

6 Faroes grounds saithe¹

pok.27.5b – *Pollachius virens* in Division 5.b

6.1 Stock description and management units

See the Stock Annex.

6.2 Scientific data

6.2.1 Trends in landings and fisheries

Nominal landings of saithe from Faroese grounds (Division 5.b) have varied cyclically between 10 000 tonnes and 68 000 tonnes since 1961. After a third high of about 60 000 tonnes in 1990, landings declined steadily to 20 000 t in 1996. Since then, landings have increased to 68 000 tonnes in 2005 (Table 6.2.1.1, Figure 6.2.1.1) but they have declined to 57 000 tonnes in 2008 and 2009. After a substantial drop in landings in 2011 which was the lowest observed since 1999 (33 000 tonnes) landings increased by 20% in 2012 up to 35 000 tonnes. Since 2011, landings have remained below historical average (37 000 tonnes) The total tonnage has decreased from 30 852 tonnes in 2017 to 16 119 tonnes in 2022.

Since the introduction of the 200 miles EEZ in 1977, the saithe fishery has been prosecuted mostly by Faroese vessels. The principal fleet consists of large pairtrawlers (>1000 HP), which have a directed fishery for saithe, about 50–77% of the reported landings in 1992–2011 (Table 6.2.1.2). The smaller pairtrawlers (<1000 HP) and single trawlers (400–1000HP) have a more mixed fishery and they have accounted for about 10–20% of the total landings of saithe in the 1997–2011 period while the percentage of total landings by large single trawlers (>1000 HP) has declined drastically to just 1%. Historically the catch composition by the pairtrawler fleet has accounted for about 75% of the total tonnage for saithe but since 2007 it has increased gradually up to 95% in 2020 due mainly to the gear-shifting of single-trawlers to pair-trawling. The share of catches by the jigger fleet was about 8% in the 1985–1998 period but has decreased to less than 0.5 % since 2000 and it now accounts for only 1% of the total domestic landings for saithe in 2020. Foreign catches that have been reported to the Faroese Authorities but not officially reported to ICES are also included in the Working Group estimates. Catches in Subdivision 2.a, which lies immediately north of the Faroes, have also been included. Little or no discarding is thought to occur in this fishery. Effort (measured as the ratio of nominal to used fishing days by the pair-trawl fleet segment) has diminished considerably in recent years. In the 2013/2014 fishing year, only 58% and 41% of fishing days were utilized in the inner and outer areas respectively while in the 2014/2015 fishing year these ratios went up to 97% and 74%, i.e. 29% of fishing days were not used. In the 2015/2016 and 2016/2017 fishing seasons 20% and 31% of the allocated days for

¹ This section was last updated Autumn 2023. NWWG response to ADG comments for this stock: The WG examined the current $B_{loss} = 36\,412$ based on the lowest observed SSB. Historical average recruitment is estimated at around 23 million. At B_{loss} and its vicinity recruitment is estimated at 18 million. Therefore recruitment is not considered to be highly impaired at B_{loss} or similarly low values of SSB. The SSB-recruitment plot for Faroe saithe does not show any clear trends but for higher abundances in mid and late 1970s where recruitment was lower than historical mean estimates (14 million). The WG agreed to examine the issue more thoroughly in the coming April 2024 meeting.

the trawl fleet were not used, respectively. In the 2017/2018 fishing year 19% of allocated days were not used. Around 10% of total fishing days were not activated in 2019.

Cumulative landings of saithe for the domestic fleets are shown in Figure 6.2.1.2. The period since 2011 is among the poorest in the time-series. The progression of landings from January to August of 2023 is well below monthly averages.

6.2.2 Catch-at-age

Catch-at-age is based on length, weight and otoliths samples from Faroese landings of small and large single and pairtrawlers, and landing statistics by fleet provided by the Faroese Authorities. Catch-at-age is calculated for each fleet by four-month periods and the total is raised by the foreign catches. Minor adjustments were made to the catch-at-age matrix for 2014 due to revised final catch statistics (Tables 6.2.2.1 and 6.2.2.2). Most of the age-disaggregated catch matrix is comprised of catches of the pair-trawl fleet (Figure 6.2.2.2). Since 2010, catch numbers are mostly comprised of age groups 4 to 6, whereas in the period from 2005 to 2009 they were mainly composed of age groups 4 to 8. The progression of the strong 2012- and 2016-year classes (age 3 in 2015 and 2019, respectively) can be easily tracked in the catch matrix. Numbers of all age groups but age 4 and 6 are lower in 2022 compared to 2021. Partial catch-at-age numbers for 2023 are compiled using sampling from January to June. These values are scaled up to estimated landings to the end of the year.

The sampling program and sampling intensity as well as the approach used in compiling catch numbers is the same as in preceding years. A summary of sampling levels since 2012 is illustrated in Table 6.2.2.3.

6.2.3 Weight at age

Mean weights at age have varied by a factor of about 2 since 1961. Mean weights at age were generally high during the early 1980s and they subsequently decreased from the mid-1980s to the early 1990s (Table 6.2.3.1 and Figures 6.2.3.1.a and 6.2.3.1.b). Mean weights increased again in the period 1992–1996 but have shown a general decrease thereafter. With the exception of 3-years old saithe, all age groups were showing signs of increasing size since 2006. In 2011, age-classes 4 to 6 were close or at long-term average. From 2012 to 2014, weight was below average for age groups 3 to 7. Age classes 7 and older are above historical average since 2014 whereas younger age groups (4–6) are lower than average. Mean weight of 3 years old saithe increased from 1.07 kg in 2016 to 1.57 kg in 2018 (50% increase) and it's 1.37 kg in 2020. Weights for all age groups but age 6 and 7 are estimated above historical average since 2019. Weight-at-age data are predicted with a Gaussian Markov Random Field (GMRF) with cohort and within year correlations in the forecast. Mean weights at age in the stock are assumed equal to those in the catch.

6.2.4 Maturity-at-age

Maturity-at-age data from the spring survey is available from 1983 onward (Steingrund, 2003.) Due to poor sampling in 1988, the proportion mature for that year was calculated as the average of the two adjacent years. At the benchmark workshop (WKFAROE) in 2017, maturity ogives were smoothed via a 10-year running average. The period for averaging was chosen as a compromise between retaining long-term trends and reducing noise in the data. For 1962–1982, the average maturity of estimated maturities of the 1983–1996 period was used. Maturity decreased from the mid-1990s to 2006 and it shows an increasing trend for all age groups since 2010. (Table 6.2.4.1 and Figure 6.2.4.1.)

Faroe saithe begins to mature at 3 years old, approximately 20% are mature at age 4, 50% at 5 years old and 100% are mature at age 9 and onwards.

6.2.5 Indices of stock size

6.2.5.1 Surveys

There are two annual groundfish surveys conducted in Faroese waters.

The surveys design is a classical random stratified design with fixed stations. The number of stations in the spring survey are 100 and the number of stations in summer are 200. Both surveys cover depths from 60 to 500 meters. The coverage of both surveys is, however, very poor for juvenile saithe, which is largely distributed in coastal areas very close to shore and therefore the surveys do not provide reliable measurements of incoming recruits. Moreover, as a result of the schooling nature of saithe variability of indices is higher than that for species like cod and haddock. The spring survey consists of time-series data since 1994 while the summer series were initiated in 1996. Historical data dating back to early 1980s exist but are unfortunately not available for analysis, although work is in progress to recover and compile these data in upcoming meetings. Both time-series cover to a large degree the traditional fishing grounds of saithe in the Faroe shelf.

Standardized biomass and abundance indices from both surveys are shown Figure 6.2.5.1.1.

In addition, abundances of fish 50 cm and smaller as a proxy for recruitment are calculated from the surveys. Catch rates (kg/hour) are also presented in Figure 6.2.5.1.2. There are seasonal effects in the series but both surveys suggest low abundances of saithe in the 1990s, followed by an increase in stock biomass until 2004 and a decline from 2005 to around 2010. From 2010 to 2016, both indices were in good agreement and indicated that stock abundance was quite stable at low levels. The summer survey index decreased from 2016 to 2022. Since 2018 the summer index has fluctuated without clear trend. The spring survey suggests a drop in stock biomass from 2019 to 2023. There are contradictory signals of both surveys from 2022 to 2023. The coefficient of variation (CV) of the summer index (CV = 18%, log-scale) is higher than the spring survey (CV = 13%, log-scale). The agreement between the survey indices measured by their correlation is estimated at $R^2 = 0.37$.

The progression of the 2012 year class in the fishery is also confirmed in both age-disaggregated indices (Figure 6.2.5.1.3 and Table 6.2.5.1.1). There are conflicting signals regarding recruitment estimates in survey indices. The recruitment index for 2019 from the spring survey (numbers of aged 3 individuals) is estimated to be the largest since 1994, whereas the summer survey indicates that recruitment strength is very low. In general, both surveys suggest poor incoming recruitment and a general lack of year classes in the stock, although numbers of age 3 individuals in the summer index in 2023 are the largest since 2014. Length compositions support the trends observed in the age-disaggregated indices (Figures 6.2.5.1.4 and 6.2.5.1.5)

The internal consistency of the summer survey measured as the correlation between the indices for the same year class in two adjacent years is good with R^2 ranging from 0.5 to 0.7 for the best-defined age groups, and R^2 varying between 0.2 and 0.4 for other age classes (Figures 6.2.5.1.6 and 6.2.5.1.7). The internal consistency of the summer index is overall inferior to the spring index. The spring survey shows a stronger internal consistency with R^2 ranging from 0.70 to 0.9 for the best-defined ages.

6.2.5.2 Commercial CPUE

The CPUE data from pairtrawlers have been used for tuning the assessment of saithe from 2000 to 2016. At the benchmark working group (WKFAROE, 2017), the series were replaced by

fisheries-independent survey indices. A description of the commercial CPUE data can be found in the stock annex. The commercial CPUE data have not been compiled since 2016.

6.2.5.3 Information from the fishing industry

No additional information beyond the landings from the commercial fleet was presented for incorporation in the assessment.

6.3 Methods

Faroe saithe was benchmarked in 2017 (WKFAROE). The SAM (state-space assessment model) framework was adopted as the basis for advice. Input data for the assessment was revised, e.g. maturity ogives (Section 6.2.4) and survey indices (Section 6.2.5.1). Configuration of the SAM model was slightly modified at the NWWG meeting in 2017. Some changes were incorporated into the SAM model in 2020. These modifications were carried out by correspondence in an intersessional process and agreed by external experts (see Annex 7 in the 2020 NWWG report). The changes caused improvements in the model performance and diagnostics. See Stock Annex for detailed information on the configuration options for the adopted SAM model. Biological reference points were re-calculated but the adopted reference points from the benchmark in 2017 were not revised. In 2022 an interbenchmark workshop (IBPFAR 2022) was conducted to investigate the inclusion of interim catch-at-age (ICAA) in the assessment year. Disaggregated catch numbers were raised to estimated landings to the end of the year according to a linear regression of seasonal (January to September) to final annual catches. In addition, to account for the larger uncertainty of the last year's catches the observation variance of those observations were doubled, which corresponds to around 41% increased standard deviation. Weight-at-age data were predicted using a Gaussian Markov Random Field (GMRF) with cohort and within year correlations in the SAM model. The inclusion of the ICAA in the final year did overall improve the retrospective pattern for 2022 (SSB: $\rho=24\%$, F_{bar} : $\rho=-11\%$). In the retrospective pattern of the SSB no individual peels are outside the confidence intervals of the model. The inter benchmark did not explore additional assessment runs. No modifications were performed to the model settings in 2023. The assessment results are available on www.stockassessment.org under the following code: [fsaithe-NWWG-2023](https://www.stockassessment.org/stockassessment.php?code=fsaithe-NWWG-2023).

6.4 Reference points

6.4.1 Biological reference points and MSY framework

At the NWWG in 2017, reference points were revised according to the ICES guidelines (ICES fisheries management reference points for category 1 and 2 stocks). The software used to implement the calculations was EqSim. The procedure was as follows:

$B_{pa} = B_{trigger}$ was set to 41 400 t (lowest historical SSB).

B_{lim} was calculated according the equation: $B_{pa} = B_{lim} \times \exp(\sigma \times 1.645) = 29\,571$ t. where $\sigma = 0.20$ (as suggested by ACOM)

The F_{MSY} estimation process consisted of 3 simulations:

1. Simulation 1. Get F_{lim}

F_{lim} is derived from B_{lim} by simulating the stock with segmented regression S-R function with the point of inflection at B_{lim} .

F_{lim} is the F that, in equilibrium, gives a 50% probability of $SSB > B_{lim}$

The simulation was conducted with:

- fixed F (i.e. without inclusion of a B_{trigger})
- without inclusion of assessment/advice errors.

2. Simulation 2. Get initial F_{MSY}

F_{MSY} should initially be calculated based on:

- a constant F evaluation
- with the inclusion of stochasticity in population and exploitation as well as assessment/advice error.
- SRRs (using all; Ricker, Beverton–Holt, Segmented)
- Uncertainty parameters used:

```
## Assessment error

sigmaF      <- 0.18 # SAM value of uncertainty from 2016

sigmaSSB    <- 0.2 # 0.23 SAM value of uncertainty from 2017,
changed to default=0.2 (ACOM)

## Advice error

cvF         <- 0.39 ; phiF      <- 0.81

cvSSB       <- 0.28 ; phiSSB    <- 0.82

## Biological parameters and selectivity

numAvgYrsB  <- 20 # Biological

numAvgYrsS  <- 20 # Selection
```

To ensure consistency between the precautionary and MSY frameworks, F_{MSY} is not allowed to be above F_{pa} , i.e. F_{MSY} is set to F_{pa} if this initial F_{MSY} estimate is higher than F_{pa} .

3. Simulation 3. Get final F_{MSY}

MSY B_{trigger} should be selected to safeguard against an undesirable or unexpected low SSB when fishing at F_{MSY} . The ICES MSY advice rule should be evaluated to check that the F_{MSY} and MSY B_{trigger} combination adheres to precautionary considerations; in the long term, $P(\text{SSB} < B_{\text{lim}}) < 5\%$

The evaluation includes:

- realistic assessment/advice error (see above)
- stochasticity in population biology and fishery exploitation.
- SRRs (using all; Ricker, Beverton–Holt, Segmented)

The new reference points are illustrated in the table below:

Biological reference points	NWWG 2017	Basis
$B_{trigger}$	41 400 t.	B_{loss}
B_{lim}	29 571 t.	$B_{pa}/1.4$
B_{pa}	41 400 t.	B_{loss}
F_{lim}	0.7	Stochastic simulations (ICES, 2017) F50% F that gives a 50% probability of $SSB > B_{lim}$
F_{pa}	0.30	F_{p05} , $P(SSB < B_{lim}) < 5\%$
F_{MSY}	0.30	Stochastic simulations (ICES, 2017).

At the IBPFAR MSY and PA reference points for the stock were recalculated with EqSim following the Guidelines for ICES fisheries management reference points for category 1 and 2 stocks (ICES, 2021a). The Saithe stock was taken as conforming to “Type 1”, a spasmodic stock showing occasional large year classes. B_{lim} is based on the lowest SSB, where large recruitment is observed ($B_{loss}=36\,412$ tonnes). The settings for the simulations are the following:

Parameter	Value
σ_F	0.215
σ_{SSB}	0.229
noSims	1001
SRused	Segreg_Bevholt_Ricker
SRyears_min	1961
SRyears_max	2020
acfRecLag1	0.49
rhoRec	FALSE
numAvgYrsB	5
numAvgYrsS	10
cvF	0.212
phiF	0.423
cvSSB	0
phiSSB	0

The revised reference points are shown in the table below.

	MSY Reference points		PA Reference points				
	MSYB _{trigger} (tonnes)	F _{MSY}	B _{lim} (tonnes)	F _{lim}	B _{pa} (tonnes)	F _{pa}	Fp05
WKFAROE	41 400	0.30	29 571	0.70	41 400	0.30	0.30
IBPFAR	36 412	0.38	24 990	0.98	36 412	0.62	0.62

Graphical output of the simulations are presented in Figures 6.4.1.1 and 6.4.1.2.

6.5 State of the stock

Recruitment of saithe (numbers of 3-years old individuals) oscillated between 9 to 80 million from 1961 to 2022 with larger numbers than the historical average (26 million) from late 1960s to early 1970s and in late 1980s followed by a period of low recruitment from 1988 to 1997 (Figure 6.5.1). Estimated recruitment increased substantially to 66 million in 2001 as the strong 1998 year class entered the fishery. Recruitment has fluctuated with no clear trend around an average of 35 million from 2005 to 2015. Since 2019 recruitment estimates have declined to historical low levels in both 2022 and 2023. Average fishing mortality (F_{bar} = average F for ages 4–8) increased steadily from F_{bar} = 0.28 in 1973 to F_{bar} = 0.64 in 1991 causing a decrease in spawning-stock biomass (SSB) from 162 kt to 83 kt. Although fishing mortality dropped substantially in the mid and late 1990s SSB continued to be low coupled with a period of poor incoming year classes. F increased from F_{bar} = 0.42 in 2005 to F_{bar} = 0.62 in 2010 resulting in the largest landings of the whole period (above 60 kt). Estimated F in 1991 (F_{bar} = 0.64) was the highest in the time-series and although it went down to 0.35 in 2000 this did not prevent the SSB to decrease at around 50 kt in 1996. The saithe fishery is characterized with significant changes in the selection pattern (Figure 6.5.1.a). The spawning-stock biomass (SSB) was estimated at its highest in the mid-1970s due to low fishing mortality ($\sim F_{bar}$ = 0.26) and higher than average recruitment. F_{bar} is estimated below F_{msy} =0.38 since 2020. SSB increased substantially from 1997 to 2005 due to the maturation of the strongest observed 1998-year class (age 3 in 2001). SSB has never been below MSY B_{trigger} (36 412 tonnes). Since 2019 SSB is stable at around 50 000 t.

Patterns in landings follow approximately a cycle of three distinctive peaks. Catches have remained below historical average (37 000 tonnes) since 2010. Nominal landings of saithe were 16 119 tonnes in 2022. Effort (number of fishing days) has decreased in recent years with around 20% to 30% of deactivated fishing days. Catches are assumed equal to landings.

Age-disaggregated fishing mortalities and stock numbers are presented in Tables 6.5.1 and 6.5.2, respectively. The stock summary table is shown in Table 6.5.3 and a summary of the model parameter estimates is presented in Table 6.5.4. The residuals plots show a reasonably random distribution in all the series (Figure 6.5.2). The relation between SSB and recruitment of saithe is shown in Figure 6.5.3.

6.6 Short-term forecast

6.6.1 Input data

SAM provides a forecast module which can simulate the stock in the period following the assessment year under certain assumptions and taking into account the uncertainty estimated in the model fit. The input data for the short-term forecast are described in the stock annex. The

main features of the input for prognosis are the estimation of catch-weights in the assessment year by the model described in Section 6.2.3 and assuming mean maturity ogives over the previous five years. Recruitment is taken randomly from the last five years (excluding last estimated recruitment) and therefore the uncertainty in the recruitment pattern is captured in the forecast. The exploitation pattern is estimated internally in the SAM model and therefore not restrained by the use of arbitrary historical averages.

Input data for the prediction are presented in Table 6.6.1.1 and the stock projection in Figure 6.6.2.1.

6.6.2 Projection of catch and biomass

Results from predictions with management option is presented in Table 6.6.2.1 and Figure 6.6.2.1. Catch options are presented for five different scenarios, F_{MSY} , F_{pa} , F_{lim} , $F_{status-quo}$ and $F = 0$.

According to the F_{MSY} advice ($F_{MSY} = 0.38$) catches are projected to 15 323 t in 2024 resulting in a SSB of 52 547 t. assuming a recruitment estimate of 8611 mill. In these conditions, SSB will go up to 51 224 t in 2025. The difference in the F_{msy} advice given in 2022 and this years' advice is -14%.

6.7 Yield-per-recruit

6.7.1 Input data to yield-per-recruit

For the yield-per-recruit calculations the average of last 15 years is assumed both in the selection pattern and in the biological parameters. F_{max} and $F_{0.1}$ are estimated at $F_{max} = 0.36$ and $F_{0.1} = 0.14$, respectively.

Results from the yield-per-recruit analysis are shown in Table 6.7.1 and Figure 6.7.1.

6.8 Uncertainties in assessment and forecast

Historically, the assessment of saithe was based on an XSA model calibrated with fisheries-dependent data (see Section 6.2.5.2). In 2017, the assessment framework adopted was SAM using fisheries-independent indices (see Section 6.2.5.1).

The assessment of Faroe saithe is relatively uncertain due to lack of good tuning data. Survey data for saithe are not as reliable of stock trends as for other gadoid species like cod and haddock. Saithe is a highly schooling, widely migrating and partly pelagic species. Moreover, saithe shows up in surveys with few year classes (usually one or two) dominating the entire haul composition making it difficult to assess the true state of the stock. There are also indications of time-varying selectivity, so changes in the commercial catch-at-age may not reflect changes in the age distribution of the population. However, both in 2022 and 2023 the assessment runs are quite consistent with low bias and retrospective peels within the model uncertainty bands.

The retrospective pattern of the SAM model shows that F is underestimated and subsequently SSB is overestimated. (Figure 6.8.1). The retrospective pattern in recruitment estimates has stabilized compared with the historical XSA model. Recruitment estimates for saithe stocks are notoriously unreliable as no measurements of juveniles are available until they reach age 3 or older and therefore forecasts are rather uncertain. Time-varying selectivity leads to high uncertainty in the estimates of current and future SSB and fishing mortality. Mohn's rho parameter (in percentage) are estimated at 20%, -11% and 84% for the spawning-stock biomass, F and recruitment, respectively. The difference between the 2021 assessment and the new adopted assessment model at the IBPFAR in 2022 is illustrated in the table below.

rho	NWWG 2021	IBPFAR 2022
R(age 3)	0.98	0.90
SSB	0.33	0.23
Fbar(4–8)	–0.13	–0.11

6.9 Comparison with previous assessment and forecast

The Faroe saithe assessment was benchmarked in 2017 (WKFAROE). Input data (new maturity ogives and adoption of survey indices) and assessment method were modified and therefore the historical stock perception of the stock has changed to some extent. Some changes were incorporated into the SAM model in 2020. The modifications were carried out in an intersessional benchmark (IBP Faroese stocks) and agreed by external experts (see Stock Annex).

At the IBPFAR (ICES, 2022) the assessment, MSY and PA reference points for the stock were revised. Partial catch-at-age data for the intermediate year were compiled and associated with larger uncertainty in the observation variance. Weights in the catch-at-age were predicted with a GMRF model with cohort and within year correlations in the SAM model. EqSim simulations were run following the Guidelines for ICES fisheries management reference points for category 1 and 2 stocks (ICES, 2021a). The Saithe stock was taken as conforming to “Type 1”, a spasmodic stock showing occasional large year classes. B_{lim} is based on the lowest SSB, where large recruitment is observed ($B_{loss}=36\,412$ tonnes).

The updated assessment suggests a downwards revision in SSB with respect to the 2022 assessment (Figure 6.9.1). The 2022 assessment estimated $F_{4-8}=0.27$ in 2022 while the 2023 assessment suggests that fishing mortality was slightly higher ($F_{4-8}=0.30$). Recruitment is revised downwards with respect to the 2022 assessment.

The advice change (advice value for 2024 relative to the advice value for 2023) was –14 % due to lower estimates of SSB and recruitment in the present assessment.

6.10 Management plans and evaluations

Currently, no management plan exists for saithe in Division 5.b. An effort management system has been in place since 1996. Work on a new management system started in 2018 and was finalized in 2019. A reform in the current management system establishes the fishing year to start on 1 January.

6.11 Management considerations

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

From 2019, advice for saithe will be issued in June and autumn as a consequence of the availability of the summer index to the WG before the end of the assessment year.

The Faroese authorities implemented in 2021 a management plan (Anon. 2019) that regulates the number of fishing days in the fishery for cod, haddock and saithe on the Faroe Plateau. The plan is supposed to be used for the years to come. Due to this management plan, this fishery was in September 2021 certified as sustainable by the Marine Stewardship Council. The management plan has not yet been evaluated by ICES and therefore ICES bases its advice on the MSY approach.

6.12 Ecosystem considerations

No evidence is available to indicate that the fishery is impacting the marine environment.

6.13 Regulations and their effects

There seems to be no relationship between number of fishing days and fishing mortality, probably because of large fluctuations in catchability. Seasonal area restriction is an alternative to reduce fishing mortality and additional real-time closures are also implemented to protect small saithe in Faroese waters. In 2021, areas closed to trawling activities were opened to trawlers.

6.14 Changes in fishing technology and fishing patterns

See Section 6.2.

6.15 Changes in the environment

According to existing literature, the productivity of the ecosystem clearly affects both cod and haddock recruitment and growth (Gaard *et al.*, 2002), a feature outlined in Steingrund and Gaard (2005). The primary production on the Faroe Shelf (< 130 m depth), over the period May through June, varied interannually by a factor of five, giving rise to low- or high-productive periods of 2–5 years duration (Steingrund and Gaard, 2005). The productivity over the outer areas seems to be negatively correlated with the strength of the Subpolar Gyre (Hátún *et al.*, 2005; Hátún *et al.*, 2009; Steingrund *et al.*, 2010), which may regulate the abundance of saithe in Faroese waters (Steingrund and Hátún, 2008). When comparing a gyre index (GI) to saithe in Faroese waters there was a marked positive relationship between annual variations in GI and the total biomass of saithe lagged 4 years (Figures 6.15.1 and 6.15.2)

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

6.16 References

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6.17 Tables

Table 6.2.1.1. Faroe saithe (Division 5.b). Nominal catches (tonnes round weight) by countries 1988–2022 as officially reported to ICES.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001							
Denmark	94	-	2	-	-	-	-	-	-	-	-	-	-	-							
Estonia	-	-	-	-	-	-	-	-	-	16	-	-	-	-							
Faroe Islands	44402	43,624	59,821	53,321	35,979	32,719	32,406	26,918	19,267	21,721	25,995	32,439		49,676							
France ³	313	-	-	-	120	75	19	10	12	9	17	-	273	934							
Germany	-	-	-	32	5	2	1	41	3	5	-	100	230	667							
German Dem. Rep.	-	9	-	-	-	-	-	-	-	-	-	-	-	-							
German Fed. Rep.	74	20	15	-	-	-	-	-	-	-	-	-	-	5							
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Ireland	-	-	-	-	-	-	-	-	-	-	-	0	0	0							
Netherlands	-	22	67	65	-	-	-	-	-	-	-	160	72	60							
Norway	52	51	46	103	85	32	156	10	16	67	53	-	-	-							
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	20	1							
UK (Eng. & W.)	-	-	-	5	74	279	151	21	53	-	19	67	32	80							
UK (Scotland)	92	9	33	79	98	425	438	200	580	460	337	441	534	708							
USSR/Russia ²	-	-	30	-	12	-	-	-	18	28	-	-	-	-							
<i>Total</i>	45027	43,735	60,014	53,605	36,373	33,532	33,171	27,200	19,949	22,306	26,065	33,207	1,161	52,131							
<i>Working Group estimate</i> ^{4,5}	45285	44,477	61,628	54,858	36,487	33,543	33,182	27,209	20,029	22,306	26,421	33,207	39,020	51,786							
Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022 ¹
Denmark	-	-	-	-	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-
Faroe Islands	55,165	47,933	48,222	71,496	72,169	66,319	63,424	63,339	48,279	32,357	38,278	28,655	25,655	27,496	30,849	32,966	25,692	22,764	24,334	18,684	16,599
France	607	370	147	123	315	108	97	68	46	135	40	31	28	122	336	40	27	5	20	63	68
Germany	422	281	186	1	49	3	3	0	-	-	-	-	-	-	-	-	-	-	-	-	-
Greenland	125	-	-	-	73	239	0	1	-	-	1	-	-	-	-	-	1	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iceland	-	-	-	-	-	-	-	148	-	-	-	-	-	-	-	-	-	0	-	3	-
Netherlands	0	0	0	0	0	3	0	0	-	-	-	-	-	-	1	-	-	-	-	-	-
Norway	77	62	82	82	35	81	38	23	28	-	-	-	4	40	198	27	40	40	38	20	7
Portugal	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Russia	10	32	71	210	104	160	38	44	3	-	-	1	-	-	-	-	-	0	-	-	-
UK (E/W/NI)	58	89	85	32	88	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	540	610	748	4,322	1,011	408	400	685	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	706	19	0	1	340	304	601	291	214	71	352	0.5	747
<i>Total</i>	57,004	49,377	49,546	76,266	73,878	67,326	64,000	64,308	49,062	32,510	38,319	28,688	26,027	27,961	31,986	33,325	25,973	22,887	24,745	18,770	17,421
<i>Working Group estimate</i> ^{4,5,6,7}	53,546	46,555	46,355	67,967	68,465	62,352	59,243	59,557	45,441	30,083	35,448	26,539	24,103	25,899	29,672	30,852	24,046	21,179	22,920	17,306	16,119

Table 6.2.1.2.a. Faroe saithe (Division 5.b). Contribution (%) by each fleet category to total national landings(1985–2020).

	Open boats	LL <100	LL >100	Gillnet	Jigger	ST <400	ST 400– 1000	ST >1000	PT <1000	PT >1000	IT	Other	Total(%)
1985	0.2	0.1	0.1	0	2.6	0.1	6.6	33.7	28.2	28.2	0.2	0.2	100
1986	0.3	0.2	0.1	0.1	3.6	0.1	2.8	27.3	27.5	36.5	0.7	0.9	100
1987	0.7	0.1	0.1	0.4	5.6	0.3	4.1	20.4	22.8	44.3	1.1	0	100
1988	0.4	0.3	0.1	0.3	6.5	0.1	6.8	20.8	19.6	43.7	1.3	0.1	100
1989	0.9	0.1	0.1	0.2	9.3	0.3	5.4	17.7	23.5	41.1	1.3	0	100
1990	0.6	0.2	0.2	0.2	7.4	0.2	3.9	19.6	24	42.8	0.9	0	100
1991	0.6	0.1	0.1	0.6	9.8	0.1	1.3	13.9	26.5	46.2	0.8	0	100
1992	0.4	0.4	0.1	0	10.5	0	0.5	7.1	24.4	55.6	1	0	100
1993	0.6	0.2	0.1	0	9.3	0.1	0.6	6.5	21.4	60.6	0.7	0	100
1994	0.4	0.4	0.2	0	12.6	0.1	1.1	6.8	18.5	59.1	0.7	0	100
1995	0.2	0.1	0.3	0	9.6	0.4	0.9	9.9	17.7	60.9	0	0	100
1996	0	0	0.2	0	9.2	0.1	1.2	6.8	23.7	58.6	0	0	100
1997	0	0.1	0.4	0	8.9	0.1	2.5	10.7	17.8	58.9	0.4	0	100
1998	0.1	0.4	0.3	0	7.5	0.1	2.6	19.3	15.4	53.9	0.4	0	100
1999	0	0.1	0.2	0	5.7	0.1	1.2	12.6	18.5	60	1.6	0	100
2000	0.1	0.1	0.1	0	3.7	0.2	0.3	15	17.5	62.3	0.7	0	100
2001	0.1	0.1	0.2	0	2.8	0.1	0.3	20.2	16.5	58.8	0.8	0.1	100
2002	0.1	0.2	0.1	0	1.6	0.1	0.1	26.5	10.5	60.8	0	0	100
2003	0	0	0.1	0	0.9	1.9	0.4	17.4	14.7	64.7	0	0	100
2004	0.1	0.2	0.2	0	1.9	3.7	0.4	15.1	14.4	63.8	0	0	100
2005	0.2	0.1	0.2	0	2.4	4.4	0.2	12.7	20.6	59.2	0	0	100
2006	0.2	0.4	0.6	0	3.9	0.3	0.1	19.8	20.6	54.1	0	0	100
2007	0.2	0.2	0.3	0	2	0.2	0.1	30.4	16	50.6	0	0	100
2008	0.2	0.3	0.5	0	3.2	1.5	0.2	20.4	16	57.7	0	0	100
2009	0.4	0.2	0.2	0	4.3	3.3	0.1	9.6	15.1	66.8	0	0	100
2010	0.1	0.1	0.6	0	3.9	1.2	2.4	8.3	15.1	68.3	0	0	100
2011	0.1	0.1	0.5	0	3.6	0.5	1.3	2.6	14.1	77.1	0	0	100

	Open boats	LL <100	LL >100	Gillnet	Jigger	ST <400	ST 400– 1000	ST >1000	PT <1000	PT >1000	IT	Other	Total(%)
2012	0.2	0.1	1	0	2.4	1.9	0.1	2.2	18.6	73.5	0	0	100
2013	0.1	0.3	0.5	0	3.2	1	0.2	0.6	24.9	69	0	0.1	100
2014	0.2	0.3	0.3	0	1.9	0.5	0.2	0.2	15.6	80.7	0	0.1	100
2015	0.2	0.4	0.3	0	2.3	1.1	0	2	18	75.5	0	0	100
2016	0.1	0.1	0.3	0	1.6	1.7	0.2	0.2	21.7	73.8	0	0.4	100
2017	0.1	0	0.1	0.1	0.7	0.7	0.3	0.2	20.6	76.9	0	0.1	100
2018	0.2	0	0.1	0	0.8	0.9	0.2	0.8	20.5	76.3	0	0	100
2019	0.1	0.1	0.3	0	0.3	0.4	0.4	1.3	18.4	78.6	0	0	100
2020	0.1	0.2	0.4	0	1.9	0.9	0.3	1.1	19.1	75.7	0	0	100

Table 6.2.1.2.b. Faroe saithe (Division 5.b). Contribution (%) by each fleet category to total national landings(2021–2022).

	LL	Gillnet	Jigger	ST	PT	Other	Total(%)
2021	0	0	2	6	91	1	100%
2022	1	0	1	3	95	0	100%

Table 6.2.2.1. Faroe saithe (Division 5.b). Catch number-at-age by fleet categories in 2021.(From gutted weights)

Age	Jiggers	Single trawlers >1000 HP	Pairtrawlers <1000 HP	Pairtrawlers >1000HP	Others	Total Division Vb
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0	0	1	6	0	8
3	0	0	34	152	0	186
4	0	0	629	2552	0	3181
5	0	0	125	452	0	577
6	0	0	155	654	0	810
7	0	0	51	154	0	205
8	0	0	49	188	0	237
9	0	0	37	163	0	200
10	0	0	15	55	0	70
11	0	0	5	23	0	28
12	0	0	2	16	0	18
13	0	0	0	0	0	0
14	0	0	0	2	0	2
15	0	0	0	2	0	2
Total No.	0	0	1104	4420	0	5524
Catch (tonnes)	0	0	3177	12705	0	15882

Table 6.2.2.2. Faroe saithe (Division 5.b). Catch number-at-age (thousands) from the commercial fleet (1961–2022)

Year-Age	3	4	5	6	7	8	9	10	11	12	13	14	15
1961	183	379	483	403	216	129	116	82	45	27	6	1	48
1962	562	542	617	495	286	131	129	113	71	29	13	16	47
1963	614	340	340	415	406	202	174	158	94	169	61	8	36
1964	684	1908	1506	617	572	424	179	150	100	83	47	30	14
1965	996	850	1708	965	510	407	306	201	156	120	89	30	46
1966	488	1540	1201	1686	806	377	294	205	156	94	52	34	45
1967	595	796	1364	792	1192	473	217	190	97	75	38	11	16
1968	614	1689	1116	1095	548	655	254	128	89	59	40	29	59
1969	1191	2086	2294	1414	1118	589	580	239	115	100	36	30	24
1970	1445	6577	1558	1478	899	730	316	241	86	48	46	15	23
1971	2857	3316	5585	1005	828	469	326	164	100	54	13	18	15
1972	2714	1774	2588	2742	1529	1305	1017	743	330	133	28	28	21
1973	2515	6253	7075	3478	1634	693	550	403	215	103	25	21	37
1974	3504	4126	4011	2784	1401	640	368	340	197	124	45	44	52
1975	2062	3361	3801	1939	1045	714	302	192	193	126	64	41	67
1976	3178	3217	1720	1250	877	641	468	223	141	96	60	54	77
1977	1609	2937	2034	1288	767	708	498	338	272	129	80	57	64
1978	611	1743	1736	548	373	479	466	473	407	211	146	95	83
1979	287	933	1341	1033	584	414	247	473	368	206	136	98	251
1980	996	877	720	673	726	284	212	171	196	156	261	133	236
1981	411	1804	769	932	908	734	343	192	92	128	176	310	407
1982	387	4076	994	1114	380	417	296	105	88	56	49	110	687
1983	2483	1103	5052	1343	575	339	273	98	98	99	25	127	289
1984	368	11067	2359	4093	875	273	161	52	65	59	18	25	151
1985	1224	3990	5583	1182	1898	273	103	38	26	72	41	8	154
1986	1167	1997	4473	3730	953	1077	245	104	67	33	56	7	62
1987	1581	5793	3827	2785	990	532	333	81	43	5	11	15	66
1988	866	2950	9555	2784	1300	621	363	159	27	43	15	1	1
1989	451	5981	5300	7136	793	546	185	83	55	10	2	11	16
1990	294	3833	10120	9219	5070	477	123	61	60	18	19	9	33
1991	1030	5125	7452	5544	3487	1630	405	238	128	77	22	8	11
1992	521	4067	3667	2679	1373	894	613	123	63	37	52	8	11
1993	1316	2611	4689	1665	858	492	448	245	54	34	10	6	2
1994	690	3961	2663	2368	746	500	307	303	150	28	19	1	1
1995	398	1019	3468	1836	1177	345	241	192	104	73	25	14	5

Year-Age	3	4	5	6	7	8	9	10	11	12	13	14	15
1996	297	1087	1146	1449	1156	521	132	77	64	45	29	1	7
1997	344	832	2440	1767	1335	624	165	71	29	48	29	15	8
1998	163	1689	1934	3475	1379	683	368	77	32	28	24	14	7
1999	322	655	3096	2551	4113	915	380	147	24	27	5	23	14
2000	811	2830	1484	4369	2226	2725	348	186	56	18	2	3	2
2001	1125	2452	8437	2155	3680	1539	1334	293	90	24	19	13	0
2002	302	8399	5962	9786	862	1280	465	362	33	36	8	1	0
2003	330	2432	11152	3994	4287	417	419	304	91	40	3	0	0
2004	76	2011	8544	8762	2125	1807	265	293	146	100	10	2	0
2005	454	2948	9486	16606	7099	843	810	32	102	27	3	0	0
2006	1509	5163	7963	7892	10537	3848	655	289	33	12	12	5	0
2007	852	3406	11596	6640	3878	4405	1578	416	83	11	9	3	0
2008	4968	3228	3737	9731	3733	2309	2127	461	165	12	6	0	0
2009	472	7618	5116	1893	5310	2065	1743	1099	300	42	3	1	0
2010	2406	3019	5486	1165	1045	2172	1292	861	389	53	23	0	0
2011	1924	2783	1968	1830	484	538	714	529	446	140	34	4	0
2012	863	9870	4157	1257	905	305	308	401	230	137	91	21	0
2013	723	5186	4231	2249	512	210	122	97	146	85	39	33	3
2014	887	2344	3172	1696	873	333	100	93	71	55	16	1	0
2015	2201	2338	2656	1988	889	292	185	89	71	34	32	9	6
2016	889	10550	1984	1924	723	293	113	67	93	9	19	1	1
2017	487	3638	8927	1074	555	462	121	25	1	10	17	2	1
2018	329	1419	4067	3585	370	201	90	41	22	4	12	5	3
2019	3273	832	1182	2152	1320	180	117	47	6	4	3	0	0
2020	405	6668	500	900	970	352	75	49	1	0	4	0	0
2021	740	1340	2956	294	375	348	116	62	3	8	3	0	3
2022	209	3583	650	912	231	267	226	79	31	20	1	2	2

Table 6.2.2.3. Faroe saithe (Division 5.b). Sampling intensity in 2007–2020.

Year		Jiggers	Single trawlers >1000 HP	Pairtrawlers <1000 HP	Pairtrawlers >1000 HP	Others	Total
2009	Lengths	511	5273	3695	23352	0	32831
	Otoliths	97	301	599	2519	0	3516
	Weights	511	0	3494	19060	0	23065
2010	Lengths	209	1442	3663	25793	151	31258
	Otoliths	5	119	480	2459	0	3063
	Weights	5	0	3060	18749	151	21965
2011	Lengths	583	18	1874	19990	753	23218
	Otoliths	60	0	300	2459	60	2879
	Weights	583	18	1458	14256	753	17068
2012	Lengths	6	0	1060	24924	211	26201
	Otoliths	6	0	120	2516	0	2642
	Weights	6	0	1060	17593	211	18870
2013	Lengths	0	0	1465	18015	920	20400
	Otoliths	0	0	360	1979	120	2459
	Weights	0	0	1465	13544	1325	16334
2014	Lengths	0	201	0	22131	920	23252
	Otoliths	0	0	0	2542	120	2662
	Weights	0	0	0	15448	920	16368
2015	Lengths	0	0	173	22455	753	23381
	Otoliths	0	0	20	2169	90	2279
	Weights	0	0	173	17199	753	18125
2016	Lengths	479	0	671	20282	2613	24045
	Otoliths	120	0	179	3118	776	4193
	Weights	479	0	671	15512	2613	19275
2017	Lengths	0	0	225	16874	1824	18923
	Otoliths	0	0	60	2253	538	2851
	Weights	0	0	225	11222	1824	13271

Year		Jiggers	Single trawlers >1000 HP	Pairtrawlers <1000 HP	Pairtrawlers >1000 HP	Others	Total
2018	Lengths	799	0	2284	14559	196	17838
	Otoliths	239	0	478	2931	60	3708
	Weights	799	0	2284	10922	196	14201
2019	Lengths	616	0	7748	6062	264	14690
	Otoliths	180	0	1645	1257	124	3206
	Weights	616	0	5720	5261	264	11861
2020	Lengths	0	0	5314	2980	0	8294
	Otoliths	0	0	1555	896	0	2451
	Weights	0	0	5314	2980	0	8294
2021	Lengths	0	195	4787	4940	0	9922
	Otoliths	0	60	1499	1428	0	2987
	Weights	0	195	4787	4940	0	9922
2022	Lengths	197	0	4233	3243	315	7988
	Otoliths	60	0	1255	1019	119	2453
	Weights	197	0	4233	3243	315	7988

Table 6.2.3.1. Faroe saithe (Division 5.b). Catch weights at age (kg; equal to stock-weights) from the commercial fleet (1961–2022).

Year-Age	3	4	5	6	7	8	9	10	11	12	13	14	15
1961	1.43	2.302	3.348	4.287	5.128	6.155	7.06	7.265	7.497	8.198	9.154	9.6	10
1962	1.273	2.045	3.293	4.191	5.146	5.655	6.469	6.706	7.15	7.903	8.449	8.654	10
1963	1.28	2.197	3.212	4.568	5.056	5.932	6.259	8	7.265	8.551	9.02	9	10
1964	1.175	2.055	3.266	4.255	5.038	5.694	6.662	6.837	7.686	8.348	8.123	9.154	10
1965	1.181	2.125	2.941	4.096	4.878	5.932	6.321	7.288	8.074	7.878	9.479	9.617	10
1966	1.361	2.026	3.055	3.658	4.585	5.52	6.837	7.265	7.662	8.123	10.21	9.728	10
1967	1.273	1.78	2.534	3.572	4.368	5.313	5.812	6.554	7.806	7.591	8.551	7.878	10
1968	1.302	1.737	2.036	3.12	4.049	5.183	6.238	7.52	8.049	8.654	8.298	9.234	10
1969	1.188	1.667	2.302	2.853	3.673	5.002	5.714	6.405	6.554	7.591	7.951	8.373	10
1970	1.244	1.445	2.249	2.853	3.515	4.418	5.444	5.733	6.662	7.31	9.047	9.073	10
1971	1.101	1.316	1.818	2.978	3.702	4.271	5.388	5.972	6.49	7.173	7.38	9.288	10
1972	1.043	1.485	2.055	2.829	3.791	4.175	4.808	5.294	6.948	6.727	7.591	9.315	10
1973	1.306	1.754	1.899	2.7	4.426	5.264	6.156	6.334	8.076	8.777	9.782	9.546	12.006
1974	1.615	1.723	2.493	2.824	3.524	5.197	6.279	6.454	7.07	7.773	8.763	10.279	11.296
1975	1.293	1.924	2.623	3.621	4.128	4.754	5.952	7.073	8.352	9.032	9.984	10.225	11.607
1976	1.162	1.79	3.074	3.291	4.579	4.648	5.116	6.314	7.069	7.069	7.808	8.337	10.68
1977	1.223	1.641	2.66	3.79	4.239	5.597	5.35	5.912	6.837	6.727	6.948	8.424	10
1978	1.493	2.324	3.068	3.746	4.913	4.368	5.276	5.832	6.053	6.706	7.686	7.219	10
1979	1.22	1.88	2.62	3.4	4.18	4.95	5.69	6.38	7.02	7.26	8.15	8.64	10
1980	1.23	2.12	3.32	4.28	5.16	6.42	6.87	7.09	7.93	8.07	8.59	9.79	10.34
1981	1.31	2.13	3	3.81	4.75	5.25	5.95	6.43	7	7.47	8.14	8.55	10.1
1982	1.337	1.851	2.951	3.577	4.927	6.243	7.232	7.239	8.346	8.345	8.956	9.584	10.33
1983	1.208	2.029	2.965	4.143	4.724	5.901	6.811	7.051	7.248	8.292	9.478	10.893	10.34
1984	1.431	1.953	2.47	3.85	5.177	6.347	7.825	6.746	8.636	8.467	8.556	11.127	10.748
1985	1.401	2.032	2.965	3.596	5.336	7.202	6.966	9.862	10.67	10.46	10.202	9.644	13.232
1986	1.718	1.986	2.618	3.277	4.186	5.589	6.05	6.15	9.536	9.823	7.303	11.869	12.875
1987	1.609	1.835	2.395	3.182	4.067	5.149	5.501	6.626	6.343	10.245	8.491	11.634	10.22
1988	1.5	1.975	1.978	2.937	3.798	4.419	5.115	6.712	9.04	9.364	9.142	10.346	10.086
1989	1.309	1.735	1.907	2.373	3.81	4.667	5.509	5.972	6.939	8.543	9.514	11.73	9.627

Year-Age	3	4	5	6	7	8	9	10	11	12	13	14	15
1990	1.223	1.633	1.83	2.052	2.866	4.474	5.424	6.469	6.343	8.418	7.383	5.822	9.408
1991	1.24	1.568	1.864	2.211	2.648	3.38	4.816	5.516	6.407	7.395	8.079	7.187	9.756
1992	1.264	1.602	2.069	2.554	3.057	4.078	5.012	6.768	7.754	8.303	7.786	9.575	9.102
1993	1.408	1.86	2.323	3.131	3.73	4.394	5.209	6.54	8.403	7.275	9.414	9.281	10.715
1994	1.503	1.951	2.267	2.936	4.214	4.971	5.657	5.95	6.891	8.752	9.752	8.629	7.349
1995	1.456	2.177	2.42	2.895	3.651	5.064	5.44	6.167	7.08	7.736	7.295	5.885	10.518
1996	1.432	1.875	2.496	3.229	3.744	4.964	6.375	6.745	7.466	7.284	8.47	10.001	10.143
1997	1.476	1.783	2.032	2.778	3.598	4.766	5.982	7.658	7.882	8.539	9.488	10.355	10.523
1998	1.388	1.711	1.954	2.405	3.3	4.22	4.999	6.391	6.665	8.214	8.485	8.668	9.2
1999	1.374	1.712	1.905	2.396	2.845	4.124	5.256	5.526	6.956	8.03	8.349	8.083	10.262
2000	1.477	1.606	2.077	2.36	2.977	3.48	4.851	5.268	6.523	4.727	8.807	8.002	10.427
2001	1.33	1.59	1.785	2.586	3.059	3.871	4.374	5.565	6.703	5.776	7.745	7.773	10
2002	1.142	1.46	1.652	1.969	3.13	3.589	4.513	5.138	6.422	8.026	4.759	11.357	10
2003	1.123	1.304	1.614	1.977	2.532	3.97	4.834	5.499	6.099	6.987	5.961	9.044	10
2004	1.143	1.333	1.45	1.789	2.56	3.159	4.154	5.167	6.015	6.186	7.056	9.391	10
2005	1.148	1.325	1.516	1.672	2.087	2.975	3.79	6.087	6.134	6.651	7.424	9.113	10
2006	1.126	1.218	1.462	1.79	2.035	2.436	3.861	4.222	5.149	6.437	6.905	5.365	10
2007	1.058	1.391	1.413	1.824	2.361	2.682	3.278	4.104	4.998	6.331	7.844	7.971	10
2008	1.146	1.312	1.672	1.816	2.395	2.902	3.1	3.728	4.769	6.072	6.451	7.96	10
2009	0.938	1.485	1.893	2.411	2.601	3.147	3.634	4.024	5.014	5.828	6.308	9.011	10
2010	1.429	1.706	2.166	2.551	3.172	3.411	3.972	4.352	5.083	4.941	5.305	9.011	10
2011	1.111	1.693	2.253	2.918	3.609	4.204	4.531	5.087	5.416	6.087	6.763	7.916	10
2012	1.029	1.334	1.626	2.709	3.785	4.448	4.799	5.207	5.562	6.018	7.143	6.247	10
2013	1.208	1.466	1.778	2.069	3.553	4.292	5.191	5.742	5.919	6.417	7.941	7.154	6.963
2014	1.369	1.724	2.163	2.868	3.325	5.903	5.899	6.877	6.784	7.467	7.121	11.31	10
2015	0.932	1.555	2.091	3.17	4.208	5.032	6.715	7.858	7.428	7.565	7.629	9.87	8.613
2016	1.07	1.246	2.091	2.613	3.98	4.927	5.876	7.426	6.967	8.153	7.89	7.36	8.233
2017	1.472	1.534	1.689	3.083	3.977	5.92	6.415	6.833	8.192	9.013	8.314	9.036	8.545
2018	1.574	1.849	2.055	2.452	3.95	4.879	6.138	7.481	8.217	7.567	7.924	8.179	8.09
2019	1.297	1.737	2.377	2.776	3.325	5.462	5.938	7.409	7.902	9.981	8.808	8.808	8.808

Year-Age	3	4	5	6	7	8	9	10	11	12	13	14	15
2020	1.369	1.814	2.411	2.846	3.751	4.687	7.553	7.336	8.821	8.821	8.88	8.88	8.88
2021	1.413	1.786	2.516	3.174	4.027	4.861	6.543	7.409	8.313	8.790	8.537	8.622	8.593
2022	1.496	1.703	2.752	3.481	4.226	5.238	5.932	7.023	7.89	8.661	9.022	9.489	7.918

Table 6.2.4.1. Faroe saithe (Division 5.b). Proportion mature at age (1983–2023). Maturities for ages 11 to 15 are set to 1.00

Year-Age	3	4	5	6	7	8	9	10
1983	0.04	0.25	0.55	0.84	0.92	0.98	1	1
1984	0.03	0.26	0.58	0.85	0.93	0.98	1	1
1985	0.04	0.26	0.57	0.86	0.93	0.99	1	1
1986	0.04	0.28	0.6	0.87	0.94	0.99	1	1
1987	0.05	0.28	0.58	0.86	0.95	0.99	1	1
1988	0.06	0.28	0.57	0.86	0.95	0.98	1	1
1989	0.06	0.27	0.58	0.85	0.94	0.97	1	1
1990	0.05	0.26	0.58	0.82	0.92	0.97	1	1
1991	0.05	0.26	0.57	0.82	0.91	0.97	1	1
1992	0.04	0.24	0.54	0.81	0.91	0.98	1	1
1993	0.04	0.25	0.56	0.79	0.91	0.98	1	1
1994	0.05	0.22	0.54	0.78	0.9	0.97	1	1
1995	0.05	0.22	0.57	0.79	0.91	0.97	1	1
1996	0.04	0.18	0.54	0.77	0.9	0.97	1	1
1997	0.02	0.17	0.55	0.77	0.89	0.97	1	1
1998	0.01	0.16	0.53	0.73	0.88	0.98	1	1
1999	0.01	0.16	0.5	0.71	0.86	0.99	0.99	1
2000	0.02	0.17	0.48	0.72	0.87	0.98	0.99	1
2001	0.02	0.16	0.47	0.72	0.87	0.98	0.99	1
2002	0.02	0.18	0.48	0.68	0.84	0.96	0.98	1
2003	0.02	0.17	0.47	0.67	0.82	0.96	0.98	1
2004	0.02	0.16	0.42	0.62	0.79	0.94	0.98	1
2005	0.01	0.16	0.39	0.59	0.77	0.92	0.98	1
2006	0.01	0.18	0.38	0.58	0.75	0.91	0.97	1
2007	0.01	0.19	0.37	0.57	0.74	0.9	0.97	1
2008	0.01	0.2	0.39	0.59	0.75	0.9	0.97	1
2009	0.01	0.19	0.38	0.61	0.77	0.9	0.98	1
2010	0.01	0.18	0.41	0.63	0.79	0.91	0.98	1
2011	0.01	0.19	0.44	0.64	0.8	0.91	0.98	1
2012	0.01	0.2	0.43	0.65	0.81	0.91	0.98	1
2013	0.01	0.19	0.42	0.64	0.83	0.91	0.97	1
2014	0.02	0.25	0.48	0.69	0.86	0.94	0.97	1
2015	0.03	0.24	0.47	0.7	0.88	0.94	0.98	1
2016	0.04	0.26	0.5	0.73	0.91	0.96	0.98	1
2017	0.05	0.26	0.53	0.75	0.91	0.97	0.99	1
2018	0.07	0.25	0.5	0.74	0.89	0.97	0.99	1
2019	0.07	0.28	0.53	0.76	0.91	0.98	0.99	1
2020	0.07	0.28	0.52	0.75	0.9	0.98	0.99	1
2021	0.07	0.29	0.54	0.75	0.9	0.98	0.99	1
2022	0.11	0.28	0.58	0.78	0.91	0.99	0.99	1
2023	0.11	0.28	0.57	0.79	0.90	0.99	1.00	1

Table 6.2.5.1. Faroe saithe (Division 5.b). Effort (hours) and catch in number-at-age for the survey indices used in the SAM model. Summer index (ages 3–10, years 1996–2023). Spring index (ages 3–10, years 1994–2023)

Year/age	Effort	3	4	5	6	7	8	9	10
Summer Survey									
1996	200	285	813	406	342	171	86	32	27
1997	200	1221	943	1563	631	460	237	79	20
1998	200	210	810	788	1131	234	116	59	20
1999	200	296	404	1258	922	1292	224	87	42
2000	200	1587	4945	1357	3009	1244	1404	184	102
2001	200	25650	14523	29825	2013	2629	826	851	210
2002	200	4630	13401	4848	5399	361	445	219	153
2003	200	15327	20811	15517	2448	2173	180	113	100
2004	200	1373	14061	32178	12762	1694	789	56	53
2005	200	4484	5729	6274	7234	1920	285	182	35
2006	200	8925	19741	9283	4059	3329	869	79	62
2007	200	1692	2094	5622	2134	1072	776	274	75
2008	200	6815	2527	997	2451	732	408	252	78
2009	200	2463	2267	6925	989	1789	709	463	388
2010	200	2741	1285	1516	223	141	257	135	106
2011	200	5869	1782	534	396	109	89	169	101
2012	200	6154	6350	3164	419	196	87	60	91
2013	200	1048	3688	4036	1965	216	90	31	33
2014	200	2454	1513	1294	583	248	41	27	20
2015	200	5858	2227	2179	881	349	92	38	24
2016	200	4057	11782	1723	712	216	115	41	44
2017	200	2347	4477	3902	442	324	178	62	24
2018	200	262	743	1762	1625	105	76	29	31
2019	200	4310	825	899	1140	651	112	61	44
2020	200	424	1705	226	440	390	117	56	82
2021	200	3722	684	1379	190	244	308	130	104
2022	200	379	2620	321	449	85	70	96	68
2023	200	2690	842	2398	455	428	124	173	220
Spring Survey									
1994	100	118	820	478	443	115	74	55	60
1995	100	156	501	908	926	381	89	60	25
1996	100	60	273	118	137	113	61	36	17
1997	100	83	113	265	139	101	68	25	27
1998	100	316	914	803	1387	339	149	108	24
1999	100	209	208	710	582	714	98	42	19
2000	100	200	366	303	1249	527	607	30	13
2001	100	757	359	1110	301	444	172	140	25
2002	100	364	6931	2721	2724	223	225	84	42
2003	100	792	909	3453	1026	636	81	51	48
2004	100	445	5040	8000	5286	343	133	13	29
2005	100	1373	1176	2805	4743	1601	234	88	28
2006	100	2505	1190	2070	1532	1557	488	44	28
2007	100	259	405	1397	562	239	256	119	14
2008	100	5925	704	494	1404	349	361	236	29
2009	100	1151	7706	1067	297	500	227	215	171
2010	100	146	377	679	183	202	302	201	153
2011	100	3743	659	215	243	67	47	94	63
2012	100	234	2312	629	148	75	43	58	65
2013	100	260	2109	1218	559	92	82	33	33
2014	100	460	1177	1463	478	252	65	55	26
2015	100	2364	982	1079	563	150	93	20	6
2016	100	933	6237	187	198	61	48	19	12
2017	100	986	4239	5542	201	86	73	27	21
2018	100	174	495	1280	842	63	36	40	17
2019	100	13387	1940	885	803	461	91	75	47
2020	100	163	1619	184	266	320	215	59	79

Year/age	Effort	3	4	5	6	7	8	9	10
2021	100	1901	933	1790	252	364	398	115	108
2022	100	250	1003	205	224	33	90	122	80
2023	100	1639	121	584	72	59	24	46	33

Table 6.3.2. Faroe saithe (Division 5.b). Parameter estimates of the SAM model.

Parameter name	par	sd(par)	exp(par)	Low	High
logFpar_0	-7.413	0.228	0.001	0.000	0.001
logFpar_1	-6.878	0.171	0.001	0.001	0.001
logFpar_2	-6.582	0.167	0.001	0.001	0.002
logFpar_3	-6.663	0.115	0.001	0.001	0.002
logFpar_4	-6.830	0.124	0.001	0.001	0.001
logFpar_5	-6.918	0.136	0.001	0.001	0.001
logFpar_6	-6.930	0.165	0.001	0.001	0.001
logFpar_7	-8.226	0.266	0.000	0.000	0.000
logFpar_8	-7.421	0.199	0.001	0.000	0.001
logFpar_9	-7.140	0.128	0.001	0.001	0.001
logFpar_10	-7.044	0.094	0.001	0.001	0.001
logFpar_11	-7.213	0.098	0.001	0.001	0.001
logFpar_12	-7.096	0.100	0.001	0.001	0.001
logFpar_13	-7.052	0.105	0.001	0.001	0.001
logSdLogFsta_0	-1.334	0.106	0.263	0.213	0.325
logSdLogN_0	-0.546	0.133	0.579	0.444	0.756
logSdLogN_1	-1.366	0.100	0.255	0.209	0.311
logSdLogObs_0	-0.900	0.044	0.407	0.373	0.444
logSdLogObs_1	0.022	0.140	1.022	0.773	1.351
logSdLogObs_2	-0.325	0.141	0.722	0.545	0.958
logSdLogObs_3	-0.378	0.136	0.685	0.522	0.899
logSdLogObs_4	-0.916	0.147	0.400	0.298	0.537
logSdLogObs_5	-0.879	0.142	0.415	0.313	0.551
logSdLogObs_6	-0.846	0.146	0.429	0.321	0.574
logSdLogObs_7	-0.736	0.164	0.479	0.345	0.665
logSdLogObs_8	-0.614	0.203	0.541	0.361	0.811

Parameter name	par	sd(par)	exp(par)	Low	High
logSdLogObs_9	0.323	0.134	1.381	1.057	1.803
logSdLogObs_10	0.019	0.124	1.019	0.795	1.306
logSdLogObs_11	-0.492	0.126	0.611	0.475	0.787
logSdLogObs_12	-0.924	0.129	0.397	0.306	0.514
logSdLogObs_13	-0.875	0.127	0.417	0.324	0.537
logSdLogObs_14	-0.873	0.137	0.418	0.318	0.550
logSdLogObs_15	-0.854	0.162	0.426	0.308	0.589
logSdLogObs_16	-0.492	0.143	0.612	0.459	0.814
transfIRARdist_0	-1.323	0.242	0.266	0.164	0.432
transfIRARdist_1	-0.741	0.203	0.477	0.318	0.715
itrans_rho_0	1.367	0.143	3.925	2.952	5.220
logPhiSW_0	5.313	1.095	202.889	22.689	1814.257
logPhiSW_1	5.271	1.088	194.559	22.075	1714.768
logSdProcLogSW_0	0.857	0.536	2.356	0.807	6.876
meanLogSW_0	0.277	0.087	1.319	1.109	1.569
meanLogSW_1	0.570	0.085	1.768	1.492	2.094
meanLogSW_2	0.830	0.083	2.293	1.942	2.708
meanLogSW_3	1.083	0.082	2.952	2.506	3.477
meanLogSW_4	1.331	0.081	3.786	3.220	4.452
meanLogSW_5	1.549	0.081	4.709	4.008	5.533
meanLogSW_6	1.712	0.081	5.541	4.717	6.509
meanLogSW_7	1.843	0.081	6.317	5.374	7.425
meanLogSW_8	1.961	0.081	7.107	6.038	8.364
meanLogSW_9	2.045	0.082	7.725	6.551	9.111
meanLogSW_10	2.099	0.084	8.161	6.901	9.651
meanLogSW_11	2.193	0.086	8.963	7.552	10.638
meanLogSW_12	2.300	0.088	9.978	8.370	11.894
logSdLogSW_0	-3.120	0.176	0.044	0.031	0.063
logPhiCW_0	5.313	1.095	202.889	22.689	1814.256

Parameter name	par	sd(par)	exp(par)	Low	High
logPhiCW_1	5.271	1.088	194.559	22.075	1714.768
logSdProcLogCW_0	0.857	0.536	2.356	0.807	6.876
meanLogCW_0	0.277	0.087	1.319	1.109	1.569
meanLogCW_1	0.570	0.085	1.768	1.492	2.094
meanLogCW_2	0.830	0.083	2.293	1.942	2.708
meanLogCW_3	1.083	0.082	2.952	2.506	3.477
meanLogCW_4	1.331	0.081	3.786	3.220	4.452
meanLogCW_5	1.549	0.081	4.709	4.008	5.533
meanLogCW_6	1.712	0.081	5.541	4.717	6.509
meanLogCW_7	1.843	0.081	6.317	5.374	7.425
meanLogCW_8	1.961	0.081	7.107	6.038	8.364
meanLogCW_9	2.045	0.082	7.725	6.551	9.111
meanLogCW_10	2.099	0.084	8.161	6.901	9.651
meanLogCW_11	2.193	0.086	8.963	7.552	10.638
meanLogCW_12	2.300	0.088	9.978	8.370	11.894
logSdLogCW_0	-3.120	0.176	0.044	0.031	0.063

Table 6.5.1. Faroe saithe (Division 5.b). Estimated fishing mortality-at-age (1961–2023) from the SAM model (median F).

Year-Age	3	4	5	6	7	8	9	10	11	12	13	14	15
1961	0.029	0.063	0.098	0.117	0.126	0.119	0.132	0.159	0.197	0.197	0.197	0.197	0.197
1962	0.034	0.072	0.112	0.132	0.145	0.139	0.156	0.191	0.238	0.238	0.238	0.238	0.238
1963	0.033	0.071	0.113	0.138	0.159	0.162	0.187	0.233	0.295	0.295	0.295	0.295	0.295
1964	0.042	0.094	0.149	0.178	0.202	0.202	0.221	0.264	0.317	0.317	0.317	0.317	0.317
1965	0.044	0.103	0.164	0.2	0.233	0.245	0.275	0.331	0.4	0.4	0.4	0.4	0.4
1966	0.043	0.104	0.166	0.201	0.237	0.253	0.283	0.337	0.395	0.395	0.395	0.395	0.395
1967	0.038	0.093	0.144	0.17	0.196	0.21	0.231	0.266	0.296	0.296	0.296	0.296	0.296
1968	0.042	0.103	0.153	0.173	0.194	0.209	0.233	0.271	0.302	0.302	0.302	0.302	0.302
1969	0.053	0.133	0.192	0.206	0.22	0.233	0.255	0.288	0.308	0.308	0.308	0.308	0.308
1970	0.061	0.15	0.203	0.202	0.201	0.202	0.21	0.229	0.235	0.235	0.235	0.235	0.235
1971	0.068	0.161	0.212	0.198	0.184	0.175	0.173	0.18	0.176	0.176	0.176	0.176	0.176
1972	0.085	0.203	0.274	0.267	0.253	0.244	0.241	0.244	0.227	0.227	0.227	0.227	0.227
1973	0.108	0.264	0.342	0.311	0.268	0.239	0.221	0.212	0.192	0.192	0.192	0.192	0.192
1974	0.118	0.289	0.357	0.311	0.255	0.222	0.2	0.191	0.179	0.179	0.179	0.179	0.179
1975	0.115	0.288	0.346	0.293	0.233	0.2	0.177	0.166	0.16	0.16	0.16	0.16	0.16
1976	0.108	0.28	0.333	0.285	0.228	0.198	0.173	0.157	0.15	0.15	0.15	0.15	0.15
1977	0.095	0.268	0.333	0.302	0.253	0.228	0.2	0.178	0.167	0.167	0.167	0.167	0.167
1978	0.071	0.216	0.281	0.276	0.253	0.25	0.232	0.21	0.199	0.199	0.199	0.199	0.199
1979	0.057	0.192	0.267	0.288	0.284	0.292	0.28	0.252	0.239	0.239	0.239	0.239	0.239
1980	0.049	0.18	0.26	0.301	0.308	0.323	0.315	0.278	0.27	0.27	0.27	0.27	0.27
1981	0.045	0.187	0.295	0.379	0.406	0.439	0.433	0.368	0.369	0.369	0.369	0.369	0.369
1982	0.041	0.184	0.305	0.402	0.426	0.46	0.455	0.375	0.398	0.398	0.398	0.398	0.398
1983	0.045	0.211	0.371	0.494	0.519	0.553	0.552	0.449	0.502	0.502	0.502	0.502	0.502
1984	0.041	0.213	0.39	0.515	0.524	0.535	0.522	0.428	0.49	0.49	0.49	0.49	0.49
1985	0.039	0.207	0.395	0.516	0.515	0.519	0.508	0.435	0.525	0.525	0.525	0.525	0.525
1986	0.037	0.206	0.43	0.601	0.605	0.63	0.63	0.552	0.656	0.656	0.656	0.656	0.656
1987	0.034	0.194	0.417	0.586	0.578	0.582	0.568	0.492	0.555	0.555	0.555	0.555	0.555
1988	0.029	0.169	0.375	0.533	0.517	0.497	0.455	0.375	0.393	0.393	0.393	0.393	0.393
1989	0.027	0.165	0.364	0.506	0.479	0.443	0.398	0.341	0.382	0.382	0.382	0.382	0.382
1990	0.032	0.203	0.459	0.627	0.586	0.519	0.468	0.432	0.534	0.534	0.534	0.534	0.534
1991	0.043	0.274	0.616	0.829	0.785	0.711	0.674	0.657	0.832	0.832	0.832	0.832	0.832
1992	0.04	0.243	0.536	0.715	0.697	0.65	0.647	0.669	0.879	0.879	0.879	0.879	0.879
1993	0.037	0.215	0.459	0.6	0.591	0.549	0.535	0.539	0.665	0.665	0.665	0.665	0.665
1994	0.033	0.187	0.4	0.535	0.555	0.526	0.503	0.487	0.551	0.551	0.551	0.551	0.551
1995	0.027	0.156	0.36	0.517	0.591	0.599	0.594	0.593	0.683	0.683	0.683	0.683	0.683
1996	0.019	0.108	0.257	0.392	0.475	0.499	0.489	0.477	0.532	0.532	0.532	0.532	0.532
1997	0.016	0.094	0.229	0.366	0.467	0.52	0.531	0.539	0.619	0.619	0.619	0.619	0.619
1998	0.015	0.087	0.216	0.353	0.468	0.552	0.582	0.596	0.698	0.698	0.698	0.698	0.698
1999	0.014	0.086	0.219	0.364	0.487	0.594	0.632	0.657	0.788	0.788	0.788	0.788	0.788
2000	0.014	0.089	0.231	0.381	0.494	0.58	0.584	0.58	0.674	0.674	0.674	0.674	0.674
2001	0.015	0.104	0.292	0.512	0.696	0.845	0.886	0.909	1.14	1.14	1.14	1.14	1.14
2002	0.013	0.089	0.258	0.455	0.615	0.739	0.751	0.76	0.968	0.968	0.968	0.968	0.968
2003	0.011	0.076	0.224	0.406	0.561	0.689	0.728	0.726	0.958	0.958	0.958	0.958	0.958
2004	0.011	0.078	0.224	0.403	0.573	0.736	0.827	0.84	1.173	1.173	1.173	1.173	1.173
2005	0.017	0.111	0.284	0.449	0.573	0.668	0.711	0.661	0.905	0.905	0.905	0.905	0.905
2006	0.028	0.171	0.388	0.554	0.652	0.733	0.79	0.742	1.001	1.001	1.001	1.001	1.001

Year-Age	3	4	5	6	7	8	9	10	11	12	13	14	15
2007	0.038	0.221	0.449	0.581	0.628	0.692	0.769	0.741	1042	1042	1042	1042	1042
2008	0.054	0.298	0.556	0.651	0.64	0.651	0.708	0.693	0.981	0.981	0.981	0.981	0.981
2009	0.059	0.342	0.612	0.694	0.657	0.633	0.667	0.647	0.886	0.886	0.886	0.886	0.886
2010	0.067	0.383	0.666	0.757	0.697	0.661	0.68	0.666	0.896	0.896	0.896	0.896	0.896
2011	0.056	0.319	0.549	0.645	0.603	0.582	0.609	0.63	0.885	0.885	0.885	0.885	0.885
2012	0.057	0.331	0.555	0.661	0.646	0.635	0.674	0.725	1.07	1.07	1.07	1.07	1.07
2013	0.055	0.313	0.516	0.601	0.588	0.583	0.599	0.637	0.937	0.937	0.937	0.937	0.937
2014	0.054	0.3	0.496	0.591	0.574	0.566	0.533	0.511	0.637	0.637	0.637	0.637	0.637
2015	0.061	0.346	0.583	0.721	0.707	0.72	0.664	0.591	0.631	0.631	0.631	0.631	0.631
2016	0.057	0.321	0.537	0.645	0.611	0.587	0.507	0.396	0.32	0.32	0.32	0.32	0.32
2017	0.053	0.289	0.465	0.529	0.482	0.434	0.346	0.239	0.159	0.159	0.159	0.159	0.159
2018	0.056	0.301	0.457	0.504	0.462	0.407	0.33	0.229	0.139	0.139	0.139	0.139	0.139
2019	0.061	0.321	0.448	0.464	0.414	0.344	0.262	0.172	0.09	0.09	0.09	0.09	0.09
2020	0.053	0.294	0.396	0.384	0.33	0.266	0.189	0.117	0.055	0.055	0.055	0.055	0.055
2021	0.048	0.278	0.386	0.367	0.311	0.25	0.178	0.11	0.05	0.05	0.05	0.05	0.05
2022	0.039	0.24	0.352	0.351	0.307	0.254	0.183	0.112	0.05	0.05	0.05	0.05	0.05
2023	0.025	0.157	0.241	0.248	0.223	0.188	0.14	0.089	0.041	0.041	0.041	0.041	0.041

Table 6.5.2. Faroe saithe (Division 5.b). Stock number-at-age (start of year; Thousands; 1961–2023).

Year Age	3	4	5	6	7	8	9	10	11	12	13	14	15
1961	8783	7307	5779	3511	1936	1354	1022	682	316	120	60	6	291
1962	13789	6984	5758	4313	2422	1378	1011	731	497	223	71	49	199
1963	20353	9799	4911	4141	3087	1648	1053	736	497	376	177	41	143
1964	16935	17853	8458	3790	3086	2165	1147	748	472	330	207	114	94
1965	20627	11942	13253	5896	2642	2067	1364	796	502	296	213	116	131
1966	15785	16279	8635	9416	3918	1730	1328	792	499	290	152	112	133
1967	19968	12183	11841	5856	6253	2441	1081	826	433	288	163	74	119
1968	20707	17232	9721	8460	4031	3915	1491	672	507	251	175	101	137
1969	33138	16292	13416	7651	6130	2889	2445	928	422	338	145	108	126
1970	30270	31764	11142	9280	5518	4212	1933	1377	521	244	206	82	129
1971	33401	23543	22764	7622	6464	4025	2901	1351	815	326	149	128	123
1972	33723	22604	16306	13386	5700	4916	3294	2272	1057	545	206	119	162
1973	26630	25740	17995	11436	7567	3618	3131	2106	1358	642	311	140	209
1974	23731	19014	15547	10655	7082	4259	2338	2061	1333	856	403	240	275
1975	19653	15102	11566	8755	6328	4700	2699	1600	1374	875	553	287	395
1976	21562	13243	8188	6122	5349	4286	3403	1994	1200	928	570	387	492
1977	14922	14445	7306	4603	3585	3661	3112	2580	1602	941	684	403	568
1978	9286	10210	8414	3712	2500	2124	2464	2281	2040	1181	731	533	669
1979	8039	6494	6279	4990	2333	1611	1207	1650	1540	1463	815	509	973
1980	14729	6144	4185	3670	3054	1396	957	688	945	929	1143	573	1072
1981	17872	10469	4229	2716	2292	1844	873	579	375	539	599	845	1209
1982	14412	18799	6218	2858	1460	1162	901	451	311	197	298	344	1360
1983	37817	10195	15000	3846	1570	809	545	436	268	166	102	203	882
1984	20851	32836	7320	9270	1984	770	383	211	247	139	66	56	522
1985	26194	18607	18597	4241	4616	929	382	178	102	150	68	29	307
1986	40693	17666	12841	8752	2418	2200	479	219	106	52	80	27	152
1987	41329	36943	11821	6848	3312	1288	887	206	111	44	20	31	73
1988	37612	30574	28919	6305	3124	1440	696	389	98	56	33	7	29

Year Age	3	4	5	6	7	8	9	10	11	12	13	14	15
1989	24300	33402	22964	17819	2817	1456	631	358	179	53	23	24	30
1990	18127	20887	23374	15271	9268	1443	692	308	218	80	34	15	39
1991	23860	16048	14507	11035	6809	3955	742	415	175	123	38	16	25
1992	19014	19650	9600	6162	3640	2566	1565	303	186	59	48	13	14
1993	24920	14994	12975	4409	2442	1482	1211	688	129	80	17	14	7
1994	15638	18915	9965	6706	1968	1162	742	647	346	57	43	6	7
1995	17528	10145	9997	6500	3186	884	608	379	300	165	25	25	7
1996	15304	16118	6402	4485	2945	1232	428	251	188	127	69	7	16
1997	21821	11969	13953	4396	3145	1643	513	205	105	104	64	33	13
1998	13864	19185	10935	12976	3260	1575	844	222	92	45	51	29	18
1999	30046	9770	17072	8495	11526	1838	765	352	87	39	16	23	19
2000	38864	33751	7037	14457	6186	6997	752	367	133	35	14	6	11
2001	76803	27899	33550	5073	8183	3074	2556	445	156	50	15	8	7
2002	47018	76061	21178	24959	2346	2800	1234	760	128	39	13	3	4
2003	43962	50266	55840	12209	10940	1108	839	604	248	47	10	4	2
2004	20413	41443	54813	39894	6182	3762	373	415	230	79	15	3	2
2005	38290	25606	32168	45406	17444	2474	1201	163	139	56	15	4	1
2006	31335	40324	24713	19887	23527	8088	934	506	68	39	19	6	2
2007	25020	18286	36362	15138	9792	8702	2991	542	144	22	13	5	2
2008	39633	17508	9432	21915	7799	5658	4152	1040	241	31	7	4	2
2009	15992	21140	11696	4291	9474	4078	2972	2109	452	79	8	2	2
2010	25337	10759	12362	2880	2304	3967	2180	1489	900	149	29	3	1
2011	39258	16553	5258	4112	1300	1028	1755	1020	608	328	58	9	1
2012	22756	28392	11890	2570	1576	697	609	800	431	177	133	22	3
2013	14106	19416	12741	6949	1179	735	320	302	297	123	39	42	7
2014	16635	11516	10744	4911	2617	574	377	212	156	94	37	8	16
2015	40073	10068	8001	4912	2168	894	328	208	130	78	36	15	10
2016	21574	41311	4887	3831	1596	850	280	149	144	64	40	10	8
2017	10888	19563	23907	2268	1535	922	355	155	45	90	54	21	10
2018	7006	7860	13214	11258	1082	735	389	221	112	35	70	39	23

Year Age	3	4	5	6	7	8	9	10	11	12	13	14	15
2019	25213	4416	4845	6614	4168	731	468	222	119	74	28	49	43
2020	8601	19255	2188	3135	3671	1540	502	416	91	87	59	20	65
2021	17315	5094	8944	1278	1835	2192	853	544	237	76	66	43	62
2022	4875	16177	2768	3580	782	1044	1286	724	459	238	45	49	69
2023	5451	2790	9228	1609	1705	502	737	821	538	348	185	35	92

Table 6.5.3. Faroe saithe (Division 5.b). Summary table (1961–2023).

Year	R(3)	Low	High	SSB	Low	High	F(4–8)	Low	High	TSB	Low	High	Catch
1961	8783	4724	1633	6405	4826	8501	0.10	0.06	0.15	1005	7528	1343	9592
1962	1378	7768	2447	6915	5276	9064	0.12	0.08	0.17	1097	8324	1447	1045
1963	2035	1156	3583	7697	5960	9941	0.12	0.09	0.18	1295	9875	1699	1269
1964	1693	9694	2958	8817	6872	1131	0.16	0.11	0.23	1510	1148	1986	2189
1965	2062	1181	3600	9819	7601	1268	0.18	0.13	0.26	1630	1242	2138	2218
1966	1578	9025	2761	1027	7858	1342	0.19	0.13	0.27	1661	1262	2186	2556
1967	1996	1146	3477	9911	7515	1307	0.16	0.11	0.23	1590	1205	2096	2131
1968	2070	1197	3579	1008	7673	1324	0.16	0.11	0.23	1639	1249	2152	2038
1969	3313	1929	5692	1073	8194	1406	0.19	0.13	0.27	1846	1409	2420	2743
1970	3027	1779	5150	1132	8645	1484	0.19	0.13	0.27	2005	1531	2626	2911
1971	3340	1978	5638	1258	9633	1644	0.18	0.13	0.26	2099	1621	2717	3270
1972	3372	2010	5656	1449	1121	1874	0.24	0.17	0.34	2280	1789	2907	4266
1973	2663	1592	4452	1610	1250	2073	0.28	0.20	0.39	2512	1984	3180	5743
1974	2373	1412	3986	1552	1206	1997	0.28	0.20	0.39	2402	1904	3030	4718
1975	1965	1168	3306	1549	1205	1990	0.27	0.19	0.37	2224	1769	2796	4157
1976	2156	1275	3643	1382	1083	1763	0.26	0.19	0.36	1971	1578	2462	3306
1977	1492	8832	2521	1289	1024	1623	0.27	0.19	0.38	1784	1440	2209	3483
1978	9286	5490	1570	1158	9323	1438	0.25	0.18	0.35	1599	1298	1970	2813
1979	8039	4739	1363	1044	8465	1288	0.26	0.19	0.36	1349	1106	1646	2724
1980	1472	8725	2486	9844	8044	1204	0.27	0.20	0.37	1356	1118	1646	2523
1981	1787	1055	3026	8276	6825	1003	0.34	0.25	0.45	1300	1063	1589	3010
1982	1441	8510	2440	7614	6292	9214	0.35	0.26	0.47	1314	1056	1635	3096
1983	3781	2221	6437	7825	6330	9674	0.42	0.32	0.56	1614	1259	2069	3917
1984	2085	1235	3518	8761	6945	1105	0.43	0.33	0.57	1778	1372	2305	5466
1985	2619	1559	4401	9506	7529	1200	0.43	0.32	0.56	1853	1450	2369	4460
1986	4069	2409	6872	8827	7052	1104	0.49	0.37	0.64	1964	1510	2555	4171
1987	4132	2450	6971	8551	6834	1069	0.47	0.36	0.61	2129	1609	2817	4002
1988	3761	2227	6350	9477	7435	1208	0.41	0.31	0.55	2179	1660	2861	4528
1989	2430	1444	4088	1038	8107	1330	0.39	0.29	0.51	2018	1564	2602	4447
1990	1812	1080	3041	1009	7973	1277	0.47	0.36	0.62	1736	1378	2186	6162
1991	2386	1430	3979	8313	6696	1032	0.64	0.49	0.83	1483	1194	1843	5485
1992	1901	1141	3166	6500	5306	7962	0.56	0.44	0.73	1260	1007	1575	3648
1993	2492	1494	4155	6295	5134	7719	0.48	0.37	0.62	1341	1058	1700	3354
1994	1563	9462	2584	6122	5036	7441	0.44	0.33	0.57	1279	1013	1615	3318
1995	1752	1057	2906	5940	4868	7247	0.44	0.33	0.58	1159	9234	1456	2720
1996	1530	9350	2505	4904	4019	5985	0.34	0.26	0.45	1065	8313	1364	2002
1997	2182	1337	3559	5437	4421	6685	0.33	0.25	0.43	1203	9354	1549	2230
1998	1386	8481	2266	6350	5177	7788	0.33	0.25	0.43	1301	1033	1639	2642
1999	3004	1814	4975	7743	6307	9506	0.35	0.27	0.45	1592	1265	2005	3320
2000	3886	2389	6320	8937	7354	1086	0.35	0.27	0.46	2094	1648	2660	3902
2001	7680	4712	1251	9508	7800	1158	0.49	0.37	0.63	2698	2067	3520	5178
2002	4701	2841	7780	9885	8045	1214	0.43	0.33	0.56	2786	2145	3618	5354
2003	4396	2684	7200	1069	8552	1336	0.39	0.29	0.51	2708	2098	3494	4655
2004	2041	1213	3432	1169	9381	1457	0.40	0.30	0.52	2638	2085	3338	4635
2005	3829	2371	6181	1122	9082	1386	0.41	0.32	0.54	2539	2044	3153	6796

Year	R(3)	Low	High	SSB	Low	High	F(4–8)	Low	High	TSB	Low	High	Catch
2006	3133	1966	4992	1052	8628	1284	0.49	0.38	0.64	2326	1894	2856	6846
2007	2502	1582	3956	9099	7519	1101	0.51	0.40	0.65	1912	1569	2331	6235
2008	3963	2449	6413	8241	6850	9914	0.55	0.44	0.71	1785	1459	2185	5924
2009	1599	1008	2535	7326	6123	8766	0.58	0.46	0.74	1393	1153	1683	5955
2010	2533	1611	3982	5785	4854	6894	0.63	0.49	0.81	1281	1044	1572	4544
2011	3925	2473	6231	4445	3759	5256	0.54	0.42	0.69	1222	9659	1545	3008
2012	2275	1444	3585	4042	3390	4820	0.56	0.44	0.72	1104	8770	1391	3544
2013	1410	8936	2226	3805	3139	4612	0.52	0.40	0.67	9803	7834	1226	2653
2014	1663	1051	2630	4238	3483	5157	0.50	0.38	0.65	9619	7710	1200	2410
2015	4007	2518	6376	4126	3395	5014	0.61	0.47	0.80	1053	8278	1341	2589
2016	2157	1363	3412	4198	3384	5207	0.54	0.41	0.71	1123	8624	1463	2967
2017	1088	6838	1733	5151	4050	6551	0.44	0.32	0.58	1105	8593	1422	3085
2018	7006	4337	1131	5229	4126	6628	0.42	0.31	0.57	9453	7466	1196	2404
2019	2521	1518	4185	4834	3793	6161	0.39	0.29	0.54	9599	7358	1252	2117
2020	8601	5117	1445	4927	3801	6387	0.33	0.23	0.46	9194	6993	1208	2292
2021	1731	9537	3143	5121	3861	6792	0.31	0.21	0.46	9064	6693	1227	1730
2022	4875	2338	1016	5082	3691	6997	0.30	0.19	0.46	8369	5852	1196	1611
2023	5451	1904	1560	4912	3245	7435	0.21	0.12	0.37	7166	4486	1144	7751

Table 6.6.1.1. Faroe saithe (Division 5.b). Input data for short-term forecast for the SAM assessment. Natural mortality (nm), maturity (mat), catch weights (cw), selection pattern(sel), stock weights (sw). Units for catch and stock weights are kg.

"age"	"N"	"nm"	"mat"	"pf"	"pm"	"sw"	"sel"	"cw"
3	78889	0.2	0.066	0	0	1.413	0.187	1.413
4	8637	0.2	0.272	0	0	1.786	0.974	1.786
5	13375	0.2	0.524	0	0	2.516	1.468	2.516
6	1397	0.2	0.75	0	0	3.174	1.724	3.174
7	1943	0.2	0.902	0	0	4.027	1.633	4.027
8	2233	0.2	0.976	0	0	4.861	1.538	4.861
9	735	0.2	0.99	0	0	6.543	1.377	6.543
10	244	0.2	1	0	0	7.409	1.044	7.409
11	149	0.2	1	0	0	8.313	0.611	8.313
12	33	0.2	1	0	0	8.79	0.611	8.79
13	30	0.2	1	0	0	8.537	0.611	8.537
14	24	0.2	1	0	0	8.622	0.611	8.622
15	35	0.2	1	0	0	8.593	0.611	8.593

Table 6.6.2.1. Faroe saithe (Division 5.b). Output of the SAM short-term-forecast including confidence intervals (low and high columns). Units for ssb and catch are tonnes, thousands for recruitment. F_{MSY} advice.

Year	fbar:median	fbar:low	fbar:high	rec:median	rec:low	rec:high	ssb:median	ssb:low	ssb:high	catch:median	catch:low	catch:high	tsb:median	tsb:low	tsb:high
2023	0.217	0.126	0.371	5314	2101	14140	50929	34594	76400	9719	6477	15159	72773	46882	113638
2024	0.38	0.221	0.65	8601	4875	25213	52547	31663	90068	15323	9948	25406	81164	48624	132091
2025	0.38	0.221	0.65	8601	4875	25213	50089	26992	95623	15205	9036	25716	82747	45913	142962
2026	0.38	0.221	0.65	8601	4875	25213	51224	25654	102183	16475	8612	29829	88389	46480	153645

Table 6.7.1. Faroe saithe (Division 5.b). Input data for the yield-per-recruit calculations of the SAM assessment. Natural mortality (nm), maturity (mat), catch weights (cw), selection pattern(sel), stock weights (sw). Units for catch and stock weights are kg.

"age"	"nm"	"mat"	"pf"	"pm"	"sw"	"sel"	"cw"
3	0.2	0.033	0	0	1228	0.119	1228
4	0.2	0.23	0	0	1575	0.644	1575
5	0.2	0.461	0	0	2013	1056	2013
6	0.2	0.68	0	0	2619	1252	2619
7	0.2	0.843	0	0	3468	1202	3468
8	0.2	0.937	0	0	4.45	1185	4.45
9	0.2	0.981	0	0	5305	1169	5305
10	0.2	1	0	0	6058	1029	6058
11	0.2	1	0	0	6626	1069	6626
12	0.2	1	0	0	7.27	1069	7.27
13	0.2	1	0	0	7524	1069	7524
14	0.2	1	0	0	8489	1069	8489
15	0.2	1	0	0	9115	1069	9115

6.18 Figures

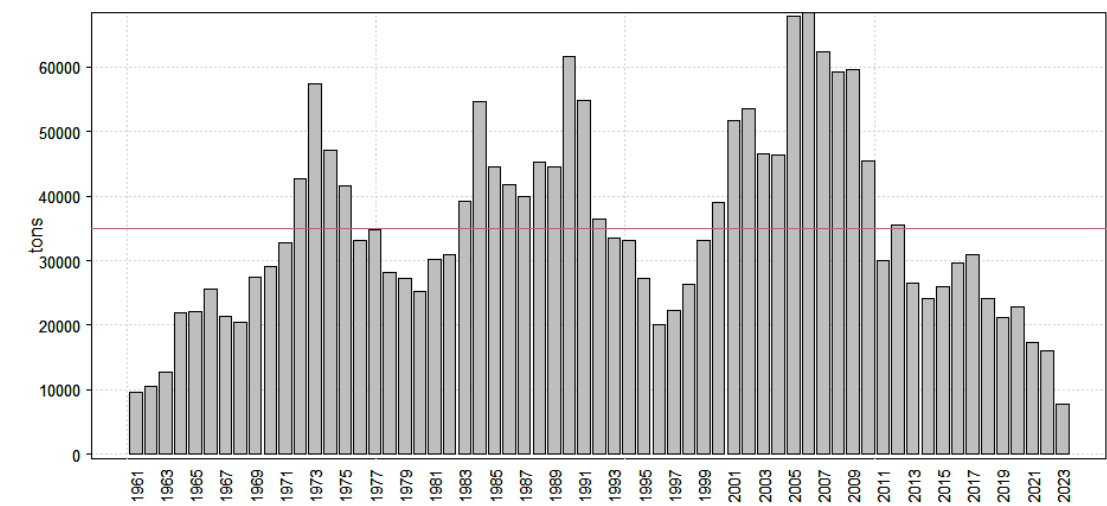


Figure 6.2.1.1. Faroe saithe (Division 5.b). Landings (tonnes; 1961–2023). Horizontal red line represents average landings. Landings in 2023 are estimated from January to September and extrapolated to total at the end of the year.

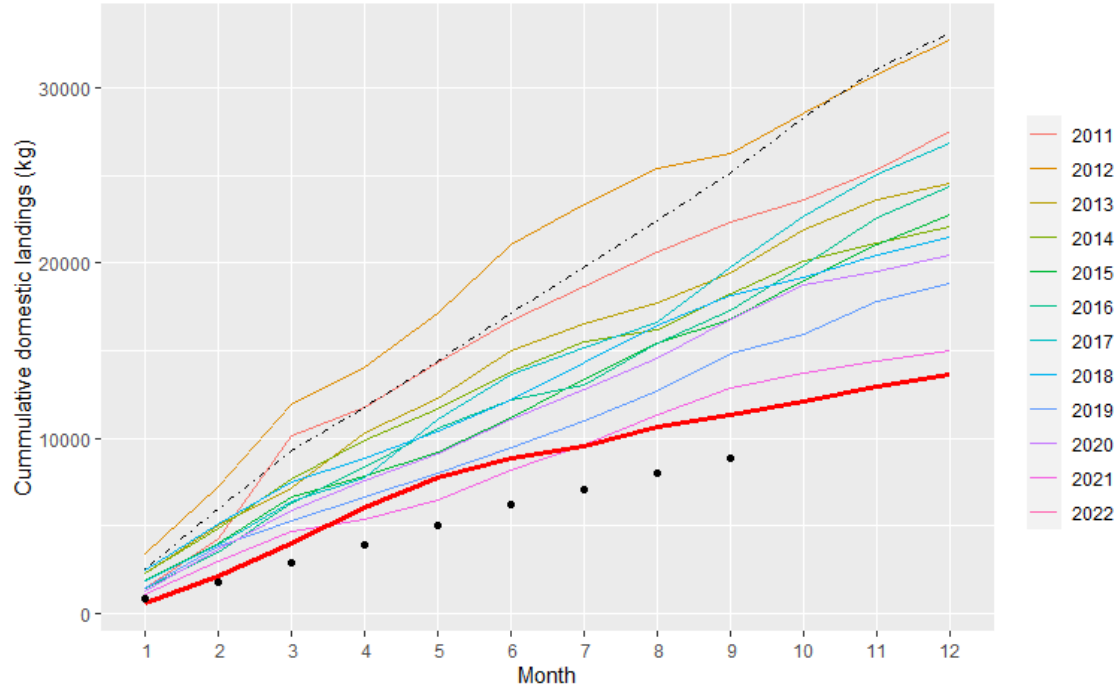


Figure 6.2.1.2. Saithe in the Faroes (Division 5.b). Cumulative domestic landings (2011–2023). Black line shows the first nine months of 2023.

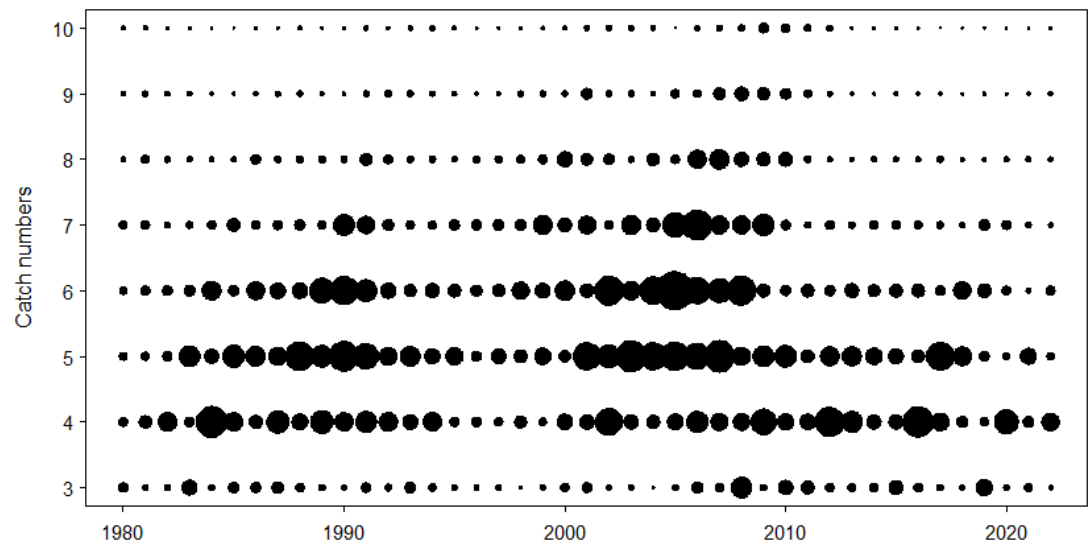


Figure 6.2.2.2. Faroe saithe (Division 5.b). Cath-at-age numbers in the commercial catches (ages 3–10; 1961–2022).

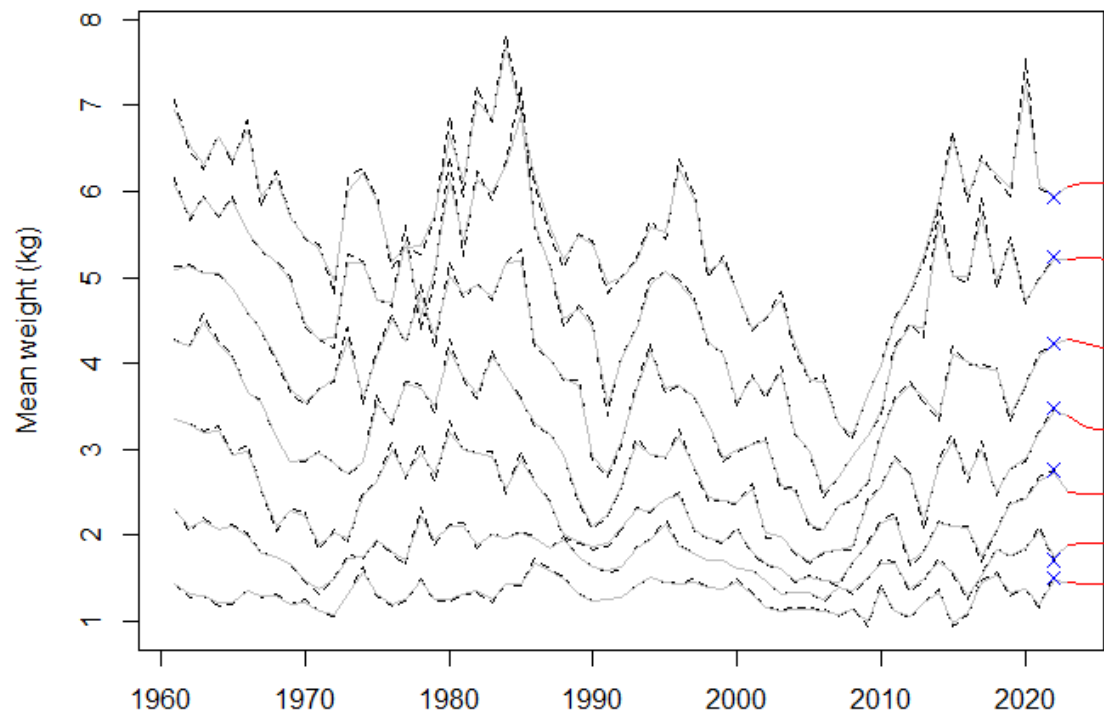


Figure 6.2.3.1.a Faroe saithe (Division 5.b). Observed (points) and predicted (line) mean weight at age (kg) in commercial catches (ages 3–11; 1961–2022). Blue cross are values for 2022. Catch-weights from 2023 are estimated by the SAM model.

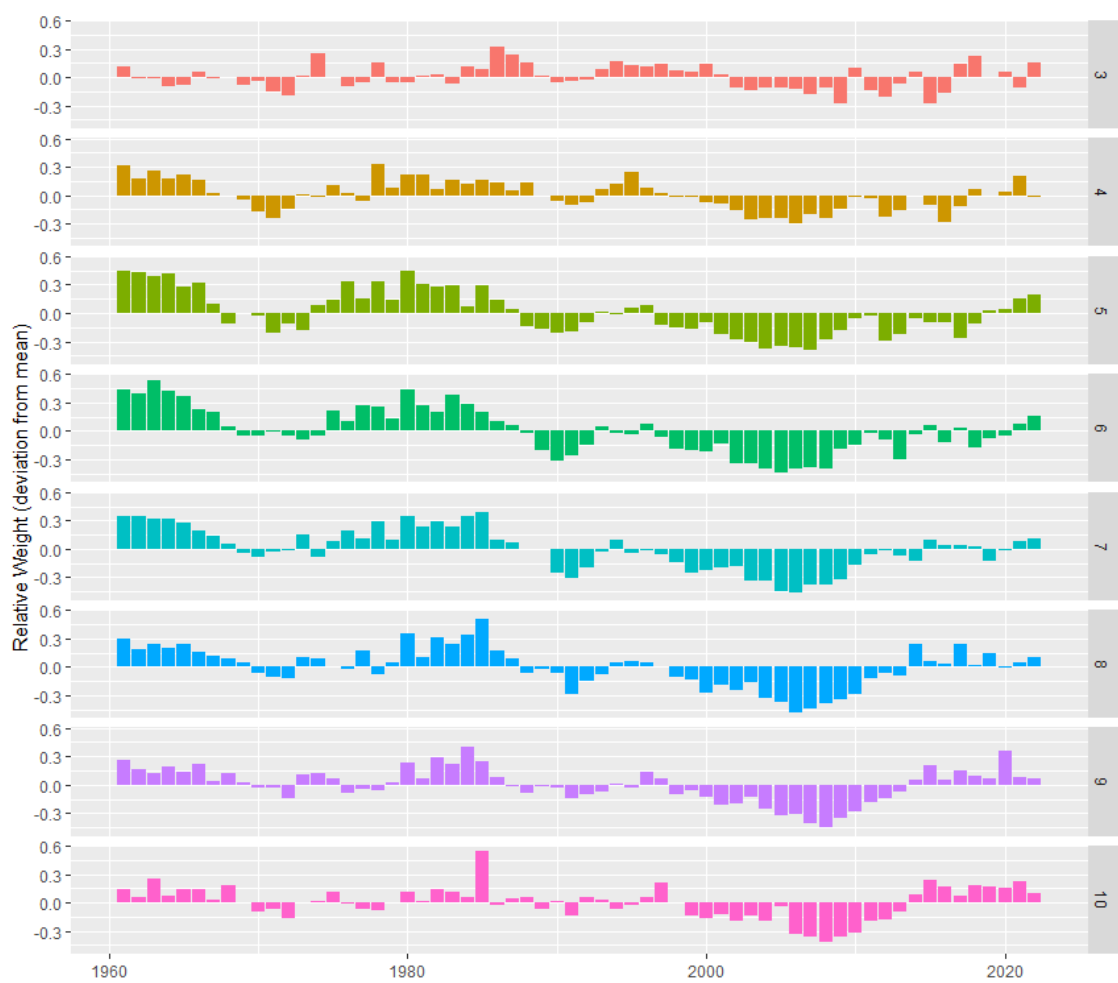


Figure 6.2.3.1.b Faroe saithe (Division 5.b). Deviations of mean weight at age (kg) from historical average in commercial catches (ages 3–10; 1961–2022).

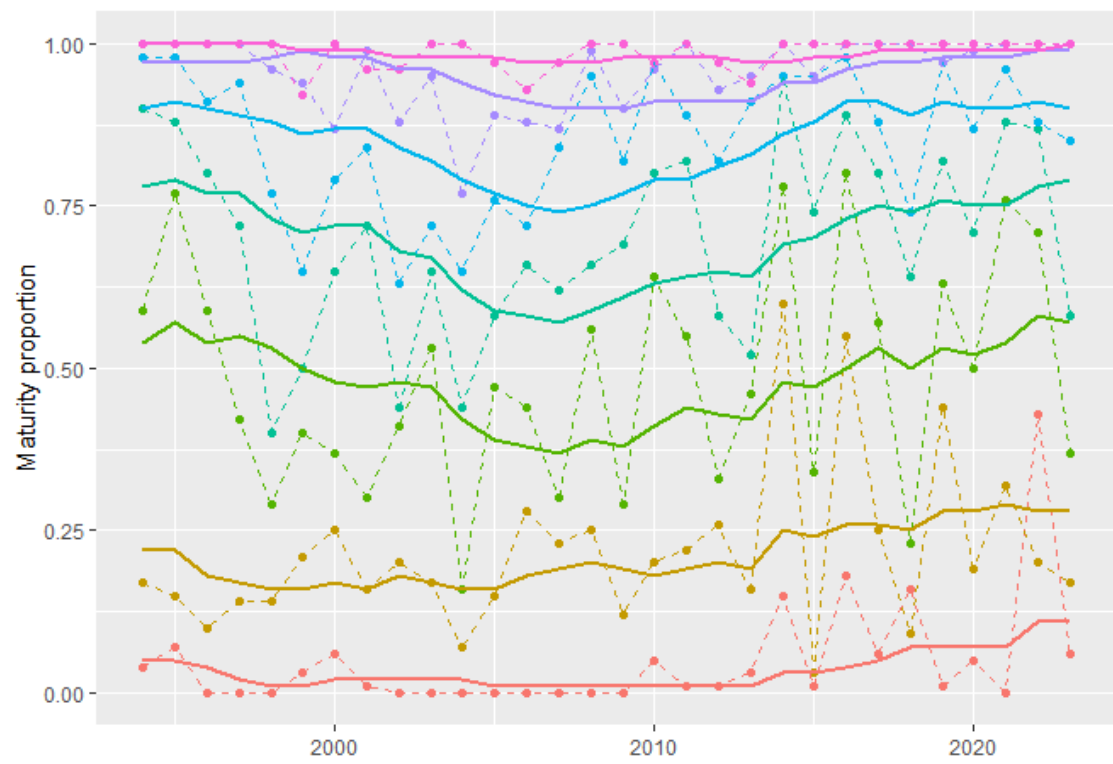


Figure 6.2.4.1. Faroe saithe (Division 5.b). Observed and smoothed maturity ogives (ages 3–9; 1994–2023) from FGFS1 (spring survey).

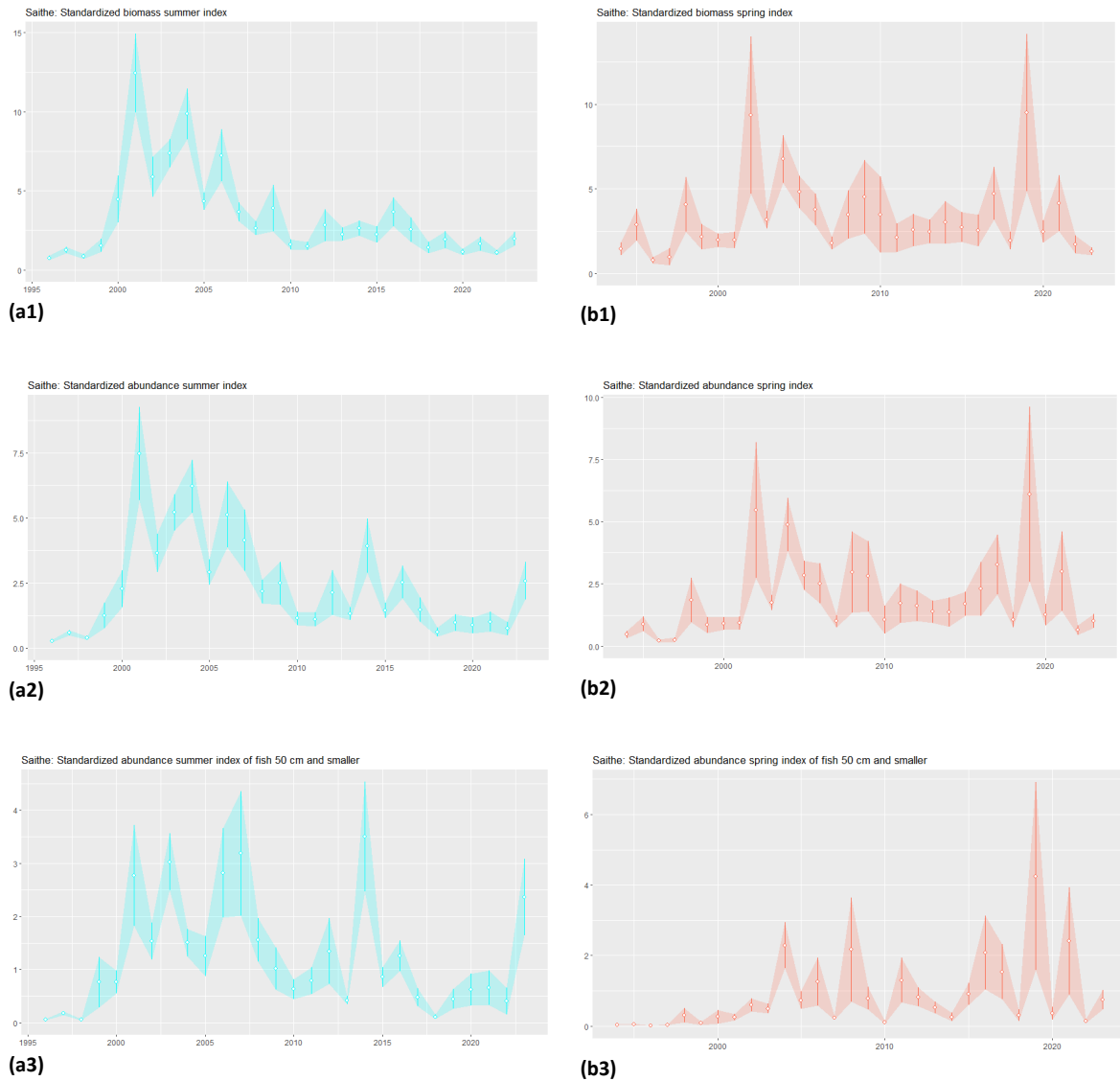


Figure 6.2.5.1.1. Faroe saithe (Division 5.b). Standardized biomass (a1; b1) and abundance (a2)(b2) indices from the Faroese bottom-trawl summer FGFS1 (1996–2023) and spring surveys FGFS2 (1994–2023). Abundance indices of fish 50 cm and smaller are proxies for recruitment strength (a3; b3). Shade areas show standard errors in the estimation of indices.

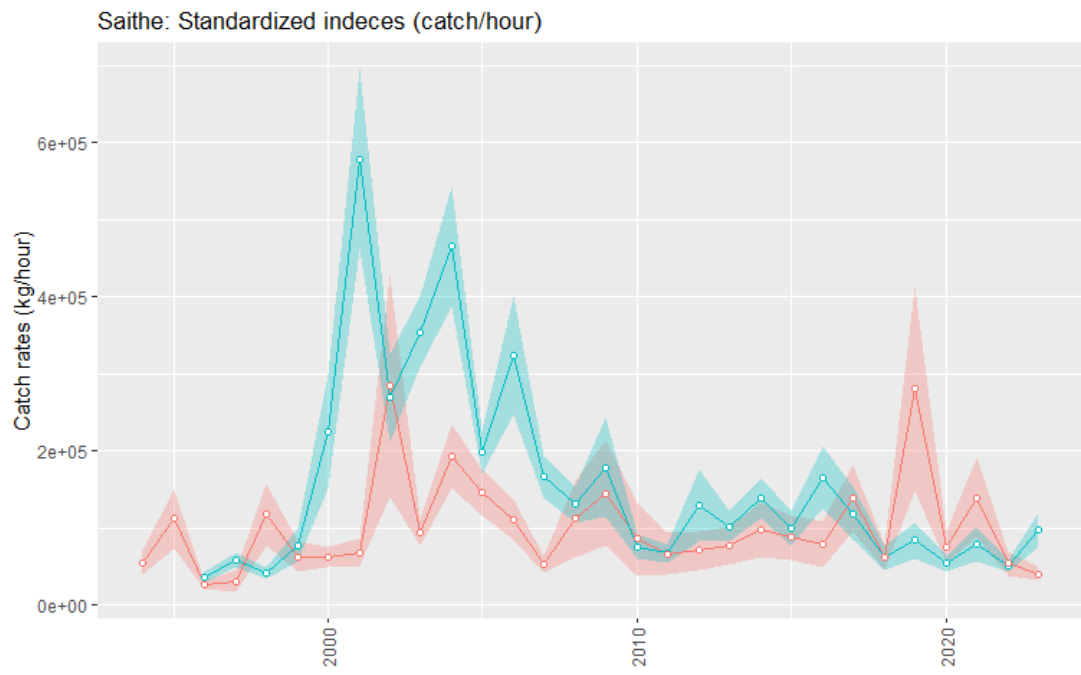


Figure 6.2.5.1.2. Faroe saithe (Division 5.b). Catch rates (kg/hour) from the Faroese bottom-trawl spring FGFS1 (1994–2023; red line) and summer survey FGFS2 (1996–2023; cyan line). Shade areas show standard errors in the estimation of indices.



Figure 6.2.5.1.3. Faroe saithe (Division 5.b). Age-disaggregated (ages 3–10) numbers from the commercial fleet (left panel), the Faroese bottom-trawl spring FGFS1 (middle panel) and summer survey FGFS2 (right panel) since 1995.

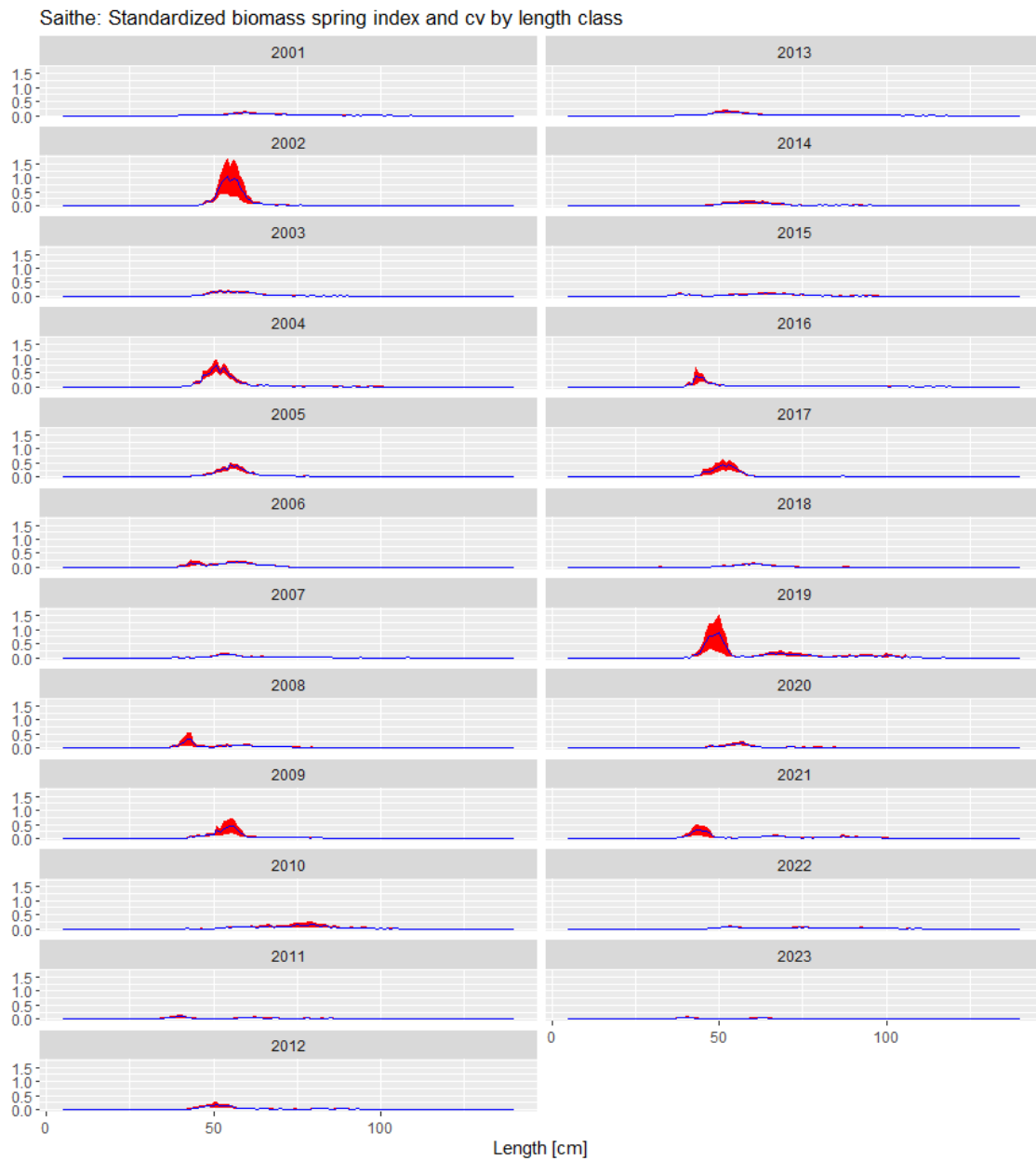


Figure 6.2.5.1.4. Faroe saithe (Division 5.b). Length composition from the Faroese bottom-trawl spring survey FGFS1 (2001–2023).



Figure 6.2.5.1.5. Faroe saithe (Division 5.b). Length composition from the Faroese bottom-trawl summer survey FGFS2 (2000–2023).

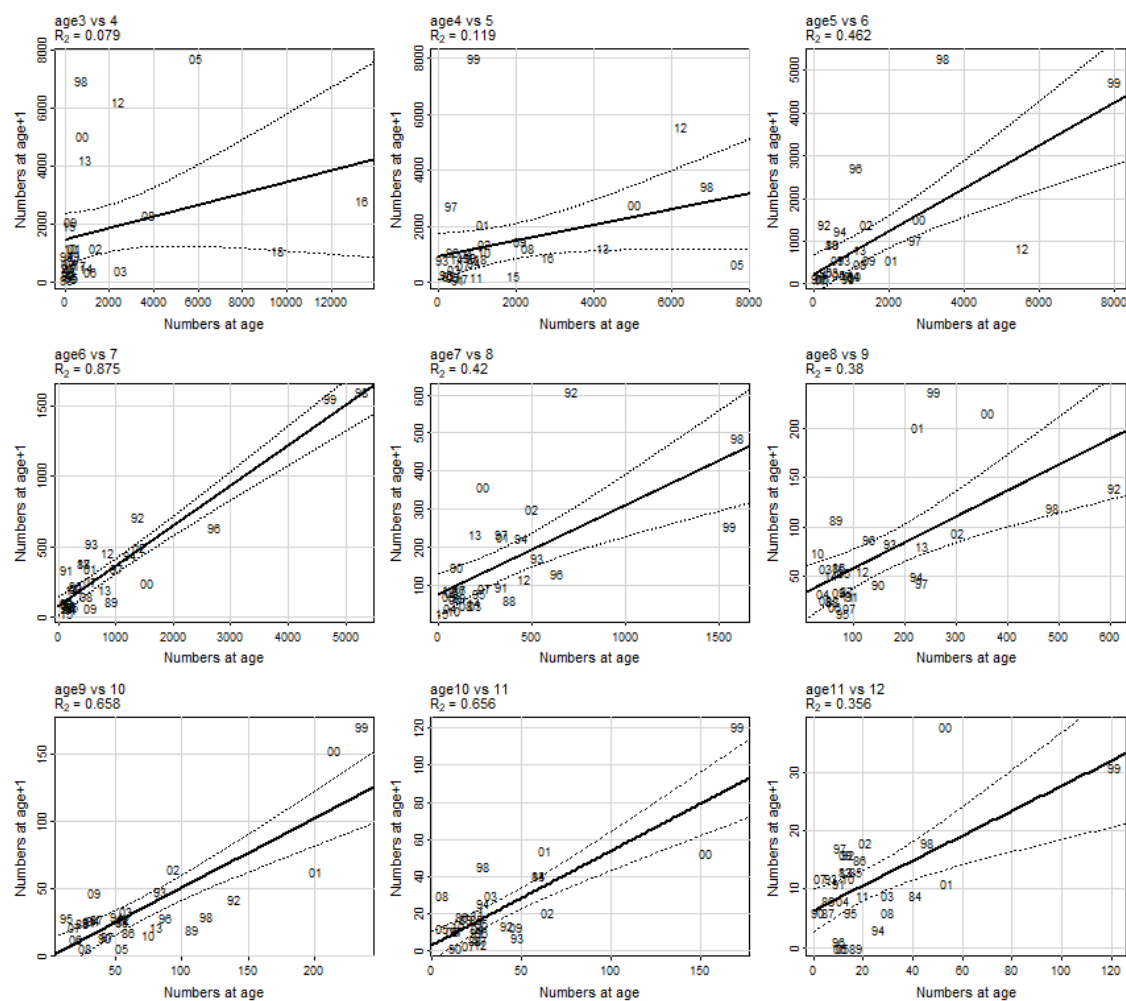


Figure 6.2.5.1.6. Faroe saithe (Division 5.b). Numbers from spring survey (FGFS1) plotted against numbers of the same year class one year later. Letters in the figures represent year classes. Horizontal and vertical lines crossing is the most recent pair.

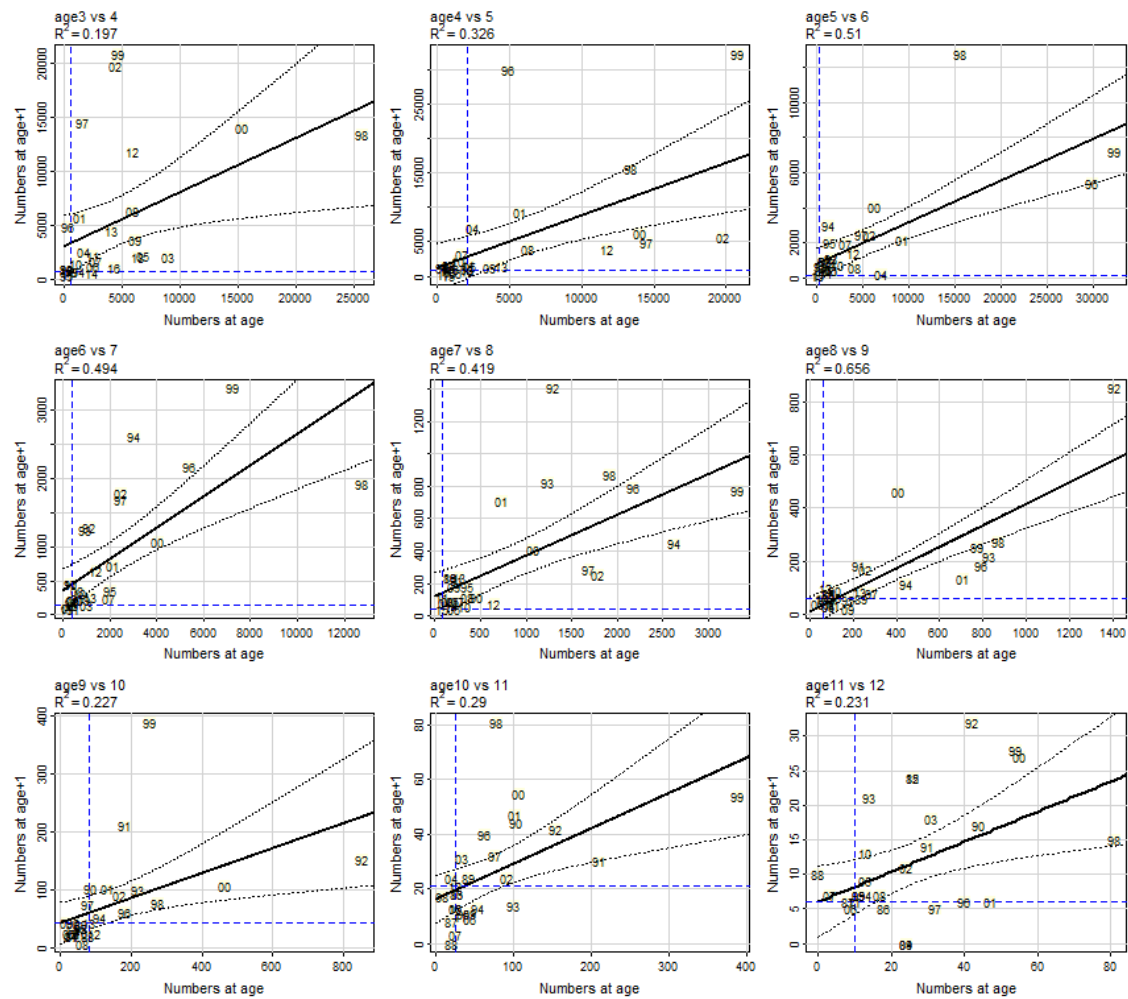


Figure 6.2.5.1.7. Faroe saithe (Division 5.b). Numbers from summer survey (FGF52) plotted against numbers of the same year class one year later. Letters in the figures represent year classes. Horizontal and vertical lines crossing is the most recent pair.

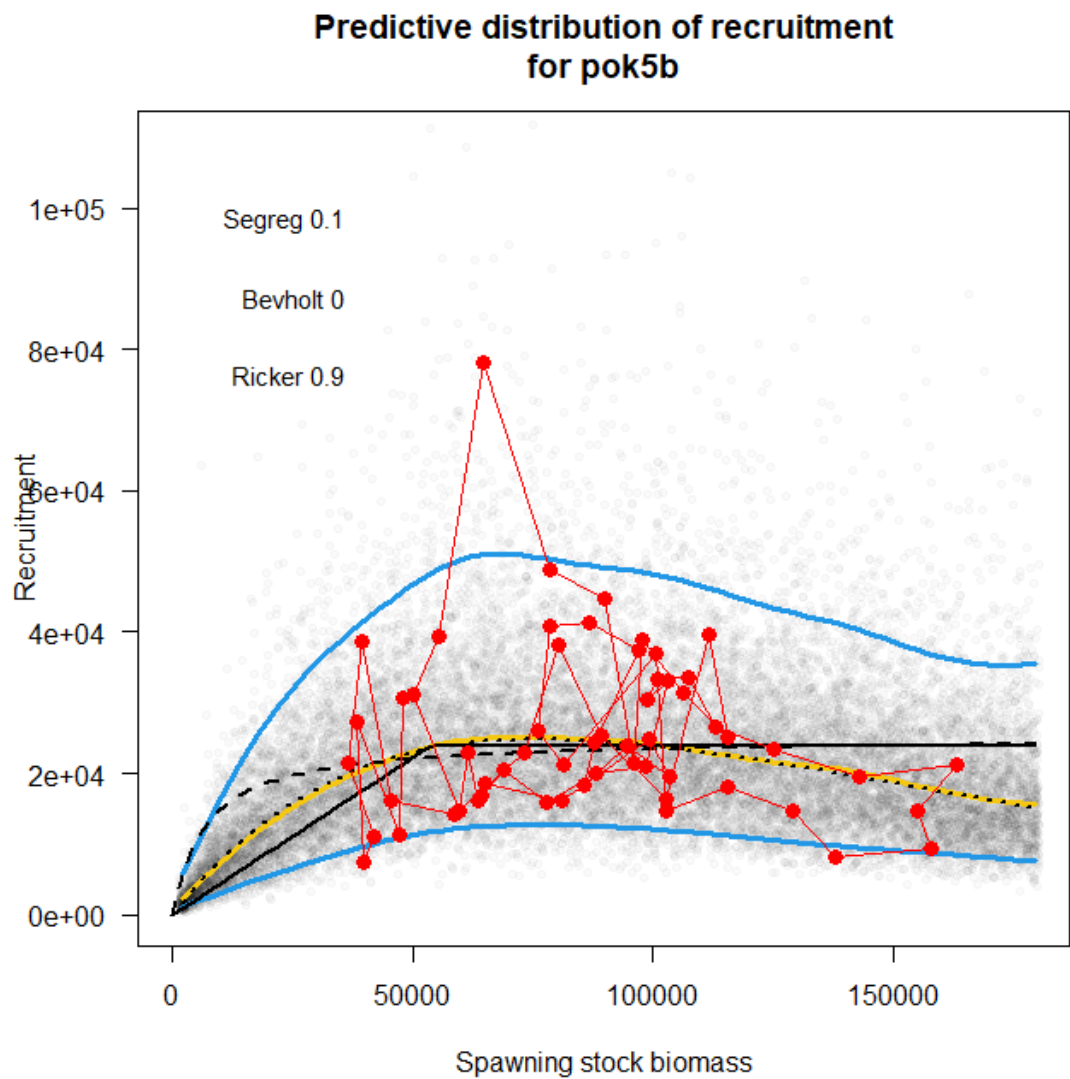


Figure 6.4.1.1. Faroe saithe (Division 5.b). EqSim simulations. Stock–recruitment functions used in the simulations (Ricker, Beverton–Holt and Segmented).

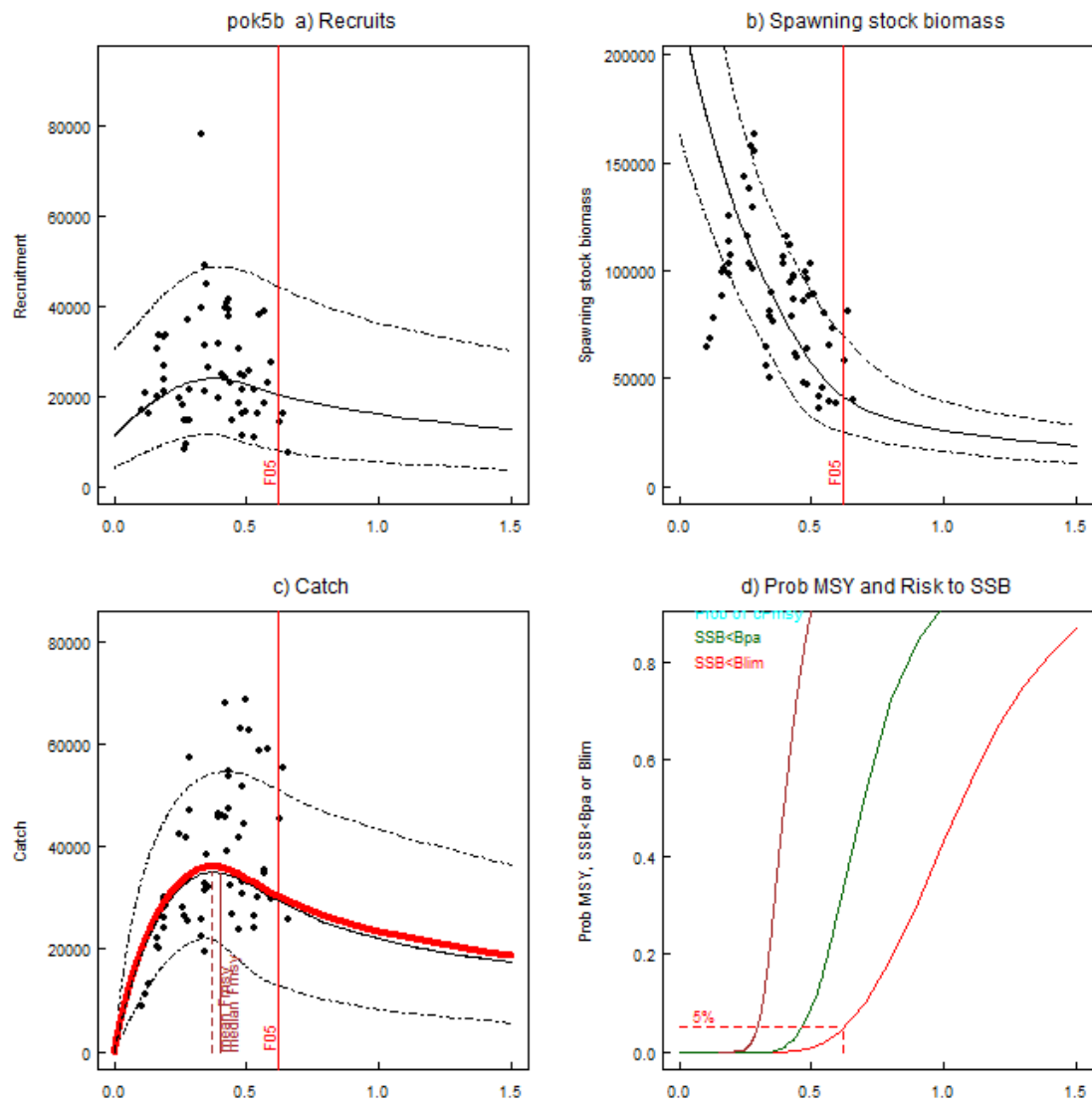


Figure 6.4.1.2. Faroe saithe (Division 5.b). EqSim simulation results. $F_{MSY} = 0.38$ is the vertical red line in the bottom-left graph.

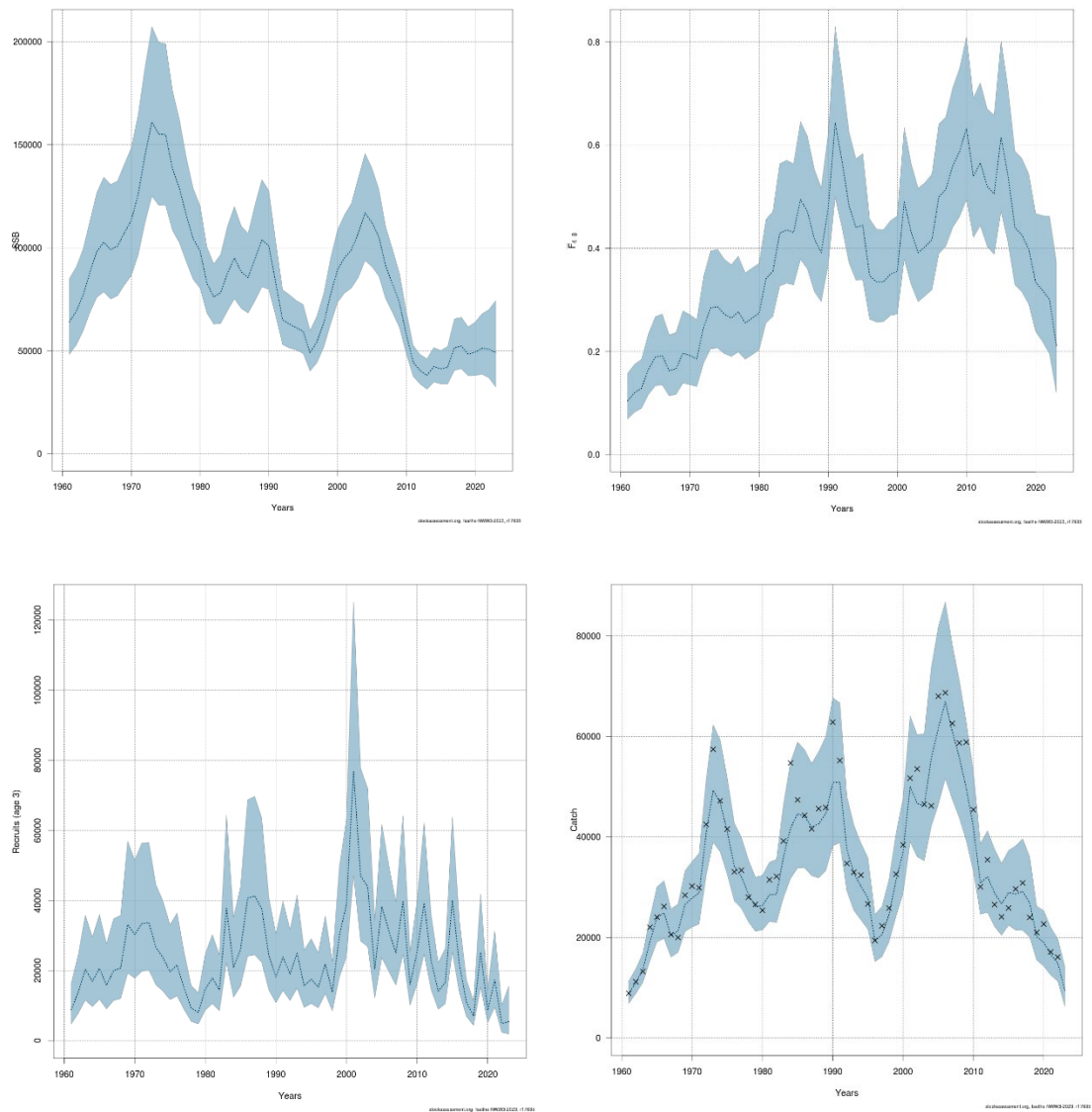


Figure 6.5.1. Faroe saithe (Division 5.b). Spawning-stock biomass (tonnes; top-left), recruitment (age 3) in millions (bottom-left), F_{bar} (ages 4 to 8; top-right) and landings (tonnes; bottom-right) from the SAM assessment. Reference points ($B_{\text{trigger}} = B_{\text{pa}} = 36\,412\text{ t}$ and $F_{\text{MSY}} = 0.38$ respectively).

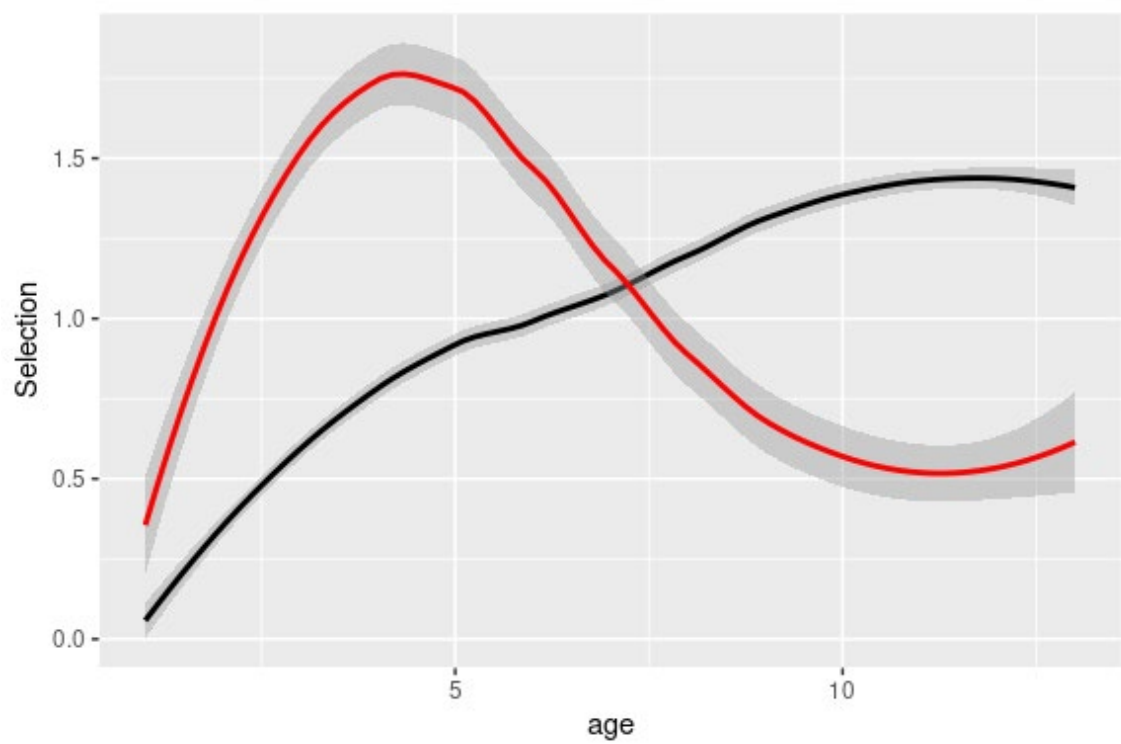


Figure 6.5.1.a Faroe saithe (Division 5.b). Selection pattern by periods in the fishery. Average selection from 2000 to 2014 (black line) and from 2015 to 2022 (red line).

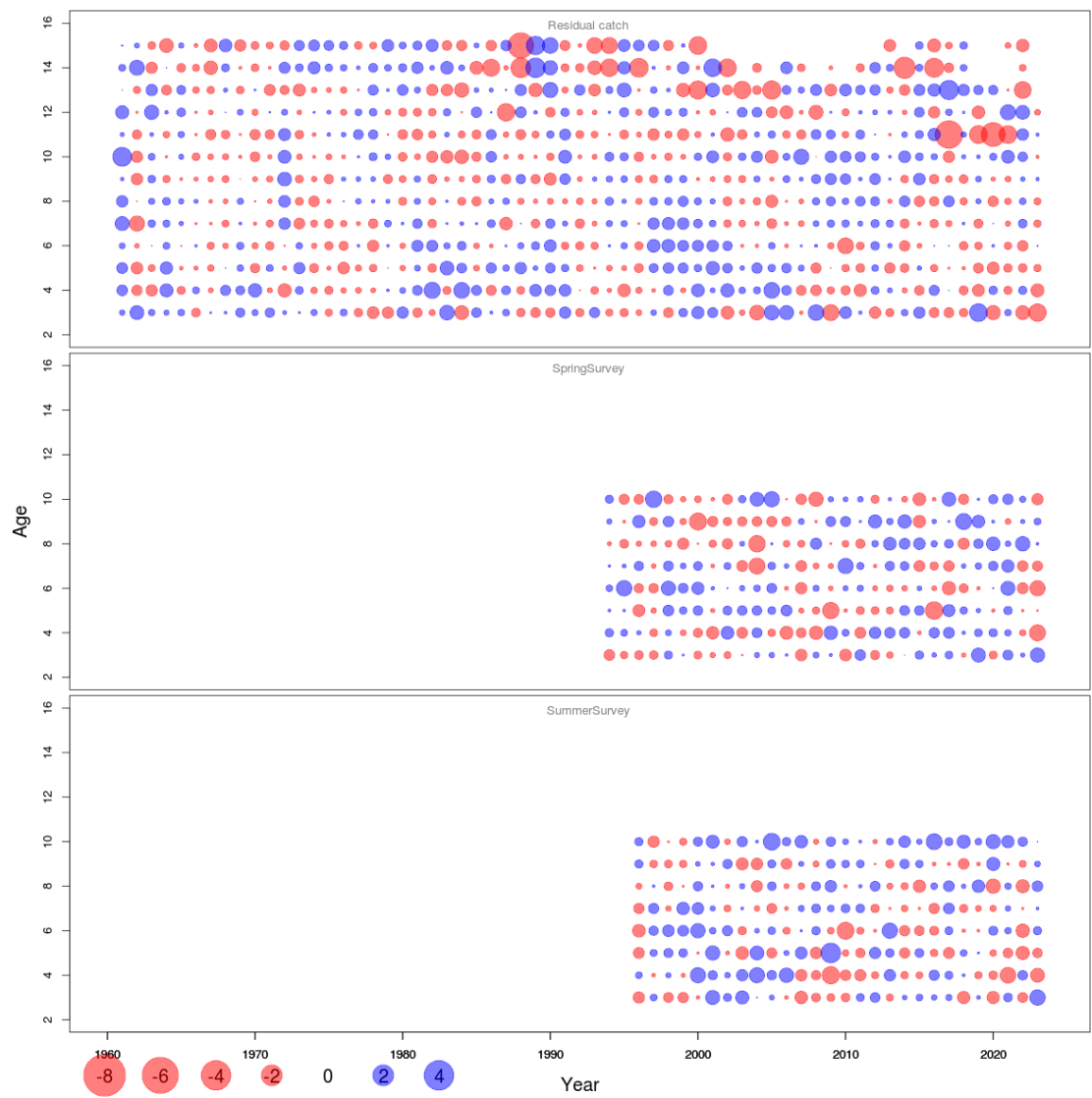


Figure 6.5.2. Faroe saithe (Division 5.b). Residuals of the SAM assessment calibrated with both survey indices. Blue and red bubbles represent positive and negative residuals respectively.

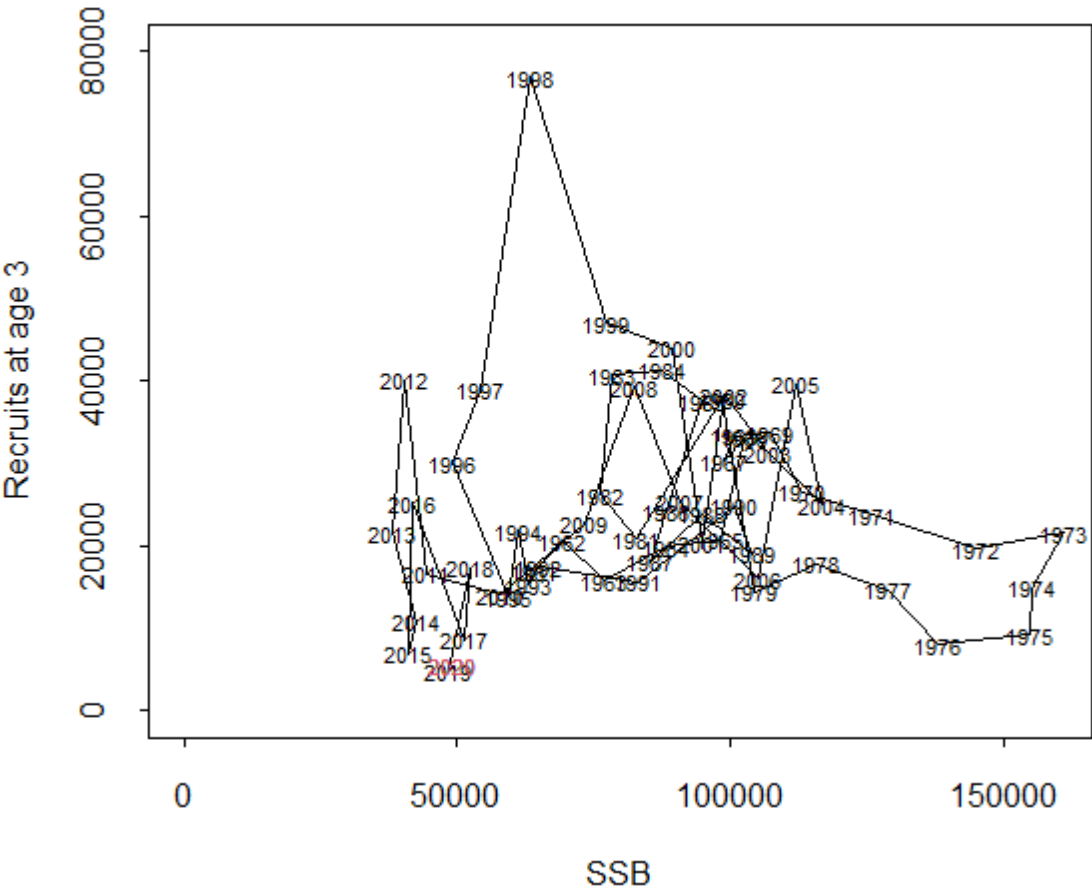


Figure 6.5.3. Faroe saithe (Division 5.b). Relation between SSB and recruitment (age 3). Numbers represent year classes. The most recent year class (2020) is highlighted in red.

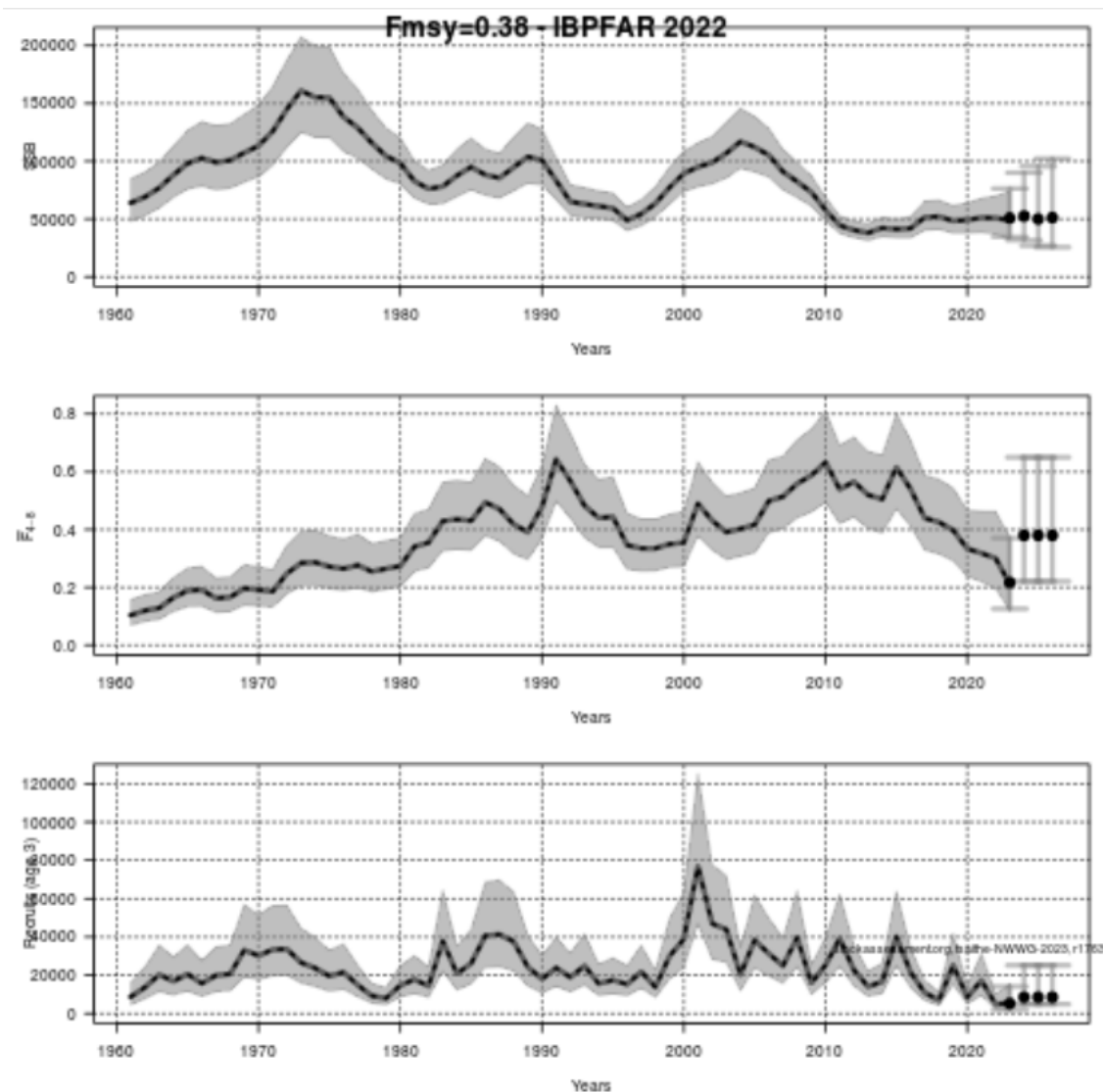


Figure 6.6.2.1. Faroe saithe (Division 5.b). Short-term forecast based on the F_{MSY} advice including historical assessment. Spawning-stock biomass (top, red line represents $B_{trigger}$), average fishing mortality (F_{4-6} ; middle) and recruitment (numbers age 3, bottom).

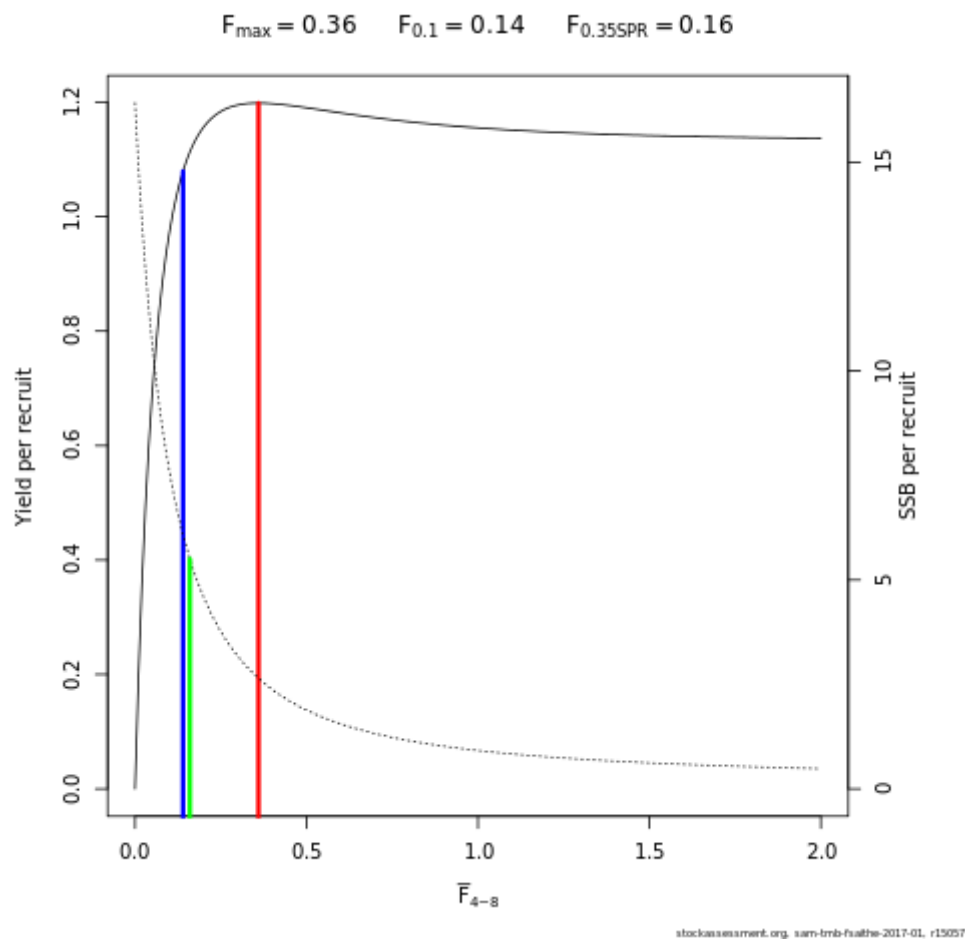


Figure 6.7.1. Faroe saithe (Division 5.b). Yield-per-recruit analysis.

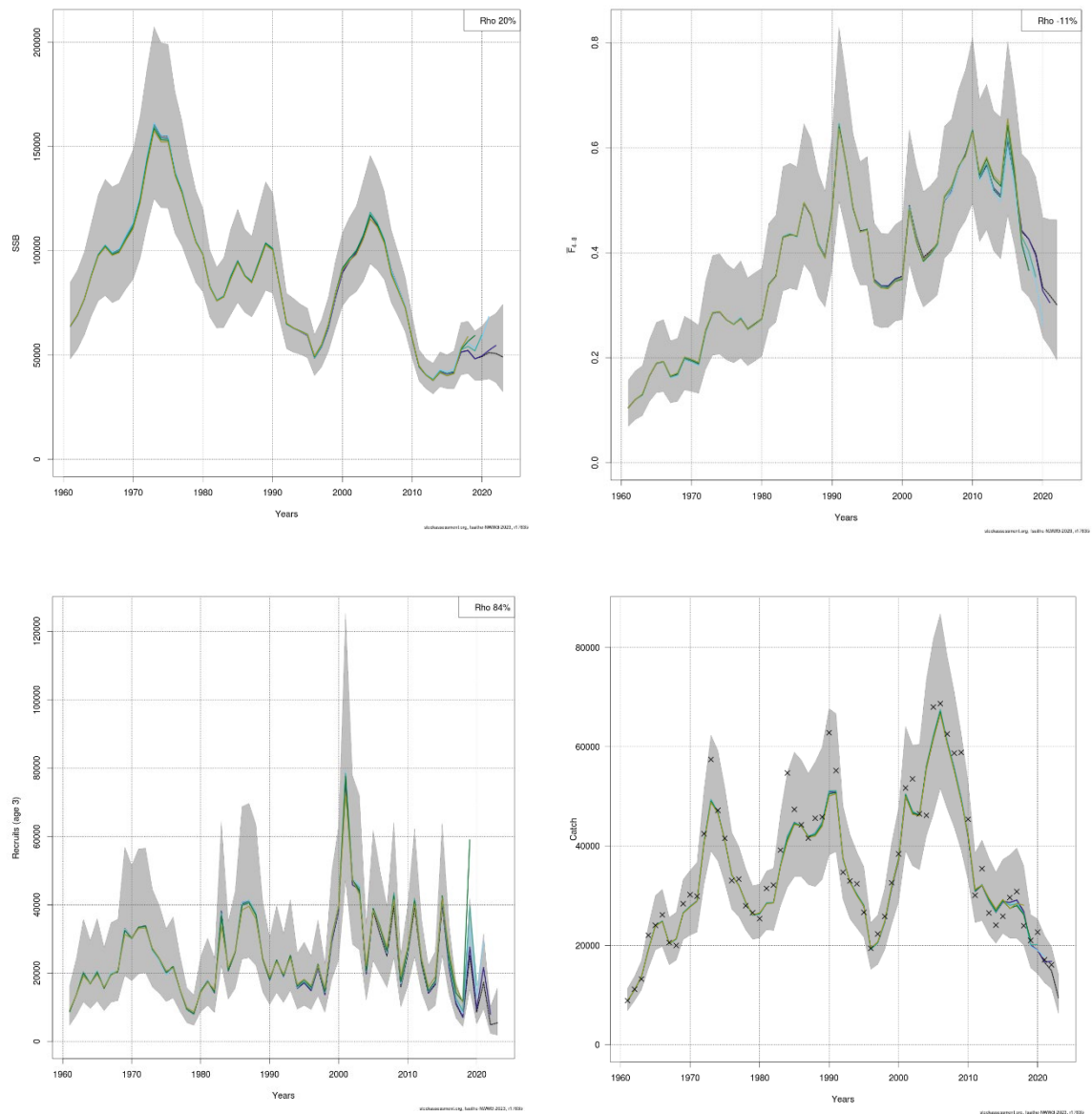


Figure 6.8.1. Faroe saithe (Division 5.b). Retrospective analysis of spawning-stock biomass (tonnes)(top-left), average fishing mortality over age groups 4–8 (top-right), recruitment-at-age 3 ('000; bottom-left) and total landings (tons)(bottom-right) from the SAM assessment.

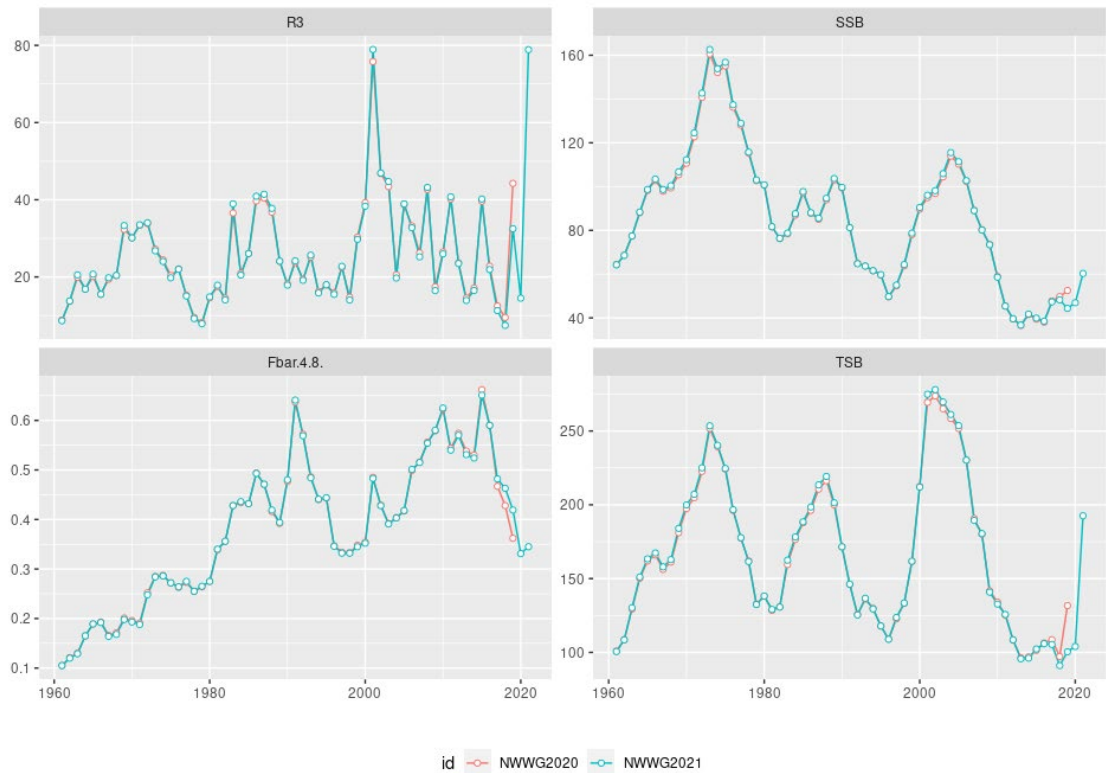


Figure 6.9.1. Faroe saithe (Division 5.b). Comparison of the 2020 and 2021 assessments. Recruitment-at-age 3 ('000; top-left), spawning-stock biomass (tonnes)(top-right), average fishing mortality over age groups 4–8 (bottom-left) and total biomass (tonnes; bottom-right) from the 2020 (red) and 2021 (cyan) assessments

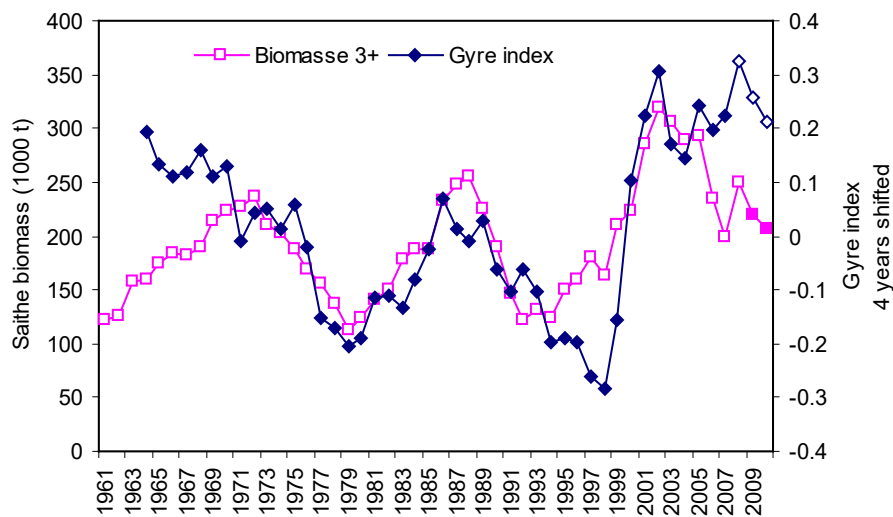


Figure 6.15.1. Faroe saithe (Division 5.b). Relationship between the Gyre index (4 years shifted) and saithe biomass (age 3+) in Faroese waters.

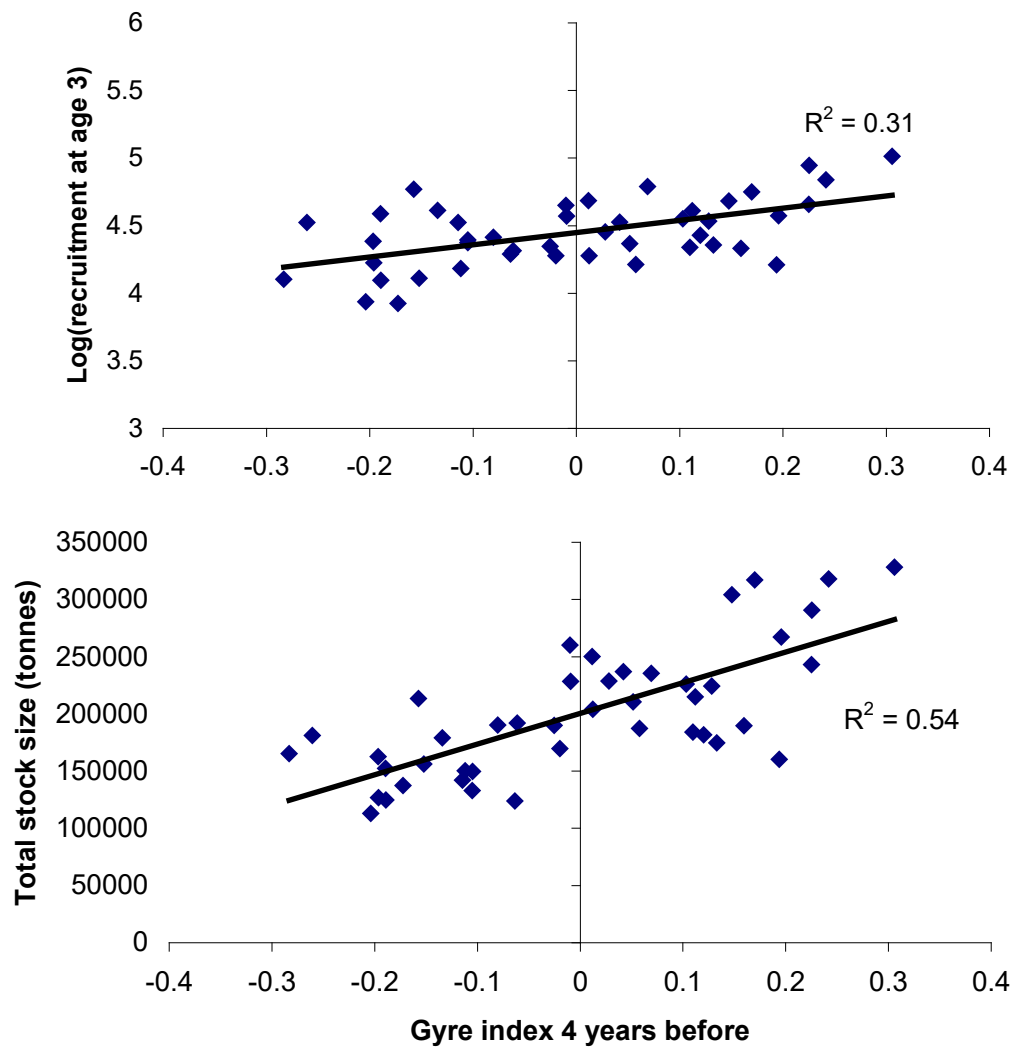


Figure 6.15.2. Relationship between the gyre index and both recruitment (top figure) and total-stock biomass estimates (bottom figure.) Note that a large gyre index indicates a small Subpolar Gyre, and, consequently, a large influx of plankton-rich warmer-than-average water to the outer areas (bottom depth > 150 m) around the Faroes, where saithe typically are found.