age 3 for the different trawlers.

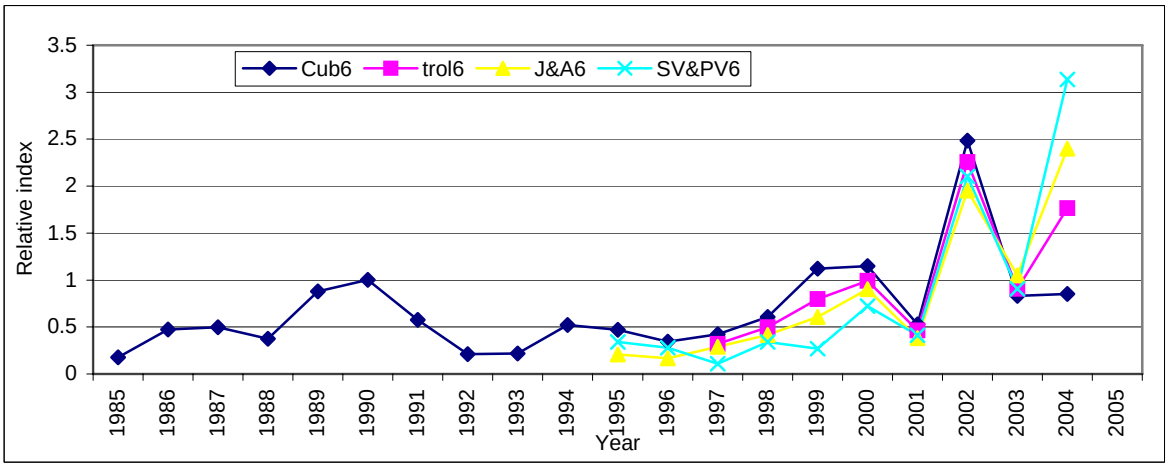


Figure 2.5.5.3. Saithe in the Faroes (Division Vb). Relative index age 6 for the different trawlers.

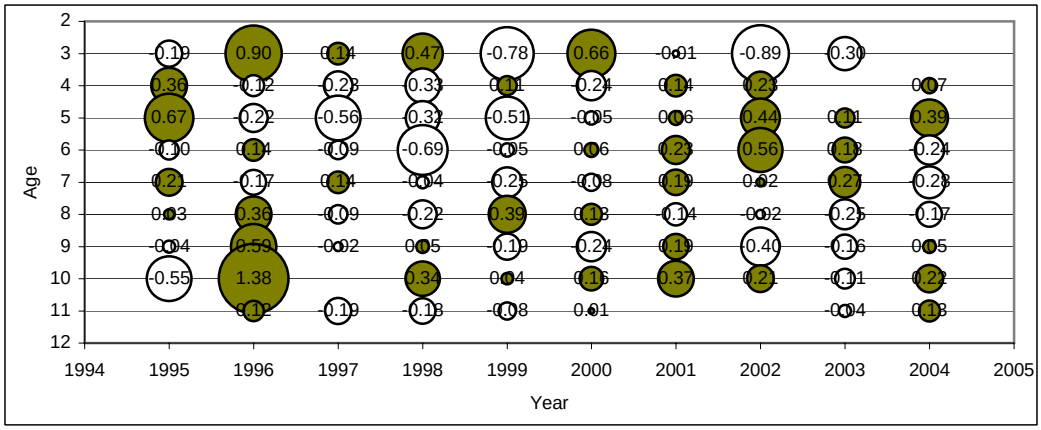
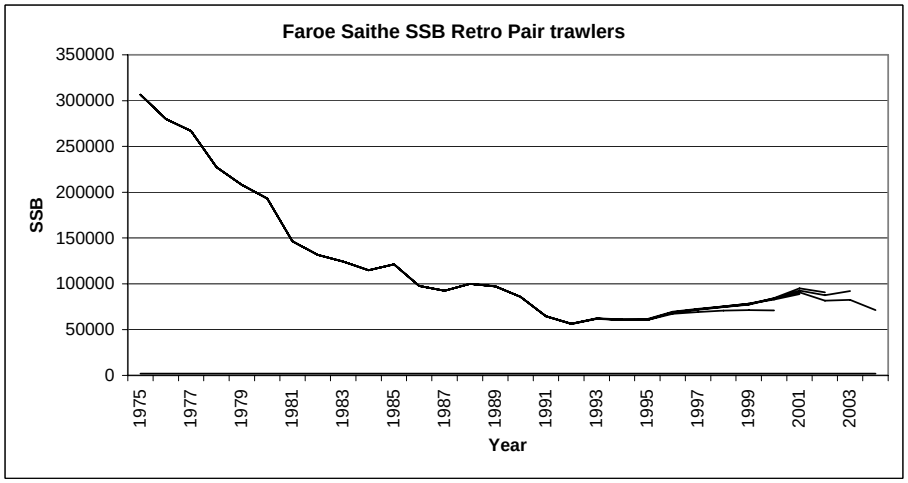


Figure 2.5.5.4. Saithe in the Faroes (Division Vb). Log catchability residuals for age groups 3 -11 from XSA.



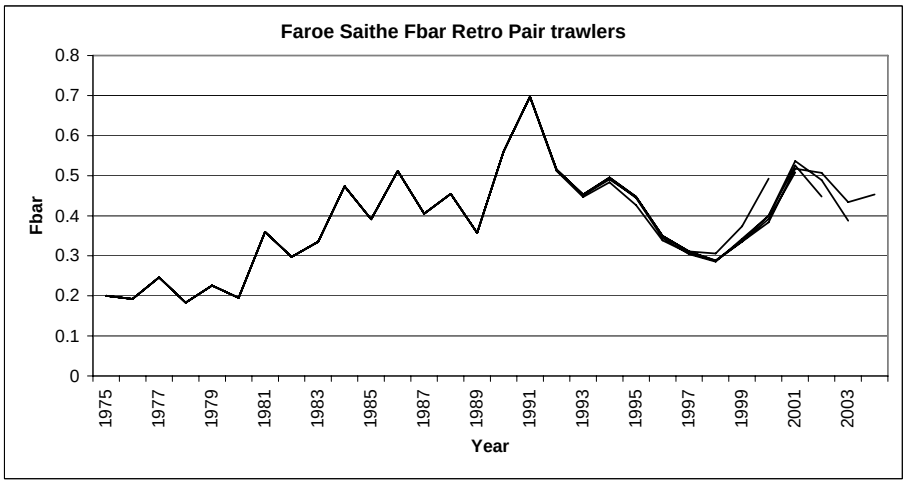


Figure 2.5.5.5. Saithe in the Faroes (Division Vb). Retrospective analysis of spawning stock biomass of age groups 4-8 from Adapt (upper figure) and retrospective analysis of average fishing-mortality of age groups 4-8 from Adapt (lower figure).

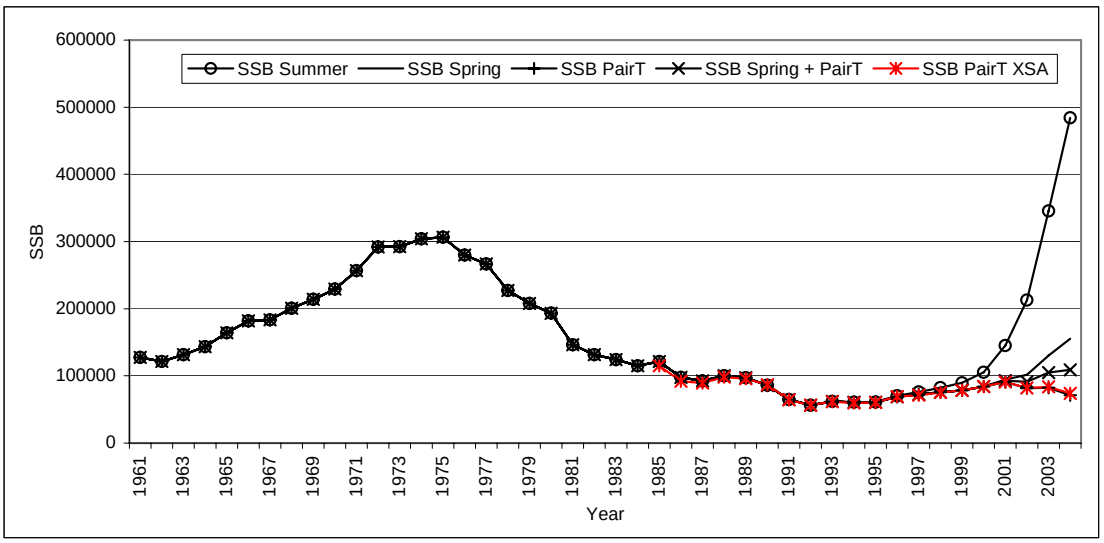


Figure 2.5.5.6. Saithe in the Faroes (Division Vb). Comparison between SSB from Adapt run and XSA run.

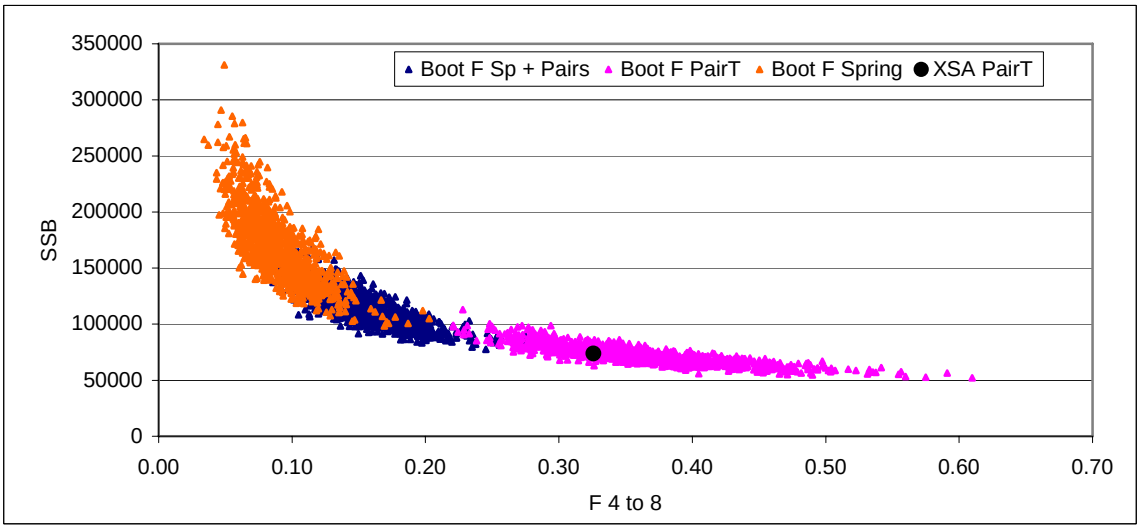


Figure 2.5.5.7. Saithe in the Faroes (Division Vb). Bootstrapped SSB and F on the pair trawler fleet ages 3-11, spring survey ages 3-9, pair trawlers and spring survey combined and the output from XSA on the pair trawlers.

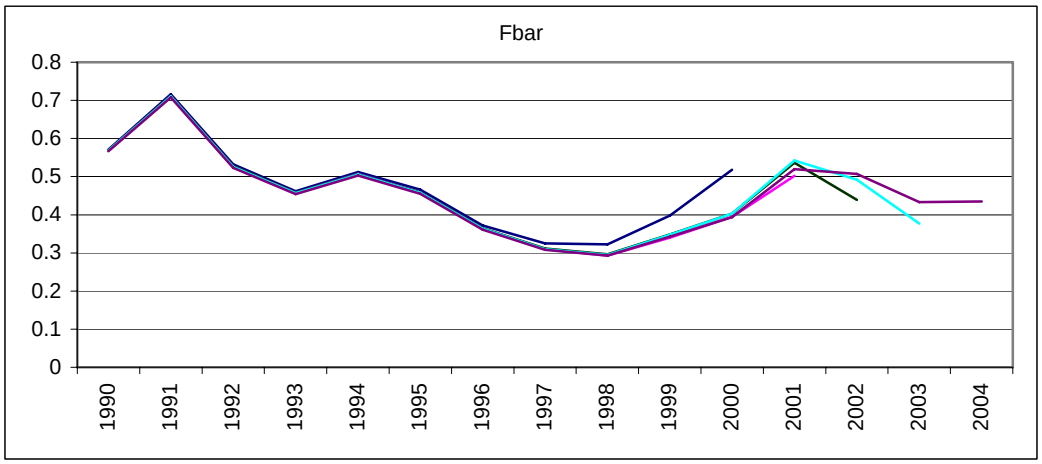


Figure 2.5.5.8. Saithe in the Faroes (Division Vb). Retrospective analysis of average fishingmortality of age groups 4-8 from XSA for the years 1997-2004.

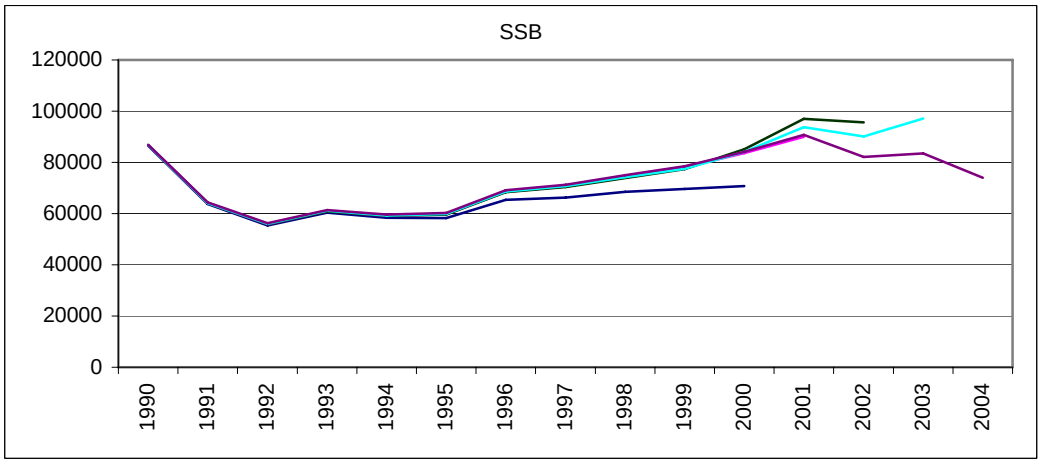


Figure 2.5.5.9. Saithe in the Faroes (Division Vb). Retrospective analysis of spawning stock biomass of age groups 4-8 from XSA for the years 1997-2004.

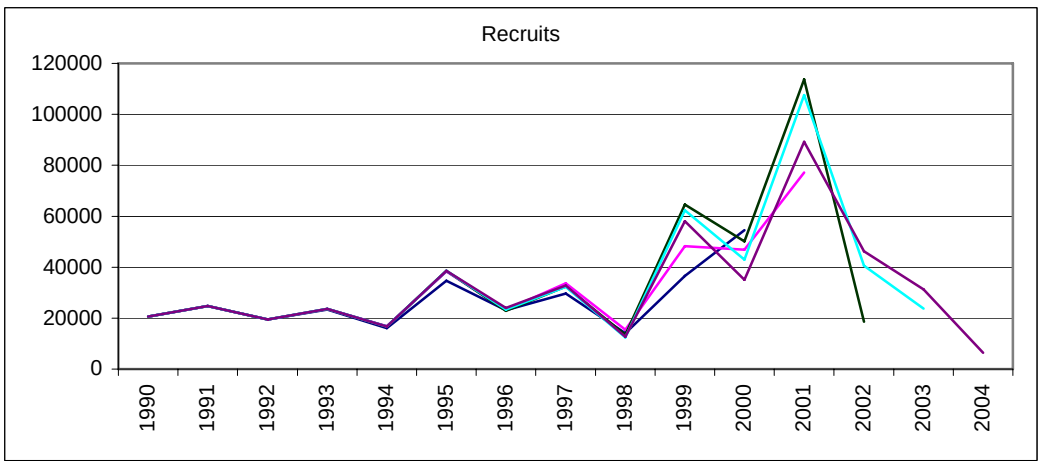


Figure 2.5.5.10. Saithe in the Faroes (Division Vb). Retrospective analysis of average recruitment for age 3 from XSA for the years 1997-2004.

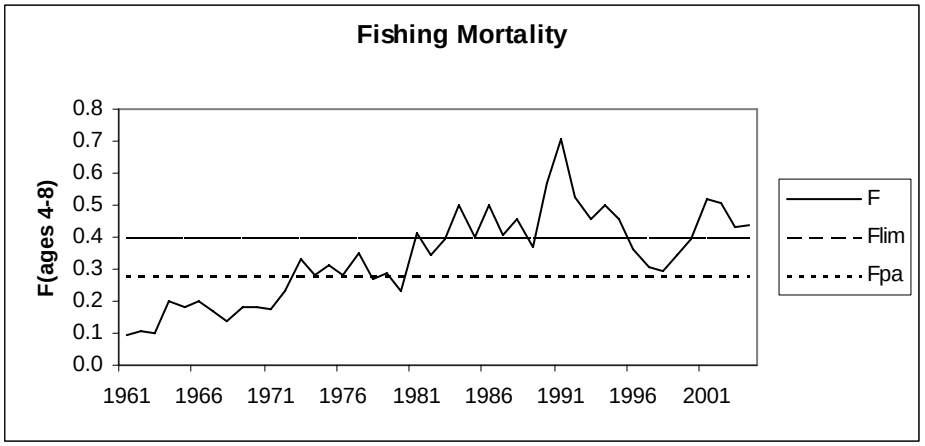


Figure 2.5.5.11. Saithe in the Faroes (Division Vb). Fishing mortality (average F ages 4-8).

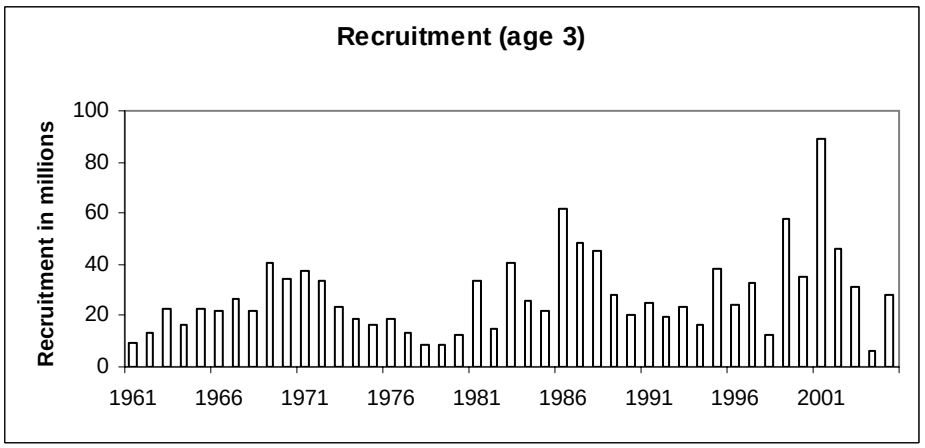


Figure 2.5.5.12. Saithe in the Faroes (Division Vb). Recruitment at age 3 (millions).

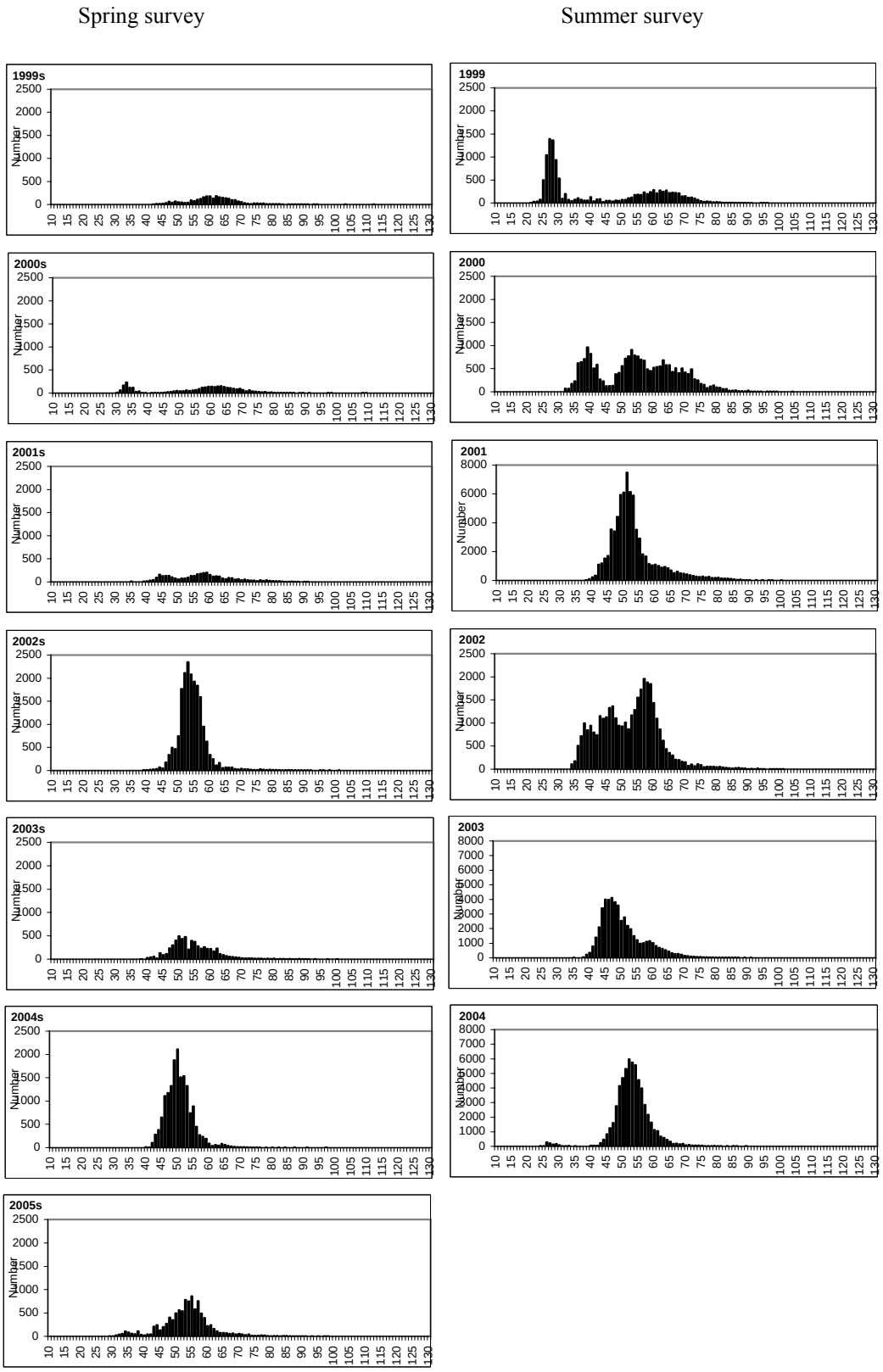


Figure 2.5.5.13. Saithe in the Faroes (Division Vb). Length distribution from spring (s) and summer survey 1999-2005. NB! Different scale for year 2001, 2003 and 2004 summer survey.

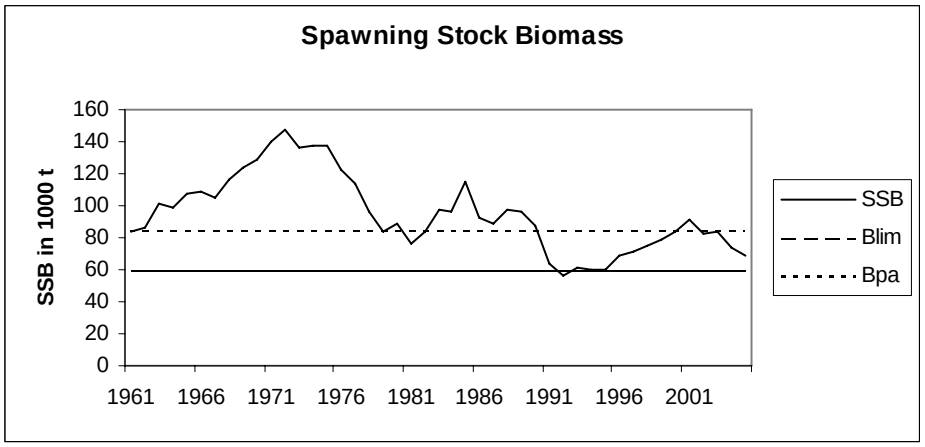


Figure 2.5.5.14 Saithe in the Faroes (Division Vb). Spawning stock biomass (1000 tonnes).

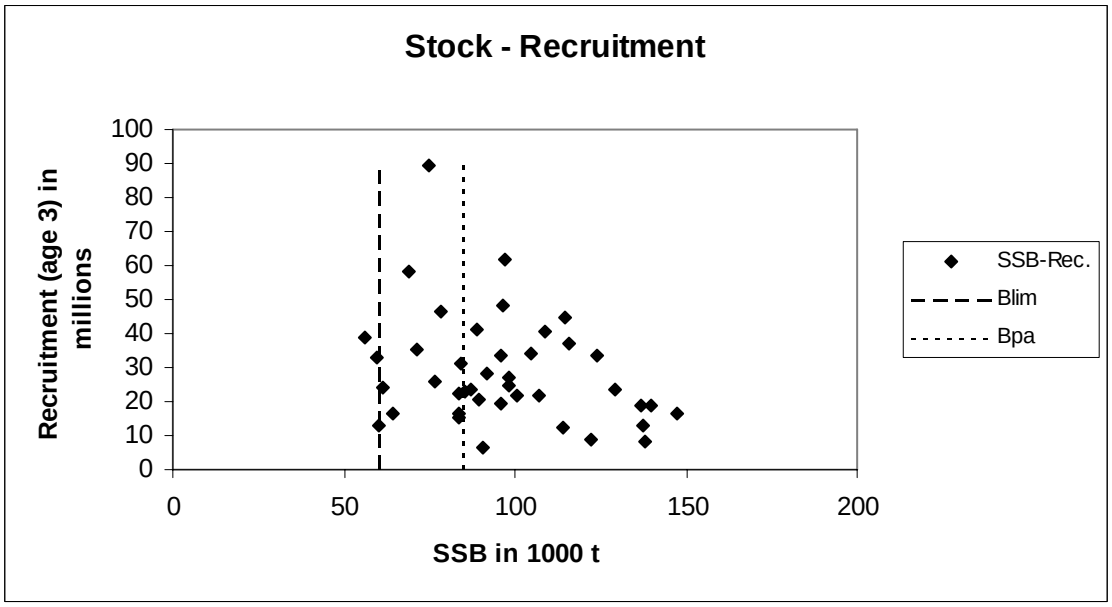


Figure 2.5.5.15 Saithe in the Faroes (Division Vb). Stock-Recruitment plot.

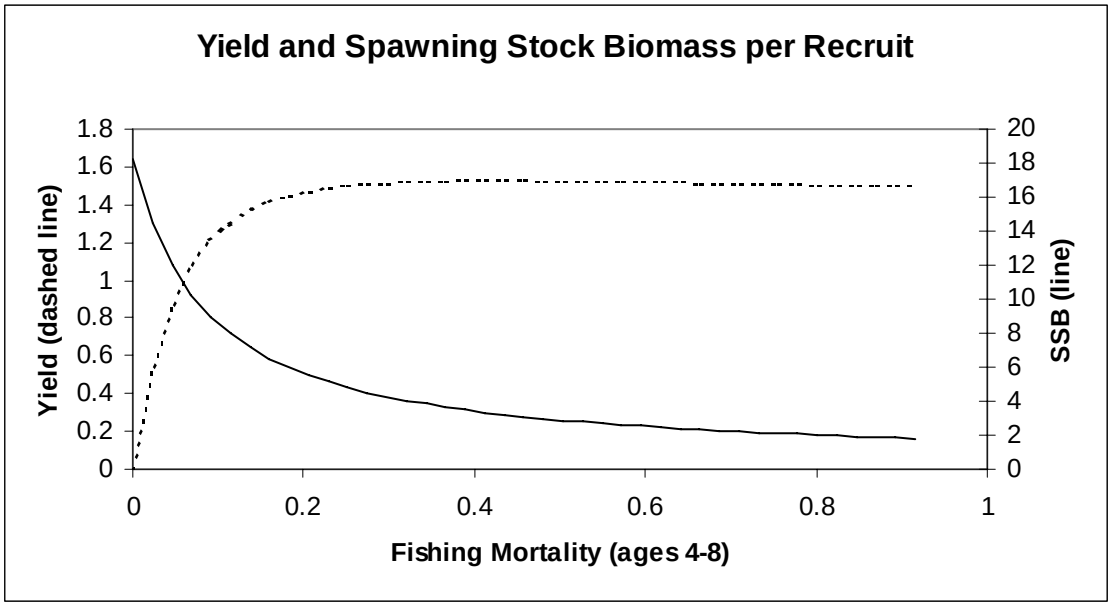


Figure 2.5.6.1 Saithe in the Faroes (Division Vb). Fish stock summary.

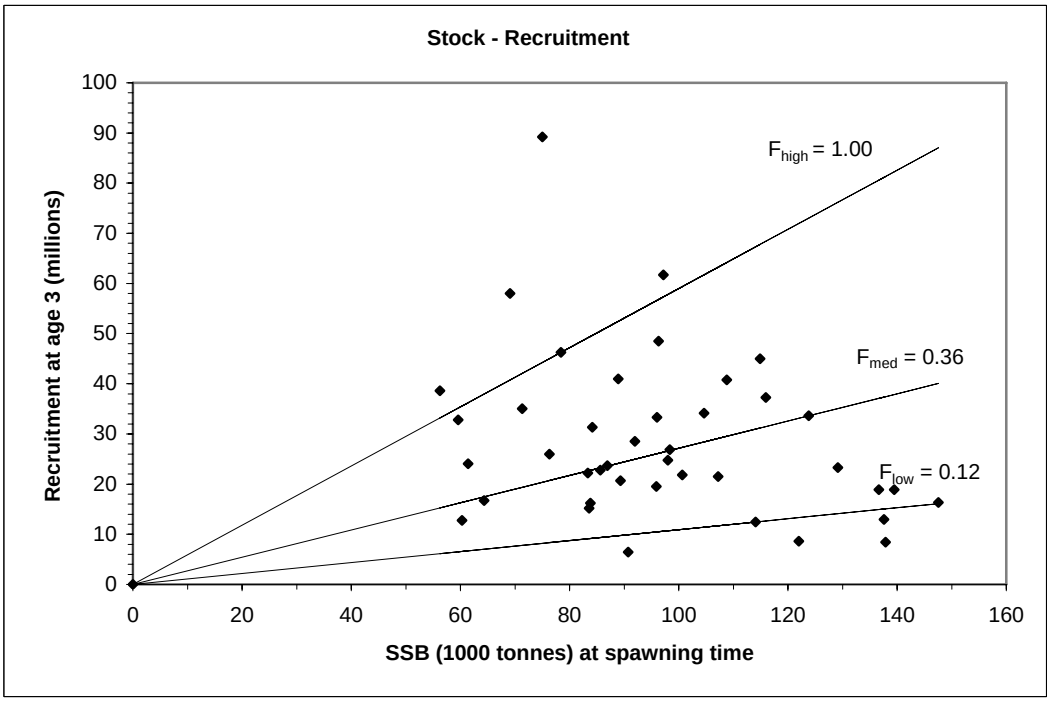


Figure 2.5.6.2 Saithe in the Faroes (Division Vb). Stock- recruitment.

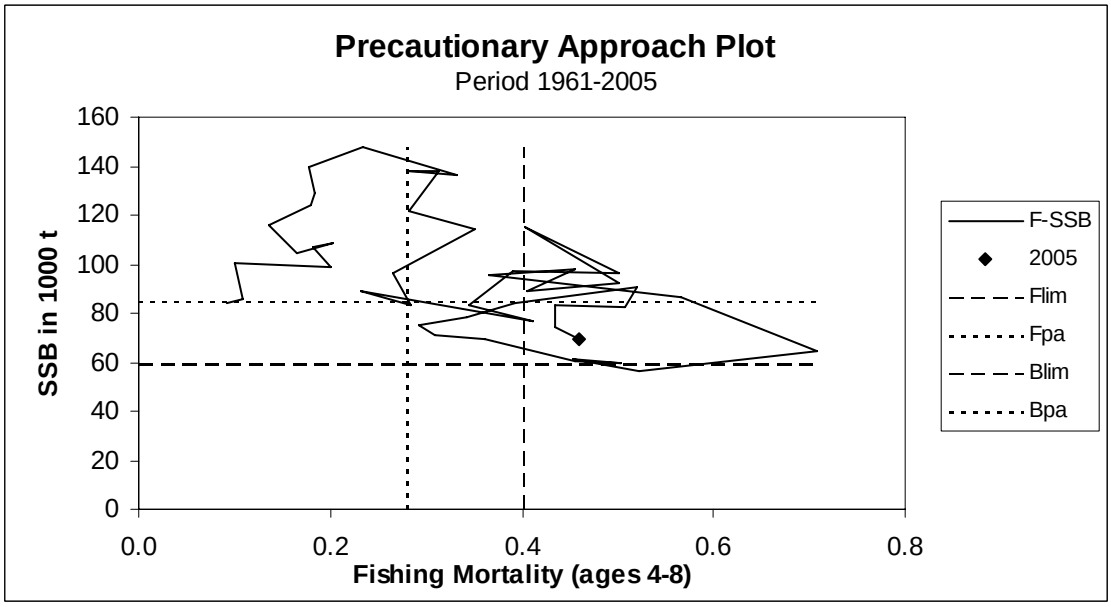
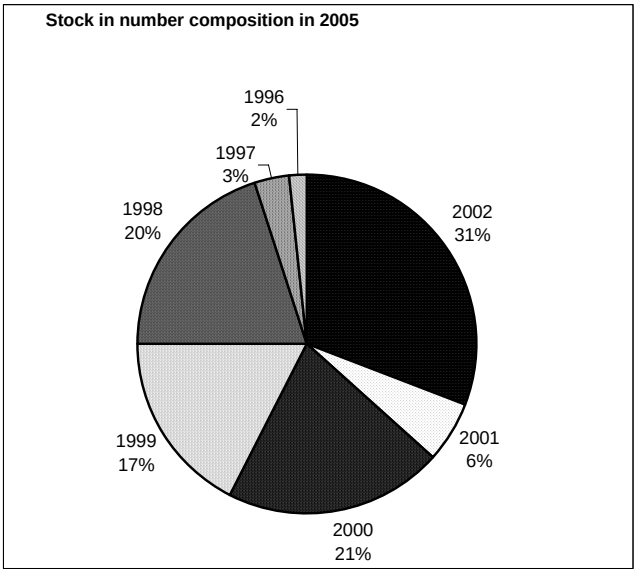


Figure 2.5.6.3. Saithe in the Faroes (Division Vb). The history of the stock/fishery in relation to the four reference points.



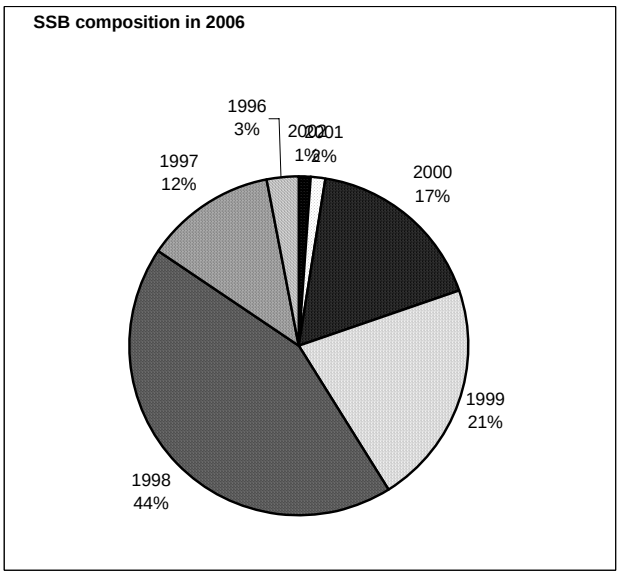


Figure 2.5.6.4. Saithe in the Faroes (Division Vb). Projected composition in number by year classes in the catch in 2005 (left figure) and the composition in SSB in 2006 by year classes (right figure).

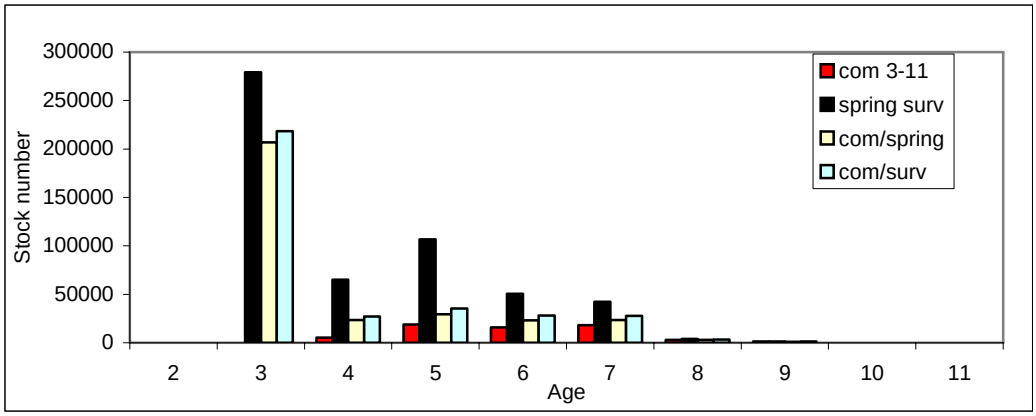


Figure 2.5.8.1. Saithe in the Faroes (Division Vb). Stock number at age in year 2005 a comparison between different XSA runs. Approved serie of the commercial pair trawlers are in the red columns (com 3-11). spring surv- spring survey series, com/spring- combined commercial and spring survey and com/surv- commercial, spring and summer survey combined.

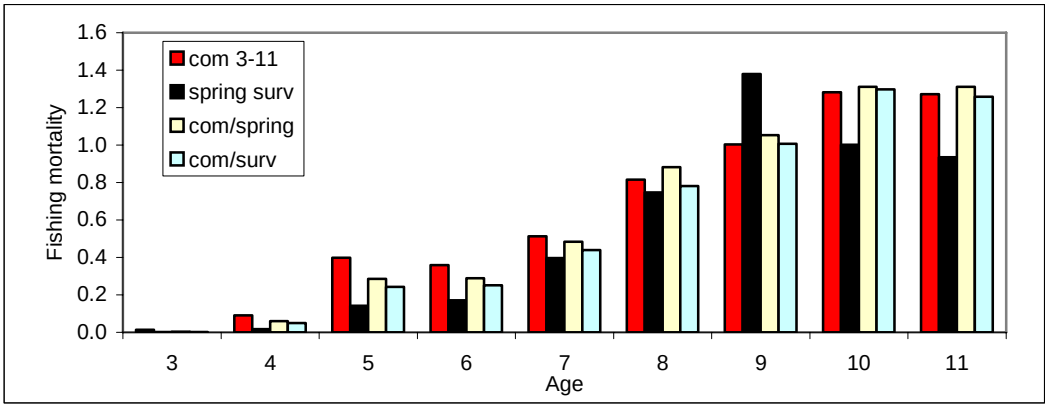


Figure 2.5.8.2. Saithe in the Faroes (Division Vb). Fishingmortality at age in year 2003. Comparison between different XSA runs. Approved serie of the commercial pair trawlers are in the red columns. Legends are explained in the text in figure 2.5.8.1.

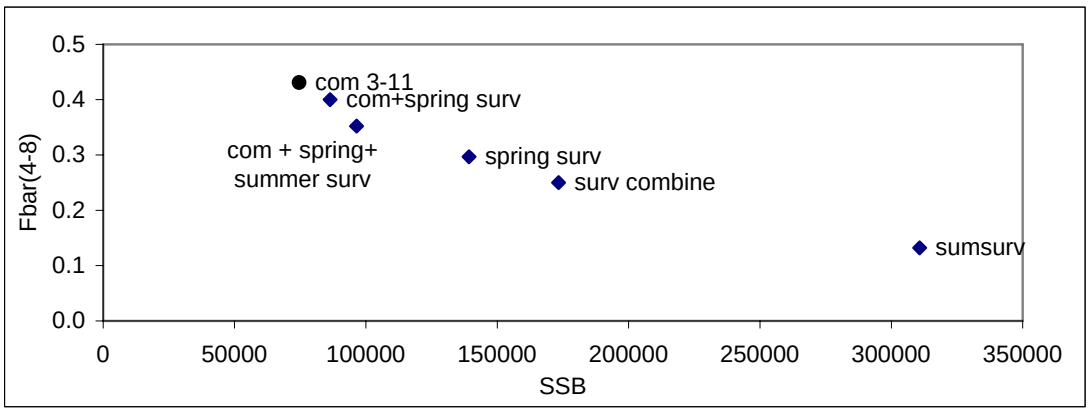


Figure 2.5.8.3. Saithe in the Faroes (Division Vb). Comparison between results from different XSA runs. The results from the approved run is showed as a black circle. Legends are explained in the text in figure 2.5.8.1.