4 Faroe Plateau cod[1]

cod.27.5b1 – *Gadus morhua* in Subdivision 5.b.1

4.1 Stock description and management units

Both genetic and tagging data suggest that there are three cod stocks present in Faroese waters: on the Faroe Bank (Division 5.b.2), on the Faroe Plateau (Division 5.b.1), and on the Faroe-Iceland Ridge. Cod on the Faroe-Iceland Ridge seem to belong to the cod stock in Iceland, and the WG in 2005 decided to exclude these catches from the catch-at-age calculations. The Stock Annex provides more information.

4.2 Scientific data

4.2.1 Trends in landings and fisheries

The landings were obtained from the Fisheries Ministry and Statistics Faroe Islands. The landings are presented in Table 4.2.1 and the working group estimates are presented in Table 4.2.2. The catches on the Faroe-Iceland Ridge, i.e. for single trawlers and the large longliners were not included in the catch-at-age calculations (Table 4.2.3).

4.2.2 Catch-at-age

Landings-at-age for 2022 are provided for the Faroese fishery in Table 4.2.4. Faroese landings from the main fleet categories were sampled (Table 4.2.5). The catch-at-age is shown in Table 4.2.6. Catch curves are shown in Figure 4.2.1.

4.2.3 Weight-at-age

Mean weight-at-age data are provided for the Faroese fishery in Table 4.2.7. These were calculated using the length/weight relationship based on individual length/weight measurements of samples from the landings. The sum-of-products-check for 2022 showed a discrepancy of 0%. The weights have increased in recent years, but since decreased (Figure 4.2.2).

4.2.4 Maturity-at-age

The proportion of mature cod by age during the Faroese groundfish surveys carried out during the spawning period (March) is given in Table 4.2.8 and in Figure 4.2.3. Full maturity is generally reached at age 5 or 6, but considerable changes have been observed in the proportion mature for younger ages between years. Maturities were slightly revised during the benchmark in February 2017. The maturities prior to 1983 were set to the average for 1983 to 1996.

[1] This section was last updated in November 2023. Note that a zero advice for 2023 and 2024 was released by ICES in November 2022. Hence, this assessment is not used as basis for the ICES advice for 2024 but is provided for information. Note that this assessment, along with the assessments of haddock and saithe, acts as basis for the allocation of fishing days according to the Faroese management plan.

4.2.5 Catch, effort, and research vessel data

4.2.5.1 Fisheries independent CPUE series

The spring groundfish surveys in Faroese waters with the research vessel Magnus Heinason and Jákup Sverri (since 2022) is used as a tuning series. The catch curves showed a normal pattern (Figure 4.2.4), i.e. a decreasing trend after age 5. The stratified mean catch of cod per unit effort (Figure 4.2.5) has decreased in the recent years and attained the lowest values in 2022 and 2023.

The other tuning series used is the Summer Groundfish Survey. The new research vessel, Jákup Sverri, conducted the august survey for the first time in 2021. The stratified mean catch of cod per unit effort has also decreased in recent years to record low values (Figure 4.2.5). The catch curves (Figure 4.2.6) show that the fish are fully recruited to the survey gear at an age of 4 or 5 years. Both tuning series are presented in Table 4.2.9 and they show that the 2016 and 2017 year classes initially seemed to be of average strength but were less abundant in 2020–2022 than expected. Catch per tow in the spring and summer survey shows that there were occasional large hauls in both surveys (Figure 4.2.7 and Figure 4.2.8).

4.2.5.2 Commercial CPUE series

Three commercial CPUE series (longliners and pairtrawlers) are also presented (Tables 4.2.10, 4.2.11, and 4.2.12, as well as Figure 4.2.9), although they are not used as tuning series. Note that the small boats (0–25 GRT) operating with longlines and jigging reels close to land have had an extremely high CPUE in recent years relative to the fishable biomass (Figure 4.2.10, Figure 4.2.11), a feature also observed for the larger longliners (Figure 4.2.9). When that happens, the recruitment of cod tends to be low (Steingrund *et al*., 2010).

4.3 Information from the fishing industry

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

4.4 Methods

The benchmark in February 2017 decided to change the traditional assessment tool from XSA to SAM although it was recognized that the results of the assessment were mainly data-driven. The SAM model had some beneficial characteristics, e.g. that it provided uncertainty estimates for the catch in numbers, surveys and the output from the assessment (biomasses and fishing mortalities). The interbenchmark in September 2022 (IBPFAR) included the catch-at-age in the interim years into the assessment. The catch in tons was estimated from the January-September landings and scaled to the whole year by a regression analysis. The age composition in the catch was based on the January-June samples. Hence, the assessment was based on the newest information that was available.

4.5 Reference points

Since the assessment model was replaced at the benchmark in February 2017, it was necessary to recalculate reference points at the NWWG meeting in 2017 (this was not finally conducted during the benchmark). After the interbenchmark in September 2022, where the effect of including a catch-at-age for the interim year was studied, new reference points were calculated and finalized at the NWWG meeting in October 2022.

Selection of B_{lim}

The stock recruit plot (Figure 4.5.1) had few observations between 20−40kt. As a result there was no very clear indication of a decline in recruitment at any point above 20 kt. Below 20 kt there was a somewhat lower recruitment, coming from poor year classes in 2012−2021 with low SSB. With the bulk of the points above 40 kt associated with a wide range of recruitment values, a segmented regression fitted to these points had a breakpoint at the ~50 kt (just before the bulk of points). However, this breakpoint was not strongly defined. Hence the breakpoint in the segreg was not used for B_{lim}.

The previous basis for B_{lim} was the lowest SSB from which the stock has recovered. Using the same basis with the most recent assessment the SSB in 1992 (17803t; Figure 4.5.2) was considered the appropriate value. The biomass was lower later in the period (2012−2017) but the stock had not recovered from this level at the time of the assessment and reference point calculations.

Calculation of B_{pa} and MSY $B_{trigger}$

The final year uncertainty on SSB and F from the SAM assessment (SSB: 0.14, F: 0.12) was considered an underestimate given the retrospective issues with the assessment. So uncertainty values of 0.2 were used in the simulations instead (Table 4.5.1).

$B_{pa} = B_{lim}$*exp(1.645*sigma) where sigma=0.20 = 24739 t

F was high in 2019−2020 (above Fmsy) so MSY $B_{trigger}$ was set at B_{pa}.

F_{MSY}

Fmsy (0.37) was well below F_{pa}=Fp05 (0.69). This was well above the previous Fmsy for the stock (0.23). A possible part of the explanation is the change in selectivity compared to the previous assessment (Figure 4.5.3). The more dome-shaped selectivity was considered to favour a higher Fmsy since older fish that contribute to SSB experienced lower Fs even with a higher Fmsy. Also, Fmsy was still on the lower end of observed F over the whole time-series (Figure 4.5.2). The stock had previously grown with F levels greater than 0.42 and the declines in 2015−22 came from Fs being between 0.5 and 0.8 from the mid-1990s to the 2010s. Old and new reference points are shown in Table 4.5.2.

4.6 State of the stock: historical and comparison to what is now

As previous years, the two surveys were used for tuning. The commercial series showed a similar overall tendency as the surveys (Figure 4.2.9) but were not used in the tuning. At the benchmark in February 2017, the traditional XSA was replaced by a SAM assessment model. The SAM model settings and the model parameters are shown in Table 4.6.1, e.g. the fishing mortality is assumed equal for ages 7+. The variation in the catchability coefficients for the survey at age was set equal for ages 2+, although different for each survey, and age 1 was set different from the other ages, but different for the two surveys. An AR covariance structure was applied for the summer survey, eliminating year effects, but not for the spring survey. The observation residuals looked quite random (Figure 4.6.1) as well as the process error (joint residuals) (Figure 4.6.2).

The results from the SAM-run show that fishing mortality (F3–7) has been far above Fmsy since 2018 (Table 4.6.2, Table 4.6.4, Figure 4.6.3). The population numbers, total biomass and spawning-stock biomass were low compared with other years in the series, but temporarily increased around 2017 and decreased again to a level below B_{lim} (Table 4.6.3, Table 4.6.4, Figure 4.6.4, Figure 4.6.5). The poor state of the stock since 2004 was due to poor recruitment (not poor individual growth). Prior to that time, extremely weak year classes (< 5 million individuals at age 2) were

only observed three times, whereas it has happened several times since 2004. In the past there has been a poor relationship between the size of the spawning stock and subsequent recruitment (Figure 4.6.6), but the increasing number of low data points in recent years have strengthened the stock–recruitment relationship. The spawning-stock biomass in the terminal year was below B_{lim} and the fishing mortality between F_{pa} and F_{lim} (Table 4.5.2, Table 4.6.4). The spawning-stock biomass in the assessment year was below B_{lim}.

The period of low biomass of Faroe Plateau cod since 2004 has been unprecedented over the last 300 years (Figure 4.6.4); for data and figures for the years before 1959, see ICES (2016), although there were short periods of low biomass between 1700 and 1750 and around 1813.

4.7 Short-term forecast

4.7.1 Input data

The short-term prediction was performed in the SAM model. The SAM model provides predictions that carry the signals from the assessment into the short-term forecast. The forecast procedure starts from the last year's (assessment year) estimate of the state (log(N) and log(F) at age. One thousand replicates of the last state are simulated from its estimated joint distribution. Each of these replicates are then simulated forward according to the assumptions and parameter estimates found by the assessment model. In the forward simulations a 5-year average (years up to the assessment year) is used for catch mean weight, stock mean weight, proportion mature, and natural mortality. Recruitment is resampled from the last 11 years (up to the year before the assessment year). In each forward simulation step the fishing mortality is scaled, such that the median of the distribution is matching the requirement in the scenario (e.g. hitting a specific mean F value or a specific catch).

4.7.2 Results

The spawning-stock biomass is expected to be 8830 tonnes in 2024 and will attain B_{lim} of 17803 tonnes in 2026 under the 'no fishing' scenario (F=0, Table 4.2.6).

4.8 Long-term forecast

The yield-per-recruitment calculations were performed in the SAM model and were based on the last 20 years (up to the year before the assessment year). The F_{max} was estimated at 0.40 (Figure 4.8.1).

4.9 Uncertainties in assessment and forecast

Since there is no incentive to discard fish or misreport catches under the effort management system, the catch figures are considered adequate, as well as the catch-at-age.

The retrospective pattern indicates uncertainties in the assessment, especially in recruitment (Figure 4.9.1). The Mohn's rho was 348%, −29% and 40% for recruitment, F, and the spawning-stock biomass, respectively. The downscaling of the recruitment is commented on later in this report (4.10). The interbenchmark process (IBPFAR, 2022) investigated the retrospective pattern and found that setting M=0.4 from 2017 and onwards reduced the retrospective pattern, e.g. for SSB where it dropped from 20% to 6%. The NWWG 2022 decided to keep the old setting of M=0.2 for all years although the rho-values were higher.

Steingrund *et al.* (2010) found that the recruitment of Faroe Plateau cod (age 2) could be rather precisely estimated as there is a significant relationship between cod biomass (age 3+) and the amount of cannibalistic cod in nearshore waters in June–October the previous year. This approach showed that the recent year classes were extremely weak (Figure 4.9.2). The importance of food is demonstrated in NWWG 2021, WD 30 where the downscaling of year classes from age 1 to age 3 was most severe when the condition factor of adult cod was low at the time the year classes were 2 years old.

In the interbenchmark process (IBPFAR 2022) some biological considerations were presented (IBPFAR 2022, WD 1). Briefly, it was noted that very large numbers of small fish (0–2 year old cod and haddock) were observed in 2016–2018. This was probably a result of the high primary production in 2017 and little competition/predation of adult cod/haddock due to their low biomasses. Preliminary calculations showed that these small fish could consume as much as 80% of the total food consumption of the cod/haddock stocks. Since age 3–4 cod/haddock eat partially the same food as age 0–2 fish (Crustacea, Polychaeta, sandeels) it was proposed that the low condition factor of adult cod/haddock in 2019 probably was caused by the superabundant small cod/haddock. As already mentioned, the survival of small cod/haddock from age 1 to age 3 is low when the condition factor of adult cod/haddock is low (NWWG 2021, WD 30). According to this reasoning the actual problem for the cod/haddock stocks could be the low biomass of adult cod/haddock that is unable to keep down the abundance of small cod/haddock. Conversely, a large biomass of adult cod/haddock could probably prevent the occurrence of superabundant small fish and subsequent food shortage and lead to larger and more stable recruitment.

Such biological conditions could confuse any assessment model. Large numbers of age 1 fish used in the tuning tell the model that large year classes will enter the fishery in the near future. However, the same numbers might be signalling just the opposite, that the downscaling will be large and that small year classes will enter the fishery. Preliminary investigations at the NWWG 2022 meeting showed that the retrospective pattern was improved if the age 1 was excluded from the tuning in the cod assessment. There are indications that the downscaling of recruitment and SSB is levelling off (Figure 4.9.1).

4.10 Comparison with previous assessment and forecast

The assessment settings were according to the Stock Annex, with the change of using a catch-at-age for the interim year. The assessment this year is much in line with last year's assessment (Figure 4.10.1).

4.11 Management plans and evaluations

A management plan based on the fishing day system was implemented in 2021. The management plan comprises the fishery for cod, haddock and saithe on the Faroe Plateau. Longliners and small trawlers are regulated by the status of the cod and haddock stocks whereas the large single trawlers and pairtrawlers are regulated by the status of the saithe stock. The change in the allocated fishing days can be either −5%, 0% or +5% from one year to the next. Due to the management plan the fishery for cod, haddock and saithe on the Faroe Plateau was certified as sustainable by MSC in September 2021. In September 2022 cod lost the MSC-certification because the spawning-stock biomass was below B_{lim}. The management plan is not yet sent to ICES for evaluation.

4.12 Management considerations

The productivity of the Faroe Plateau cod stock seems to be less now than decades ago. It is stated in the management plan that if extraordinary situations arise there is an option to modify the management plan, although situations or actions are not explicitly specified. This could be relevant since the cod stock currently is very low and will likely stay low the next years. Cod and haddock are caught in a mixed fishery and managed by an effort management system. It might be a challenge for the fleets to avoid fishing cod while still fishing haddock. An evaluation of the management plan by Faroese authorities will be initiated in November 2023.

4.13 Ecosystem considerations

Regarding the ecosystem effects on fishing, this issue is partly addressed in the overview section for Faroese stocks. Although the fishery has changed substantially during the last century the total biomass of cod+haddock+saithe has fluctuated around the same level. However, the proportion of saithe has increased steadily over the period, whereas cod has decreased. This could indicate some effect of fishing on the ecosystem, although other factors cannot be ruled out.

4.14 Regulations and their effects

There seems to be a poor relationship between the number of used fishing days and the fishing mortality because of large fluctuations in catchability. Area restrictions may help to reduce fishing mortality, but they cause practical problems for the fishing fleets (e.g. high concentrations of vessels in certain areas).

4.15 Changes in fishing technology and fishing patterns

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

The fishing pattern in recent years has changed compared with previous years. The large longliners seem to have exploited the deep areas (> 200 m) to a larger extent (ling and tusk) because the catches in shallower waters of cod and haddock have been so poor – which was also observed at the beginning of the 1990s. They also have fished in other areas, e.g. in Greenland and on the Flemish Cap. This could reduce the fishing mortality on cod and haddock, but the small longliners and jiggers still exploit the shallow areas.

4.16 Changes in the environment

The primary production was low for a number of years, albeit high in 2008 to 2010 and in 2017, but it is not believed that this has any relationship with a change in the environment. Since 2002, the temperature has been about 1°C higher than in the 1990s, which may have had a negative effect on cod recruitment.

4.17 Tables

Table 4.2.1. Faroe Plateau cod (Subdivision 5.b.1). Nominal catch (t) by countries, as officially reported to ICES.

	Denmark	Faroe Islands	France	Germany	Iceland	Netherlands	Norway	Greenland	Portugal	UK	UK (Scotland)	Total
1986	8	34492	4	8			83	-		0	0	34595
1987	30	21303	17	12			21	-		8	0	21391
1988	10	22272	17	5			163	-		0	0	22467
1989	-	20535	-	7			285	-		0	0	20827
1990	-	12232	-	24			124	-		0	0	12380
1991	-	8203	-**	16			89	-		1	0	8309
1992	-	5938	3***	12			39	-		74	0	6066
1993	-	5744	1***	+			57	-		186	0	5988
1994	-	8724	-	2***			36	-		56	0	8818
1995	-	19079	2***	2			38	-		43	0	19164
1996	-	39406	1***	+			507	-		126	0	40040
1997	-	33556	-	+			410	-		61***	0	34027
1998	-	23308	-*	-			405	-		27***	0	23740
1999	-	19156	-*	39	-		450	-		51	0	19696
2000		0	1	2	-		374	-		18	0	395
2001		29762	9***	9	-		531	-		50	0	30361

	Denmark	Faroe Islands	France	Germany	Iceland	Netherlands	Norway	Greenland	Portugal	UK	UK (Scotland)	Total
2002		40602	20	6	5		573			42	0	41248
2003		30259	14	7	-		447	-		15	0	30742
2004		17540	2	3***			414		1	15	0	17975
2005		13556	-				201			24	0	13781
2006		11629	7	1***			49	5		0	0	11691
2007		9905	1***				71	7		0	360	10344
2008		9394	1				40			0	383	9818
2009		10736	1				14	7		0	300	11058
2010		13878	1				10			0	312	14206
2011		11348	-				0			0	0	11348
2012		8437	0		28		0			0	0	8466
2013		5331	0		20		0	2		0	0	5333
2014		6655					2			0	226	6883
2015		7812					33	14		0	367	8174
2016		6736					31	5		0	456	7232
2017		6215	2			0	16			0	388	6625
2018		13297	2			0	69			0	504	13872
2019		22282	1			0	219			0	233	22735

	Denmark	Faroe Islands	France	Germany	Iceland	Netherlands	Norway	Greenland	Portugal	UK	UK (Scotland)	Total
2020		10614	2			0	163			0	690	11470
2021		5875	3				65			0	0	5942
2022		4816*	2			0	26			0	751	5596

* Preliminary

** Included in 5.b.2

*** Reported as 5.b

Table 4.2.2. Faroe Plateau cod (Subdivision 5.b.1). Nominal catch (t) used in the assessment.

	Officially reported	Faroese catches				Reported as 5.b.2			Foreign catches				Used in the assessment
		in 5.b.1	Adjustment in 5.b.1	On Faroe-Iceland ridge	in 2.a within Faroe area jurisdiction	UK	UK (Scotland)	UK	French ***	Greenland ***	Russia ***	UK ***	
1986	34595												34595
1987	21391												21391
1988	22467				715								23182
1989	20827				1229				12				22068
1990	12380				1090	-	205		17				13692
1991	8309				351	-	90						8750
1992	6066				154		+ 176						6396
1993	5988						1 118						6107

	Officially reported	Faroese catches				Reported as 5.b.2			Foreign catches				Used in the assessment
		in 5.b.1	Adjustment in 5.b.1	On Faroe-Iceland ridge	in 2.a within Faroe area jurisdiction	UK	UK (Scotland)	UK	French ***	Greenland ***	Russia ***	UK ***	
1994	8818					1	227						9046
1995	19164	3330****				-	551						23045
1996	40040					-	382						40422
1997	34027					-	277						34304
1998	23740					-	265						24005
1999	19696			−661		-	210						19245
2000	395	21793*		−600		-	245						21833
2001	30361		−1766	−306		-	288						28577
2002	41248		−2409	−223		-	218	-				-	38834
2003	30742		−1795	−4034		-	254	-				-	25167
2004	17975		−1041	−4338		-	244	-				-	12840
2005	13781		−804	−3987			1129					-	10119
2006	11691		−690	−1435			278						9844
2007	10344		−588	−2304			53			6			7511
2008	9818		−557	−1978			32						7315
2009	11058		−637	−510			38			26	4		9979

	Officially reported	Faroese catches				Reported as 5.b.2			Foreign catches				Used in the assessment
		in 5.b.1	Adjustment in 5.b.1	On Faroe-Iceland ridge	in 2.a within Faroe area jurisdiction	UK	UK (Scotland)	UK	French ***	Greenland ***	Russia ***	UK ***	
2010	14206		−823	−680			54			5			12762
2011	11348		−673	−986						3			9692
2012	8466		−500	−766						5			7205
2013	5333		−316	−544							0		4473
2014	6883		−395	−777									5711
2015	8174		−460	−384									7329
2016	7232		−399	−958									5876
2017	6625		−369	−896									5360
2018	13872		−789	−869									12214
2019	22735		−1326	−804									20609
2020	11470		−630	−402									10438
2021	5942		−349	−182									5412
2022	5596*		−285	−444									4866

*** Preliminary**

**** In order to be consistent with procedures used previous years**

***** Reported to Faroese Coastal Guard**

****** expected misreporting/discard**

Table 4.2.4. Faroe Plateau cod (Subdivision 5.b.1). Catch in numbers-at-age per fleet in terminal year. Numbers are in thousands. LL<100: Longliners smaller than 100 GRT. LL>100: Longliners larger than 100 GRT.

	Numbers in thousands				Percent		
Age	LL < 100	LL > 100	Trawlers	Total	LL < 100	LL > 100	Trawlers
1	8.9	0	0.1	9			
2	328.8	15.8	13.5	358.1	92	4	4
3	279.9	49.6	26.5	356	79	14	7
4	333.5	112.4	34.8	480.6	69	23	7
5	239.9	106.1	59.5	405.6	59	26	15
6	35.6	28.4	23	87	41	33	26
7	15.3	10.3	5.2	30.8	50	33	17
8	5.7	7.3	2.5	15.5	37	47	16
9	8.7	7.4	0.6	16.7	52	44	4
10+	0	0	0.5	0.5	0	0	100
Sum	1256.3	337.3	166.2	1759.8	71	19	9

Table 4.2.5. Faroe Plateau cod (Subdivision 5.b.1). Number of samples, lengths, otoliths, and individual weights in year before the interim year.

Drift	Samples		Only lengths		Lengths and Weights		Otoliths	
	Q1-2	Q3-4	Q1-2	Q3-4	Q1-2	Q3-4	Q1-2	Q3-4
Open boats	0	1	0	0	0	174	0	60
Longliners < 100 GRT	0	4	0	0	0	701	0	220
Jiggers	1	0	0	0	69	0	60	0
Single trawlers < 400 HP	4	1	0	0	733	222	240	60
Single trawlers > 400 HP	0	0	0	0	0	0	0	0
Pair trawlers < 1000 HP	14	6	0	0	1952	768	837	362
Pair trawlers > 1000 HP	13	10	0	0	1792	1393	778	600
Longliners > 100 GRT	7	0	0	0	1186	0	397	0
Sum	39	22	0	0	5732	3258	2312	1302

Table 4.2.6. Faroe Plateau cod (Subdivision 5.b.1). Catch in numbers-at-age.

	Age									
Year	1	2	3	4	5	6	7	8	9	10+
1959	0	2002	4239	858	1731	200	207	50	10	0
1960	0	4728	4027	2574	513	876	171	131	61	0
1961	0	3093	2686	1331	1066	232	372	78	29	0
1962	0	4424	2500	1255	855	481	93	94	22	0
1963	0	4110	3958	1280	662	284	204	48	30	0
1964	0	2033	3021	2300	630	350	158	79	41	0
1965	0	852	3230	2564	1416	363	155	48	63	0
1966	0	1337	970	2080	1339	606	197	104	33	0
1967	0	1609	2690	860	1706	847	309	64	27	0
1968	0	1529	3322	2663	945	1226	452	105	11	0
1969	0	878	3106	3300	1538	477	713	203	92	0

	Age									
Year	1	2	3	4	5	6	7	8	9	10+
1970	0	402	1163	2172	1685	752	244	300	44	0
1971	0	328	757	821	1287	1451	510	114	179	0
1972	0	875	1176	810	596	1021	596	154	25	0
1973	0	723	3124	1590	707	384	312	227	120	97
1974	0	2161	1266	1811	934	563	452	149	141	91
1975	0	2584	5689	2157	2211	813	295	190	118	150
1976	0	1497	4158	3799	1380	1427	617	273	120	186
1977	0	425	3282	6844	3718	788	1160	239	134	9
1978	0	555	1219	2643	3216	1041	268	201	66	56
1979	0	575	1732	1673	1601	1906	493	134	87	38
1980	0	1129	2263	1461	895	807	832	339	42	18
1981	0	646	4137	1981	947	582	487	527	123	55
1982	0	1139	1965	3073	1286	471	314	169	254	122
1983	0	2149	5771	2760	2746	1204	510	157	104	102
1984	0	4396	5234	3487	1461	912	314	82	34	66
1985	0	998	9484	3795	1669	770	872	309	65	80
1986	0	210	3586	8462	2373	907	236	147	47	38
1987	0	257	1362	2611	3083	812	224	68	69	26
1988	0	509	2122	1945	1484	2178	492	168	33	25
1989	0	2237	2151	2187	1121	1026	997	220	61	9
1990	0	247	2892	1504	865	410	298	295	51	26
1991	0	192	451	2152	622	303	142	93	53	24
1992	0	205	455	466	911	293	132	53	30	34
1993	0	120	802	603	222	329	96	33	22	25
1994	0	573	788	1062	532	125	176	39	23	16
1995	0	2615	2716	2008	1012	465	118	175	44	49
1996	0	351	5164	4608	1542	1526	596	147	347	47
1997	0	200	1278	6710	3731	657	639	170	51	120

	Age									
Year	1	2	3	4	5	6	7	8	9	10+
1998	0	455	745	1558	5140	1529	159	118	28	25
1999	0	1246	1044	840	1164	2339	461	62	18	8
2000	0	2170	2737	811	443	700	840	108	8	1
2001	0	3967	3812	2130	373	372	728	443	36	6
2002	0	2099	7354	3405	1688	474	538	417	293	7
2003	0	697	2186	4696	1979	657	182	94	118	21
2004	0	98	673	1230	2051	717	234	63	41	36
2005	0	504	604	896	1146	841	208	41	19	31
2006	0	1110	1097	469	663	801	333	76	10	3
2007	0	506	1226	723	315	289	255	85	20	3
2008	0	287	761	783	430	187	157	156	57	19
2009	0	873	2262	861	618	296	85	55	43	17
2010	0	2114	2034	861	468	481	178	58	33	38
2011	0	328	2344	1234	365	188	126	50	19	2
2012	0	49	517	1347	555	200	99	69	25	22
2013	0	55	173	333	587	175	39	25	15	5
2014	0	387	517	286	499	350	86	14	9	1
2015	0	154	1026	517	208	280	219	46	23	7
2016	0	175	374	702	214	146	143	67	18	2
2017	0	112	280	333	438	151	75	41	24	8
2018	0	929	1026	717	541	476	94	60	36	4
2019	0	574	2163	1403	1238	925	238	36	23	9
2020	0	27	1634	1220	478	324	184	44	9	1
2021	0	41	386	754	314	118	55	20	7	1
2022	0	358	356	481	406	87	31	15	17	0
2023	0	55	552	377	355	269	73	16	5	3

Table 4.2.7. Faroe Plateau cod (Subdivision 5.b.1). Mean weight at age (kg) in the catches. Stock weights are set equal to catch weights.

	Age								
Year	2	3	4	5	6	7	8	9	10+
1959	0.850	1.730	3.230	4.400	5.800	6.370	7.340	7.880	10.270
1960	1.000	2.030	3.370	4.420	6.020	6.650	8.120	11.000	10.270
1961	1.080	2.220	3.450	4.690	5.520	7.090	9.910	8.030	10.270
1962	1.000	2.270	3.350	4.580	4.930	9.080	6.590	6.660	10.270
1963	1.040	1.940	3.510	4.600	5.500	6.780	8.710	11.720	10.820
1964	0.970	1.830	3.150	4.330	6.080	7.000	6.250	6.190	14.390
1965	0.920	1.450	2.570	3.780	5.690	7.310	7.930	8.090	11.110
1966	0.980	1.770	2.750	3.510	4.800	6.320	7.510	10.340	11.650
1967	0.960	1.930	3.130	4.040	4.780	6.250	7.000	11.010	10.690
1968	0.880	1.720	3.070	4.120	4.650	5.500	7.670	10.950	9.280
1969	1.090	1.800	2.850	3.670	4.890	5.050	7.410	8.660	14.390
1970	0.960	2.230	2.690	3.940	5.140	6.460	10.310	7.390	9.340
1971	0.810	1.800	2.980	3.580	3.940	4.870	6.480	6.370	10.220
1972	0.660	1.610	2.580	3.260	4.290	4.950	6.480	6.900	11.550
1973	1.110	2.000	3.410	3.890	5.100	5.100	6.120	8.660	7.570
1974	1.080	2.220	3.440	4.800	5.180	5.880	6.140	8.630	7.620
1975	0.790	1.790	2.980	4.260	5.460	6.250	7.510	7.390	8.170
1976	0.940	1.720	2.840	3.700	5.260	6.430	6.390	8.550	13.620
1977	0.870	1.790	2.530	3.680	4.650	5.340	6.230	8.380	10.720
1978	1.112	1.385	2.140	3.125	4.363	5.927	6.348	8.715	12.229
1979	0.897	1.682	2.211	3.052	3.642	4.719	7.272	8.368	13.042
1980	0.927	1.432	2.220	3.105	3.539	4.392	6.100	7.603	9.668
1981	1.080	1.470	2.180	3.210	3.700	4.240	4.430	6.690	10.000
1982	1.230	1.413	2.138	3.107	4.012	5.442	5.563	5.216	6.707
1983	1.338	1.950	2.403	3.107	4.110	5.020	5.601	8.013	8.031
1984	1.195	1.888	2.980	3.679	4.470	5.488	6.466	6.628	10.981
1985	0.905	1.658	2.626	3.400	3.752	4.220	4.739	6.511	10.981

	Age								
Year	2	3	4	5	6	7	8	9	10+
1986	1.099	1.459	2.046	2.936	3.786	4.699	5.893	9.700	8.815
1987	1.093	1.517	2.160	2.766	3.908	5.461	6.341	8.509	9.811
1988	1.061	1.749	2.300	2.914	3.109	3.976	4.896	7.087	8.287
1989	1.010	1.597	2.200	2.934	3.468	3.750	4.682	6.140	9.156
1990	0.945	1.300	1.959	2.531	3.273	4.652	4.758	6.704	8.689
1991	0.779	1.271	1.570	2.524	3.185	4.086	5.656	5.973	8.147
1992	0.989	1.364	1.779	2.312	3.477	4.545	6.275	7.619	9.725
1993	1.155	1.704	2.421	3.132	3.723	4.971	6.159	7.614	9.587
1994	1.194	1.843	2.613	3.654	4.584	4.976	7.146	8.564	8.796
1995	1.218	1.986	2.622	3.925	5.180	6.079	6.241	7.782	8.627
1996	1.016	1.737	2.745	3.800	4.455	4.978	5.270	5.593	7.482
1997	0.901	1.341	1.958	3.012	4.158	4.491	5.312	6.172	7.056
1998	1.004	1.417	1.802	2.280	3.478	5.433	5.851	7.970	8.802
1999	1.050	1.586	2.350	2.774	3.214	5.496	8.276	9.129	10.652
2000	1.416	2.170	3.187	3.795	4.048	4.577	8.182	11.895	13.009
2001	1.164	2.076	3.053	3.976	4.394	4.871	5.563	7.277	12.394
2002	1.017	1.768	2.805	3.529	4.095	4.475	4.650	6.244	7.457
2003	0.820	1.362	2.127	3.329	4.092	4.670	6.000	6.727	6.810
2004	1.037	1.154	1.693	2.363	3.830	5.191	6.326	7.656	9.573
2005	0.986	1.373	1.760	2.293	3.138	5.287	8.285	8.703	9.517
2006	0.839	1.304	1.988	2.386	3.330	4.691	7.635	9.524	11.990
2007	0.937	1.324	1.970	3.076	3.529	4.710	6.464	9.461	9.509
2008	1.209	1.478	2.104	2.714	3.804	4.669	5.915	7.233	9.559
2009	0.805	1.431	2.287	2.723	3.435	5.081	6.281	8.312	9.959
2010	1.049	1.642	2.400	3.212	3.678	4.774	5.973	7.094	9.800
2011	0.815	1.367	2.413	3.493	4.525	5.076	6.631	6.863	10.089
2012	1.007	1.315	1.893	3.102	4.279	5.573	5.871	7.482	9.206
2013	1.011	1.527	2.528	3.180	4.672	6.776	6.966	9.028	10.324

	Age								
Year	2	3	4	5	6	7	8	9	10+
2014	1.099	1.653	2.466	3.000	4.148	6.489	9.394	9.236	12.120
2015	1.198	1.733	2.769	3.650	4.403	5.768	8.035	10.334	11.127
2016	1.358	1.993	2.752	3.937	4.419	5.399	7.059	10.227	10.975
2017	1.281	2.162	3.051	4.042	4.985	5.650	7.407	9.172	10.882
2018	1.278	2.095	3.392	4.249	4.919	5.553	6.987	8.530	10.099
2019	1.328	2.123	3.408	4.292	4.956	5.663	7.009	8.817	10.393
2020	0.975	1.329	2.523	4.085	4.971	6.021	8.442	11.328	14.004
2021	1.016	1.880	2.993	4.183	4.977	6.007	6.458	9.447	10.151
2022	1.162	1.722	2.525	3.709	5.817	8.162	9.596	12.013	12.460
2023	0.971	1.539	2.217	3.137	4.715	7.429	9.944	10.833	12.553

Table 4.2.8. Faroe Plateau cod (Subdivision 5.b.1). Proportion mature at age. The average for 1983 to 1996 is used prior to 1983.

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1959	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1960	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1961	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1962	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1963	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1964	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1965	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1966	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1967	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1968	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1969	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1970	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1971	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1972	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1973	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1974	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1975	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1976	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1977	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1978	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1979	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1980	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1981	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1982	0.00	0.18	0.64	0.87	0.95	0.99	0.99	0.99	1.00	1.00
1983	0.00	0.03	0.71	0.93	0.94	1.00	1.00	1.00	1.00	1.00
1984	0.00	0.07	0.96	0.98	0.97	1.00	1.00	1.00	1.00	1.00
1985	0.00	0.00	0.50	0.96	0.96	1.00	1.00	1.00	1.00	1.00
1986	0.00	0.00	0.38	0.93	1.00	1.00	0.96	0.94	1.00	1.00
1987	0.00	0.00	0.67	0.91	1.00	1.00	1.00	1.00	1.00	1.00
1988	0.00	0.06	0.72	0.90	0.97	1.00	1.00	1.00	1.00	1.00
1989	0.00	0.05	0.54	0.98	1.00	1.00	1.00	1.00	1.00	1.00
1990	0.00	0.00	0.68	0.90	0.99	0.96	0.98	1.00	1.00	1.00
1991	0.00	0.00	0.72	0.86	1.00	1.00	1.00	1.00	1.00	1.00
1992	0.00	0.06	0.50	0.82	0.98	1.00	1.00	1.00	1.00	1.00
1993	0.00	0.03	0.73	0.78	0.91	0.99	1.00	1.00	1.00	1.00
1994	0.00	0.05	0.33	0.88	0.96	1.00	0.96	1.00	1.00	1.00
1995	0.00	0.09	0.35	0.33	0.66	0.97	1.00	1.00	1.00	1.00
1996	0.00	0.04	0.43	0.74	0.85	0.94	1.00	1.00	1.00	1.00
1997	0.00	0.00	0.64	0.91	0.97	1.00	1.00	1.00	1.00	1.00
1998	0.00	0.00	0.62	0.90	0.99	0.99	1.00	1.00	1.00	1.00
1999	0.00	0.02	0.43	0.88	0.98	1.00	1.00	1.00	1.00	1.00
2000	0.00	0.02	0.39	0.69	0.92	0.99	1.00	1.00	1.00	1.00
2001	0.00	0.07	0.47	0.86	0.94	1.00	1.00	1.00	1.00	1.00

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
2002	0.00	0.04	0.37	0.76	0.97	0.93	0.97	1.00	1.00	1.00
2003	0.00	0.00	0.29	0.79	0.88	0.98	1.00	1.00	1.00	1.00
2004	0.00	0.00	0.51	0.78	0.92	0.89	0.87	1.00	1.00	1.00
2005	0.00	0.05	0.66	0.90	0.93	0.98	0.92	1.00	1.00	1.00
2006	0.00	0.04	0.59	0.80	0.99	0.99	1.00	1.00	1.00	1.00
2007	0.00	0.00	0.47	0.78	0.91	0.99	0.97	1.00	1.00	1.00
2008	0.00	0.10	0.78	0.91	0.90	0.95	1.00	1.00	1.00	1.00
2009	0.00	0.09	0.61	0.81	0.96	0.94	0.96	1.00	1.00	1.00
2010	0.00	0.08	0.61	0.77	0.94	0.97	1.00	1.00	1.00	1.00
2011	0.00	0.06	0.51	0.69	0.84	0.93	0.98	1.00	1.00	1.00
2012	0.00	0.00	0.63	0.85	0.94	0.97	1.00	1.00	1.00	0.83
2013	0.00	0.24	0.82	0.95	0.98	1.00	1.00	1.00	1.00	1.00
2014	0.00	0.24	0.73	0.98	1.00	1.00	1.00	1.00	1.00	1.00
2015	0.00	0.28	0.48	0.70	0.95	0.97	1.00	1.00	1.00	1.00
2016	0.00	0.21	0.89	0.91	0.97	1.00	1.00	1.00	1.00	1.00
2017	0.00	0.10	0.73	0.98	0.98	0.97	1.00	1.00	1.00	1.00
2018	0.00	0.14	0.64	0.78	0.94	0.95	0.91	0.92	1.00	1.00
2019	0.00	0.07	0.55	0.83	0.98	0.97	1.00	1.00	1.00	1.00
2020	0.00	0.07	0.45	0.74	0.93	1.00	1.00	1.00	1.00	1.00
2021	0.00	0.03	0.69	0.81	0.94	1.00	0.96	1.00	1.00	1.00
2022	0.00	0.03	0.68	0.97	0.98	0.99	1.00	1.00	1.00	1.00
2023	0.00	0.11	0.57	0.93	0.97	1.00	1.00	1.00	1.00	1.00

Table 4.2.9. Faroe Plateau cod (Subdivision 5.b.1). Summer survey tuning series (number of individuals per 200 stations) and spring survey tuning series (number of individuals per 100 stations) used as tuning series in the assessment model. Zero values were disregarded by the assessment model.

Year	Effort	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9
1996	200	39.0	724.2	6568.0	3719.9	1298.6	700.2	232.4	48.4	75.5
1997	200	55.0	514.5	1476.6	6647.4	1445.9	177.0	138.1	30.6	1.4
1998	200	411.5	529.2	507.9	981.8	3677.1	901.0	49.6	36.5	17.8

Year	Effort	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9
1999	200	121.7	374.3	1257.2	752.3	676.4	1419.0	236.8	40.0	10.0
2000	200	461.6	1374.3	1151.0	672.7	310.5	436.6	601.2	36.5	7.6
2001	200	212.2	3442.3	2446.6	1534.3	417.2	237.4	282.9	242.7	30.9
2002	200	737.1	2368.2	5574.6	1812.6	811.5	149.2	84.3	69.9	49.9
2003	200	68.3	357.4	1038.0	2211.5	566.0	123.7	17.7	12.0	18.4
2004	200	204.1	451.8	839.2	1081.3	1547.3	344.3	80.1	25.6	21.6
2005	200	218.8	616.3	736.6	871.7	1167.8	754.8	142.4	44.7	12.7
2006	200	133.5	980.1	689.3	348.3	311.5	256.3	122.8	28.0	15.5
2007	200	85.6	233.2	449.5	314.0	179.7	134.8	75.8	30.8	12.7
2008	200	181.6	70.3	370.6	328.0	400.6	159.8	52.5	27.8	33.3
2009	200	612.4	435.5	1975.0	821.1	552.9	392.3	131.5	47.2	37.6
2010	200	269.1	1247.8	1551.3	1008.4	363.2	244.2	148.9	41.8	34.2
2011	200	7.1	302.8	1374.7	1083.8	380.7	160.7	105.0	37.4	14.1
2012	200	40.9	22.2	231.1	1080.5	512.6	88.3	35.7	19.2	4.7
2013	200	394.5	105.1	205.3	209.3	888.9	541.5	104.3	44.3	30.9
2014	200	14.4	644.0	866.2	357.9	357.6	400.8	124.0	36.8	22.2
2015	200	205.8	233.0	2236.9	1694.9	412.5	361.1	241.6	66.8	15.8
2016	200	205.6	590.4	838.8	1849.4	693.1	146.5	142.7	73.2	14.6
2017	200	708.3	831.3	997.4	1591.2	1636.3	361.0	129.7	65.0	17.8
2018	200	980.3	982.0	779.4	781.5	502.9	409.8	105.8	27.7	19.8
2019	200	234.0	743.9	922.9	801.5	437.6	276.2	123.4	36.3	16.6
2020	200	83.6	164.6	857.0	685.5	212.3	86.0	48.6	29.6	4.5
2021	200	114.4	102.9	136.6	485.8	211.2	62.0	20.2	15.3	9.1
2022	200	33.9	279.5	198.9	181.7	186.1	47.8	21.3	17.3	4.1
2023	200	23.8	114.2	311.8	111.0	105.3	107.1	36.1	15.7	5.3

Year	Effort (hours)	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9
1994	100	7.8	611.1	336.9	915.0	509.3	130.1	187.3	29.0	0.0
1995	100	4.4	628.7	848.3	1524.9	1518.4	1200.4	282.5	348.3	49.5

Year	Effort (hours)	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9
1996	100	0.0	216.6	4042.0	3986.7	1889.7	1374.3	421.6	83.2	169.2
1997	100	2.1	74.9	841.6	5395.5	2362.7	332.6	225.4	57.4	4.9
1998	100	1.2	69.5	422.0	1568.5	4928.3	1136.3	82.0	40.6	35.0
1999	100	10.7	708.4	676.9	991.9	1227.7	2085.0	253.4	25.0	13.6
2000	100	2.0	321.5	1433.1	747.1	442.1	507.8	838.6	64.5	1.6
2001	100	1.4	945.3	2381.3	1992.4	456.6	323.9	576.9	125.2	5.3
2002	100	0.2	397.1	4559.4	2896.1	1578.3	330.5	230.8	177.9	130.7
2003	100	0.0	91.4	723.4	3915.6	1263.7	531.3	68.5	52.3	39.8
2004	100	0.5	629.8	581.8	846.8	1178.8	295.0	66.5	22.4	12.0
2005	100	0.0	382.1	440.3	1151.8	1442.4	839.5	140.1	14.0	3.8
2006	100	1.1	167.7	156.5	177.0	360.1	292.6	94.7	15.4	4.0
2007	100	0.0	41.7	271.8	286.2	154.8	170.4	105.1	38.6	14.8
2008	100	5.6	174.0	464.9	832.6	469.8	149.4	83.2	39.4	13.5
2009	100	73.7	309.3	470.5	980.0	1162.5	427.1	73.4	31.8	24.8
2010	100	36.9	699.5	1316.9	747.7	539.3	381.2	99.1	41.4	17.4
2011	100	0.0	149.5	1318.6	1241.6	562.7	300.4	237.4	84.8	21.8
2012	100	0.0	1.4	273.2	1301.5	327.5	73.7	27.1	23.9	6.2
2013	100	3.5	65.2	379.6	1694.7	2055.9	297.3	32.6	22.6	17.5
2014	100	1.0	143.6	126.2	160.3	421.2	333.2	74.8	21.9	13.4
2015	100	0.0	22.5	532.4	226.5	193.9	304.9	138.9	32.6	8.0
2016	100	6.2	82.7	279.3	697.0	152.2	73.7	77.4	27.2	7.7
2017	100	26.6	109.4	529.0	695.0	1085.1	136.0	56.3	31.7	10.3
2018	100	22.7	592.3	923.6	1002.7	730.6	714.4	155.0	50.8	35.3
2019	100	39.0	352.1	1080.5	760.0	555.5	350.7	187.4	20.2	14.2
2020	100	0.2	11.2	676.7	728.7	306.2	147.2	76.2	36.1	4.1
2021	100	35.3	84.6	224.7	629.1	242.9	86.8	17.3	9.5	4.8
2022	100	2.0	66.3	85.6	223.6	188.6	49.8	14.9	8.1	3.5
2023	100	56.1	114.5	178.2	94.0	183.1	80.9	17.6	2.9	0.2

Table 4.2.10. Faroe Plateau cod (Subdivision 5.b.1). Pairtrawler abundance index (number of individuals per 1000 fishing hours). This series was not used in the tuning in the assessment model. The season is June–December. The otoliths are selected from deep (> 150 m) locations.

Year	Age							
	2	3	4	5	6	7	8	9
1989	1353	1848	2011	1558	1046	810	335	219
1990	135	3308	2382	966	538	485	231	0
1991	10	193	1831	1135	431	294	85	121
1992	120	695	993	1762	1084	504	184	89
1993	66	1400	2840	967	1376	515	87	138
1994	1671	2709	1853	2809	887	1579	586	67
1995	689	4350	6180	5012	3305	648	644	127
1996	461	20234	31822	15231	8412	370	0	1380
1997	36	874	7830	12157	3129	1224	146	0
1998	85	775	1912	6294	5195	848	303	0
1999	505	2369	2200	3423	5844	2526	248	5
2000	5779	6575	2886	1588	1666	2815	634	0
2001	3447	6825	3065	565	423	812	878	26
2002	618	6938	5433	1337	468	433	45	247
2003	106	2264	7512	6129	1469	456	257	246
2004	44	0	522	4746	5302	3246	513	345
2005	71	686	1125	3033	3729	1476	255	120
2006	143	207	1074	1160	2428	941	1209	109
2007	60	852	1643	1294	745	610	192	43
2008	49	264	374	512	345	407	435	162
2009	18	1203	1313	1240	735	406	241	171
2010	3310	6122	3751	1140	1264	399	0	170
2011	44	2948	8082	3899	1232	873	189	49
2012	0	183	2967	3466	1841	431	78	206
2013	73	214	1590	3308	1401	216	119	76
2014	423	2363	1457	2447	2625	690	136	146
2015	51	1152	2316	1214	1419	1294	382	115

Year	Age							
	2	3	4	5	6	7	8	9
2016	159	594	2726	1863	1108	845	443	216
2017	553	1374	2996	5174	1965	967	756	497
2018	2167	4214	6745	6739	5127	2199	616	257
2019	3997	9468	4132	2223	624	159	15	10
2020	65	2021	3827	1550	599	323	152	46
2021	180	957	3702	2661	461	193	21	0
2022	998	1578	1852	2626	755	122	35	3

Table 4.2.11. Faroe Plateau cod (Subdivision 5.b.1). Longliner abundance index (number of individuals per 100 000 hooks). This series was not used in the tuning in the assessment model. The age composition was obtained from all longliners > 100 GRT. The area was restricted to the area west of Faroe Islands at depths between 100 and 200 m.

Year	Age							
	1	2	3	4	5	6	7	8
1993	405	2610	9306	3330	806	2754	847	258
1994	101	8105	14105	7863	4659	962	1187	71
1995	0	15249	23062	2895	2505	1568	708	1073
1996	0	2269	18658	13265	4153	8435	4513	1147
1997	0	1738	5837	26368	18089	2805	2807	402
1998	1892	4490	2025	2565	11738	2732	131	19
1999	849	10968	3811	985	1891	3759	548	109
2000	2695	10983	6710	998	780	1473	2136	109
2001	287	12999	7409	2660	515	1135	1808	2545
2002	105	6862	20902	10819	7759	1561	1945	1265
2003	16	2099	6057	15910	7778	1830	708	650
2004	59	510	1773	2438	3214	1059	293	71
2005	297	2169	1543	2313	2327	1360	170	13
2006	151	5813	5319	674	2205	2352	1148	56
2007	274	3578	6383	2778	1927	1159	1118	134
2008	1270	2243	4449	4773	2564	1133	816	716
2009	294	2670	15107	6308	3028	2491	683	132

Year	Age							
	1	2	3	4	5	6	7	8
2010	23	20287	16914	8733	2595	4780	1878	864
2011	160	2817	28218	14391	4295	2207	1252	195
2012	0	1833	9562	8309	2364	1296	403	197
2013	0	52	209	2887	5132	2654	1222	359
2014	93	5898	9602	4695	4398	3475	1289	116
2015	0	1260	10417	8202	3167	3342	2428	414
2016	157	1790	3118	5109	1985	873	1370	1548
2017	584	1624	1700	1255	1073	743	462	553
2018	0	3690	8057	7624	6613	7832	1836	1899
2019	0	5430	15027	7622	6057	2776	698	73
2020	0	356	5698	5857	2203	1782	978	460
2021	23	1195	3509	4806	1942	981	600	275
2022	187	3035	2633	3871	3123	692	261	186

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

Year	Age							
	1	2	3	4	5	6	7	8
1983	0.9	7.5	4.7	3.8	1.6	0.9	0.5	0.2
1984	0.0	33.3	32.1	13.2	5.8	6.3	1.0	0.7
1985	0.0	3.7	50.1	35.0	25.3	14.1	19.6	5.8
1986	0.0	5.6	41.6	24.0	15.3	6.8	6.2	2.2
1987	0.0	6.8	11.3	16.6	27.5	12.4	5.3	0.9
1988	0.0	3.1	6.4	13.0	8.5	19.1	6.5	2.6
1989	0.1	43.7	21.3	20.5	13.9	7.5	16.1	2.2
1990	0.0	7.9	40.3	8.6	12.2	6.5	7.7	4.2
1991	0.0	0.0	5.2	27.0	8.7	3.9	2.4	0.7
1992	0.0	6.2	17.1	6.9	3.9	3.6	1.8	1.4
1993	0.4	4.6	19.2	7.3	1.4	1.3	0.3	1.3

Year	Age							
	1	2	3	4	5	6	7	8
1994	0.1	14.9	18.4	15.4	6.6	2.1	2.6	0.5
1995	0.0	53.6	47.8	12.2	8.4	5.1	2.0	3.1
1996	0.0	5.9	76.2	52.1	13.1	28.8	14.3	4.2
1997	0.0	4.6	16.6	71.8	54.5	7.9	7.6	0.9
1998	5.8	12.1	5.6	8.2	33.1	9.9	0.4	0.4
1999	0.3	29.2	10.0	4.7	7.0	15.9	2.5	0.1
2000	9.6	40.4	23.5	1.3	1.3	2.4	4.2	0.5
2001	0.6	96.6	48.7	17.1	3.0	5.7	12.6	12.9
2002	0.1	47.6	97.2	43.4	30.0	7.3	11.5	6.8
2003	0.0	17.5	37.4	106.4	59.1	12.9	4.1	1.5
2004	0.0	7.0	21.5	21.0	31.1	8.2	0.3	0.0
2005	0.6	14.7	20.5	18.5	32.9	15.6	1.5	0.0
2006	2.0	58.7	47.0	9.1	10.6	13.6	4.1	0.4
2007	0.2	11.2	23.2	8.9	4.2	4.9	3.5	0.6
2008	0.3	3.4	16.2	21.1	14.4	3.3	1.5	2.1
2009	3.1	33.3	154.6	57.5	33.9	23.5	9.6	5.9
2010	2.6	135.7	147.1	62.4	27.3	28.5	8.5	1.8
2011	0.0	19.7	156.5	65.0	25.2	15.6	8.5	1.9
2012	0.3	4.6	39.3	59.0	15.1	5.2	2.6	1.3
2013	1.2	16.6	23.8	63.6	58.0	7.8	2.9	0.0
2014	2.1	103.4	102.0	46.9	27.3	17.1	1.4	0.0
2015	0.9	25.4	148.6	65.3	23.0	17.9	10.7	0.7
2016	3.2	30.5	40.6	36.9	7.8	4.9	5.6	0.0
2017	14.6	41.2	36.0	18.8	11.6	2.1	0.1	0.0
2018	1.2	126.1	86.6	40.4	25.1	27.8	6.5	9.3
2019	0.0	60.5	148.2	83.0	63.4	46.5	7.8	1.0
2020	0.0	3.1	49.8	51.2	19.3	15.6	8.6	4.0
2021	0.2	8.8	25.8	35.3	14.3	7.2	4.4	2.0

Year	Age							
	1	2	3	4	5	6	7	8
2022	1.5	25.0	21.7	31.9	25.8	5.7	2.2	1.5

Table 4.5.1. Faroe Plateau cod (Subdivision 5.b.1). EQSIM settings for calculations of reference points at NWWG 2022.

Setting	Value
stockName	Cod.27.5b1
SAOAssessment	Cod_27_5b1
sigmaF	0.2
sigmaSSB	0.2
noSims	1001
SRused	Segreg_Ricker_Bevholt
SRyears_min	1959
SRyears_max	2021
acfRecLag1 (autocorrelation in recruitment)	0.56
rhoRec (simulate autocorrelation for recruitment)	FALSE
numAvgYrsB (biology years)	5
numAvgYrsS (selectivity years)	10
cvF (advice uncertainty)	0.212
phiF (advice uncertainty autocorrelation)	0.423

Table 4.5.2. Faroe Plateau cod (Subdivision 5.b.1). Results of reference point calculations from the NWWG 2022 assessment compared with the previous values.

Framework	Reference point	OLD Value	NEW Value	Technical basis
MSY approach	MSY $B_{trigger}$	29 226 t	24 739 t	B_{lim}*exp(1.645*sigma) where sigma=0.20
	F_{MSY}	0.23	0.37	Stochastic simulations assuming segmented regression, Ricker and Beverton and Holt stock recruitment relationships.
Precautionary approach	B_{lim}	21 000 t	17 803 t	B_{loss} in 1992 from the 2022 assessment.
	B_{pa}	29 226 t	24 739 t	B_{lim}*exp(1.645*sigma) where sigma = 0.20
	F_{lim}	0.90	1.47	F that, gives a 50% probability of SSB > B_{lim}, from Stochastic simulations
	F_{pa}	0.41	0.69	F that, gives a 95% probability of SSB > B_{lim}, from Stochastic simulations

Table 4.6.1. Faroe Plateau cod (Subdivision 5.b.1). Configuration in the SAM-run and the model parameters.

```
> conf
$minAge
[1] 1

$maxAge
[1] 10

$maxAgePlusGroup
[1] 1

$keyLogFsta
     [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
[1,]   -1    0    1    2    3    4    5    5    5     6
[2,]   -1   -1   -1   -1   -1   -1   -1   -1   -1    -1
[3,]   -1   -1   -1   -1   -1   -1   -1   -1   -1    -1

$corFlag
[1] 2

$keyLogFpar
     [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
[1,]   -1   -1   -1   -1   -1   -1   -1   -1   -1    -1
```

```
[2,]    0    1    2    3    4    5    6    7    7    -1
[3,]    8    9   10   11   12   13   14   15   15    -1

$keyQpow
     [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
[1,]   -1   -1   -1   -1   -1   -1   -1   -1   -1    -1
[2,]   -1   -1   -1   -1   -1   -1   -1   -1   -1    -1
[3,]   -1   -1   -1   -1   -1   -1   -1   -1   -1    -1

$keyVarF
     [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
[1,]    -1    1    0    0    0    0    0    0    0     0
[2,]   -1   -1   -1   -1   -1   -1   -1   -1   -1    -1
[3,]   -1   -1   -1   -1   -1   -1   -1   -1   -1    -1

$keyVarLogN
[1] 0 1 1 1 1 1 1 1 1

$keyVarObs
     [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
[1,]    -1    0    0    0    0    0    0    0    0     5
[2,]    1    2    2    2    2    2    2    2    2    -1
[3,]    3    4    4    4    4    4    4    4    4    -1

$obsCorStruct
[1] ID AR ID
Levels: ID AR US

$keyCorObs
     1-2 2-3 3-4 4-5 5-6 6-7 7-8 8-9 9-10
[1,]  NA  NA  NA  NA  NA  NA  NA  NA   NA
[2,]   0   0   0   0   0   0   0   0   -1
[3,]  NA  NA  NA  NA  NA  NA  NA  NA   -1

$stockRecruitmentModelCode
[1] 0
```

```
$noScaledYears
[1] 0

$keyScaledYears
numeric(0)

$keyParScaledYA
<0 x 0 matrix>

$fbarRange
[1] 3 7

$keyBiomassTreat
[1] -1 -1 -1

$obsLikelihoodFlag
[1] LN LN LN
Levels: LN ALN

$fixVarToWeight
[1] 0
```

Table of model parameters:

Parameter name	par	sd(par)	exp(par)	Low	High
logFpar_0	-9.034	0.204	0.000	0.000	0.000
logFpar_1	-7.733	0.112	0.000	0.000	0.001
logFpar_2	-6.678	0.109	0.001	0.001	0.002
logFpar_3	-6.179	0.108	0.002	0.002	0.003
logFpar_4	-5.960	0.107	0.003	0.002	0.003
logFpar_5	-5.898	0.106	0.003	0.002	0.003
logFpar_6	-5.885	0.108	0.003	0.002	0.003
logFpar_7	-5.841	0.109	0.003	0.002	0.004
logFpar_8	-12.081	0.405	0.000	0.000	0.000
logFpar_9	-8.306	0.130	0.000	0.000	0.000
logFpar_10	-6.685	0.126	0.001	0.001	0.002

Parameter name	par	sd(par)	exp(par)	Low	High
logFpar_11	−5.780	0.125	0.003	0.002	0.004
logFpar_12	−5.458	0.125	0.004	0.003	0.005
logFpar_13	−5.451	0.124	0.004	0.003	0.006
logFpar_14	−5.591	0.125	0.004	0.003	0.005
logFpar_15	−5.905	0.097	0.003	0.002	0.003
logSdLogFsta_0	−1.221	0.087	0.295	0.248	0.351
logSdLogFsta_1	−0.455	0.117	0.634	0.501	0.802
logSdLogN_0	−0.411	0.112	0.663	0.530	0.830
logSdLogN_1	−1.758	0.117	0.172	0.136	0.218
logSdLogObs_0	−1.797	0.099	0.166	0.136	0.202
logSdLogObs_1	0.024	0.138	1.024	0.777	1.350
logSdLogObs_2	−0.634	0.074	0.530	0.457	0.615
logSdLogObs_3	0.649	0.152	1.913	1.411	2.593
logSdLogObs_4	−0.414	0.049	0.661	0.599	0.729
logSdLogObs_5	−0.104	0.117	0.901	0.713	1.140

Model	log(L)	#par	AIC
Current	−885.52	28	1827.05
base	−885.52	28	1827.05

Table 4.6.2. Faroe Plateau cod (Subdivision 5.b.1). Fishing mortality-at-age from the SAM model.

Year / Age	1	2	3	4	5	6	7	8	9	10
1959		0.205	0.471	0.481	0.528	0.461	0.517	0.517	0.517	0.290
1960		0.435	0.635	0.638	0.711	0.706	0.837	0.837	0.837	0.437
1961		0.319	0.519	0.541	0.635	0.646	0.759	0.759	0.759	0.402
1962		0.281	0.471	0.521	0.616	0.591	0.602	0.602	0.602	0.330
1963		0.239	0.412	0.482	0.551	0.537	0.528	0.528	0.528	0.295
1964		0.139	0.323	0.431	0.535	0.581	0.614	0.614	0.614	0.336
1965		0.123	0.299	0.417	0.541	0.608	0.667	0.667	0.667	0.360
1966		0.085	0.238	0.340	0.477	0.626	0.848	0.848	0.848	0.441

Year Age	1	2	3	4	5	6	7	8	9	10
1967		0.085	0.235	0.328	0.445	0.579	0.766	0.766	0.766	0.405
1968		0.097	0.256	0.369	0.462	0.531	0.613	0.613	0.613	0.336
1969		0.108	0.273	0.397	0.487	0.603	0.742	0.742	0.742	0.395
1970		0.061	0.209	0.310	0.377	0.488	0.587	0.587	0.587	0.324
1971		0.038	0.170	0.268	0.364	0.536	0.649	0.649	0.649	0.354
1972		0.047	0.174	0.255	0.319	0.438	0.467	0.467	0.467	0.269
1973		0.067	0.205	0.283	0.322	0.384	0.439	0.439	0.439	0.258
1974		0.069	0.193	0.269	0.327	0.401	0.471	0.471	0.471	0.270
1975		0.097	0.255	0.378	0.443	0.481	0.544	0.544	0.544	0.299
1976		0.078	0.242	0.399	0.526	0.593	0.748	0.748	0.748	0.376
1977		0.062	0.263	0.488	0.666	0.744	0.936	0.936	0.936	0.422
1978		0.052	0.232	0.399	0.494	0.535	0.640	0.640	0.640	0.300
1979		0.050	0.247	0.410	0.489	0.533	0.609	0.609	0.609	0.281
1980		0.055	0.256	0.389	0.452	0.502	0.581	0.581	0.581	0.263
1981		0.055	0.268	0.394	0.466	0.534	0.651	0.651	0.651	0.291
1982		0.054	0.263	0.382	0.443	0.508	0.663	0.663	0.663	0.295
1983		0.105	0.398	0.589	0.687	0.784	0.978	0.978	0.978	0.402
1984		0.097	0.377	0.544	0.579	0.586	0.650	0.650	0.650	0.281
1985		0.062	0.352	0.587	0.707	0.886	1.088	1.088	1.088	0.428
1986		0.033	0.295	0.545	0.637	0.755	0.800	0.800	0.800	0.323
1987		0.030	0.252	0.453	0.496	0.589	0.644	0.644	0.644	0.261
1988		0.065	0.328	0.579	0.616	0.746	0.832	0.832	0.832	0.314
1989		0.150	0.428	0.757	0.811	0.945	1.043	1.043	1.043	0.368
1990		0.080	0.317	0.620	0.708	0.812	0.915	0.915	0.915	0.330
1991		0.042	0.217	0.464	0.547	0.621	0.675	0.675	0.675	0.256
1992		0.024	0.153	0.344	0.432	0.507	0.568	0.568	0.568	0.220
1993		0.015	0.115	0.239	0.289	0.323	0.377	0.377	0.377	0.154
1994		0.026	0.128	0.245	0.274	0.287	0.325	0.325	0.325	0.133
1995		0.061	0.187	0.356	0.384	0.405	0.456	0.456	0.456	0.173

Year Age	1	2	3	4	5	6	7	8	9	10
1996		0.045	0.202	0.456	0.675	0.890	1.155	1.155	1.155	0.361
1997		0.046	0.209	0.446	0.736	1.096	1.526	1.526	1.526	0.431
1998		0.074	0.234	0.413	0.600	0.873	1.202	1.202	1.202	0.320
1999		0.107	0.267	0.401	0.494	0.695	1.041	1.041	1.041	0.253
2000		0.120	0.288	0.368	0.374	0.460	0.651	0.651	0.651	0.152
2001		0.134	0.318	0.409	0.409	0.493	0.687	0.687	0.687	0.150
2002		0.195	0.422	0.616	0.743	0.903	1.151	1.151	1.151	0.218
2003		0.130	0.365	0.574	0.780	0.953	1.065	1.065	1.065	0.194
2004		0.035	0.217	0.376	0.613	0.895	1.101	1.101	1.101	0.190
2005		0.091	0.292	0.421	0.589	0.807	0.939	0.939	0.939	0.157
2006		0.154	0.358	0.456	0.594	0.767	0.816	0.816	0.816	0.129
2007		0.116	0.327	0.405	0.476	0.586	0.628	0.628	0.628	0.099
2008		0.070	0.290	0.381	0.450	0.587	0.712	0.712	0.712	0.107
2009		0.140	0.429	0.513	0.534	0.602	0.613	0.613	0.613	0.090
2010		0.186	0.472	0.606	0.685	0.815	0.799	0.799	0.799	0.106
2011		0.096	0.358	0.508	0.596	0.698	0.672	0.672	0.672	0.083
2012		0.053	0.270	0.435	0.603	0.801	0.815	0.815	0.815	0.091
2013		0.025	0.175	0.275	0.376	0.466	0.464	0.464	0.464	0.052
2014		0.058	0.239	0.358	0.446	0.490	0.430	0.430	0.430	0.044
2015		0.064	0.244	0.377	0.483	0.641	0.691	0.691	0.691	0.062
2016		0.044	0.188	0.282	0.373	0.552	0.628	0.628	0.628	0.053
2017		0.023	0.140	0.210	0.293	0.456	0.513	0.513	0.513	0.042
2018		0.092	0.306	0.418	0.526	0.769	0.821	0.821	0.821	0.057
2019		0.098	0.497	0.840	1.095	1.381	1.276	1.276	1.276	0.075
2020		0.026	0.374	0.770	1.066	1.338	1.252	1.252	1.252	0.066
2021		0.028	0.308	0.573	0.747	0.845	0.783	0.783	0.783	0.041
2022		0.075	0.379	0.652	0.761	0.797	0.842	0.842	0.842	0.041
2023		0.033	0.303	0.684	0.948	1.055	1.099	1.099	1.099	0.052

Table 4.6.3. Faroe Plateau cod (Subdivision 5.b.1). Stock number-at-age from the SAM model.

Year	1	2	3	4	5	6	7	8	9	10
1959	17258	12454	12070	2425	4270	631	519	163	27	0
1960	15807	14214	8734	6018	1208	1896	348	233	97	14
1961	23693	12518	7316	3698	2568	530	708	141	70	42
1962	24550	19888	7262	3494	1836	1143	246	232	54	49
1963	20892	20369	12628	3605	1727	758	515	133	91	53
1964	10939	17676	12716	6902	1739	838	344	233	80	76
1965	21134	8199	13356	7766	3539	835	380	131	121	80
1966	25697	17853	5518	8355	4051	1547	356	174	59	97
1967	21480	21579	13721	3664	5315	2095	680	113	58	72
1968	11717	18102	16478	8818	2431	3116	974	283	33	61
1969	9567	9335	13791	10827	4595	1212	1600	392	156	51
1970	12806	7576	6573	8492	6051	2250	555	722	128	89
1971	23303	10270	5674	4052	4765	3557	1167	237	372	112
1972	16607	20327	8459	4075	2502	2613	1649	516	86	230
1973	38510	12554	16387	6374	2775	1540	1086	769	316	195
1974	36837	33474	9087	9859	3842	1735	1050	515	408	293
1975	24702	30892	25157	6712	6591	2327	925	514	283	390
1976	11221	20764	23642	14094	3644	3598	1207	522	243	358
1977	14067	8578	15143	17555	7684	1683	1750	451	221	271
1978	16812	11554	6880	8898	9145	2934	644	503	148	215
1979	26219	13519	8575	4979	4616	4797	1371	285	212	192
1980	17550	22729	10813	5159	2736	2234	2290	700	115	209
1981	27726	13559	18141	6909	2802	1467	1065	1166	301	188
1982	30827	23246	10163	10922	3998	1419	688	417	536	251
1983	53031	24505	17958	6786	6053	2242	761	275	179	380
1984	22621	47710	18109	9114	3277	2484	826	216	81	265
1985	10355	18432	35362	10097	4008	1429	1257	406	99	200
1986	11703	7976	14220	20510	4965	1687	460	336	101	133
1987	11335	9682	6761	7964	9081	2079	607	159	140	115

Year	1	2	3	4	5	6	7	8	9	10
1988	17284	9000	7955	4639	3870	4462	957	291	66	129
1989	5008	15832	6806	4618	2194	1769	1686	349	103	98
1990	6419	3708	11066	3602	1801	822	563	478	97	88
1991	11151	5148	2650	6170	1596	712	316	193	136	86
1992	11854	9438	3981	1727	2880	751	305	139	78	116
1993	27821	9199	7785	3144	973	1405	341	125	71	117
1994	44812	23365	7532	5599	2301	580	826	179	68	124
1995	12228	41752	18104	6152	3834	1587	380	599	121	133
1996	6377	9618	32141	13170	3319	2525	954	216	415	153
1997	7902	5224	7520	21967	7109	1139	892	261	53	188
1998	15491	6765	4008	5245	12039	2748	290	159	48	102
1999	24901	12963	5218	2794	3255	5281	811	87	34	67
2000	36648	20890	10457	2964	1603	2034	2174	214	22	49
2001	15254	33949	14748	6554	1470	1066	1377	957	82	44
2002	7414	13058	23378	8308	3425	851	680	634	427	63
2003	4794	5994	8072	11719	3682	1200	297	176	179	152
2004	7065	3744	4093	4517	4808	1281	348	97	60	155
2005	9181	6043	2757	2788	2861	1848	397	82	30	120
2006	5943	7989	4013	1554	1531	1434	632	130	24	90
2007	6227	4896	4850	2306	878	704	561	219	49	74
2008	10091	4932	3690	2710	1353	481	324	259	113	81
2009	15137	7597	5245	2274	1617	747	228	133	104	108
2010	5085	12903	5957	2351	1067	841	343	110	65	128
2011	1415	4033	8237	3166	934	439	305	118	43	113
2012	3325	1076	2619	4349	1408	375	184	130	46	103
2013	8370	2577	1191	1624	2116	573	123	68	47	91
2014	3343	7221	2469	960	1223	1028	258	60	33	89
2015	5264	2733	5299	1681	602	668	463	116	40	86
2016	6793	4276	2467	3176	840	348	308	164	44	80

Year	1	2	3	4	5	6	7	8	9	10
2017	11482	5539	2986	2037	1877	445	194	129	64	80
2018	8425	9717	4339	2505	1600	1040	209	103	68	87
2019	2226	6857	5876	2626	1645	1061	365	66	37	83
2020	2215	1536	4808	2431	834	451	233	77	14	63
2021	4917	1728	1458	2204	709	220	94	50	17	47
2022	2643	4257	1305	1049	938	225	68	32	23	40
2023	2834	2094	2650	749	532	397	98	26	9	40

Table 4.6.4. Faroe Plateau cod (Subdivision 5.b.1). Summary table from the SAM model (catch is also provided) and forecast with F=0 fishing mortality.

Year	R(age 1)	Low	High	SSB	Low	High	Fbar(3–7)	Low	High	Catch	TSB	Low	High
1959	17258	11167	26671	48226	41654	55835	0.492	0.414	0.584	22415	66463	57523	76792
1960	15807	10305	24245	53290	46838	60632	0.706	0.604	0.824	32255	74388	65473	84516
1961	23693	15383	36491	45599	40070	51891	0.62	0.527	0.73	21598	64886	56835	74077
1962	24550	15816	38108	42474	37275	48397	0.56	0.473	0.663	20967	66753	57706	77218
1963	20892	13245	32953	48414	42115	55656	0.502	0.424	0.595	22215	76736	65681	89650
1964	10939	6877	17400	54505	46998	63213	0.497	0.42	0.588	21078	80234	68538	93927
1965	21134	13251	33706	54177	46831	62675	0.506	0.429	0.598	24212	70683	60903	82033
1966	25697	16115	40978	55505	47784	64474	0.506	0.427	0.599	20418	77176	65944	90322
1967	21480	13488	34208	67364	58194	77978	0.471	0.395	0.561	23562	96599	82416	113223
1968	11717	7328	18733	76799	66331	88919	0.446	0.375	0.531	29930	104304	89435	121647
1969	9567	5925	15449	79411	68373	92231	0.5	0.419	0.597	32371	101715	87285	118530
1970	12806	7897	20768	77363	66353	90200	0.394	0.327	0.476	24183	92991	79834	108318
1971	23303	14434	37621	59280	50847	69111	0.397	0.326	0.484	23010	72413	62199	84304
1972	16607	10327	26706	53764	46096	62707	0.331	0.27	0.405	18727	71669	61165	83978
1973	38510	24056	61649	74780	63900	87513	0.326	0.269	0.396	22228	101552	86084	119801
1974	36837	23144	58630	90342	77660	105095	0.332	0.276	0.4	24581	132764	112467	156724
1975	24702	15498	39373	104688	90839	120648	0.42	0.354	0.498	36775	145139	124684	168950

Year	R(age 1)	Low	High	SSB	Low	High	Fbar(3–7)	Low	High	Catch	TSB	Low	High
1976	11221	6994	18003	113847	98917	131030	0.502	0.426	0.591	39799	150668	130150	174422
1977	14067	8779	22539	108729	94235	125452	0.619	0.525	0.731	34927	131994	114380	152321
1978	16812	10496	26928	75661	65246	87739	0.46	0.386	0.549	26585	93730	81140	108272
1979	26219	16380	41967	64407	56020	74049	0.458	0.384	0.545	23112	81939	71269	94206
1980	17550	10981	28049	56644	49658	64613	0.436	0.366	0.518	20513	81632	70181	94951
1981	27726	17433	44097	60209	52430	69141	0.463	0.391	0.547	22963	84375	72529	98157
1982	30827	19546	48619	62571	54644	71647	0.452	0.384	0.532	21489	94961	81042	111270
1983	53031	33366	84285	97423	84904	111789	0.687	0.591	0.8	38133	121980	104909	141830
1984	22621	14211	36008	114418	98883	132394	0.547	0.468	0.64	36979	150899	126740	179663
1985	10355	6440	16650	83280	71953	96390	0.724	0.624	0.839	39484	130882	111339	153855
1986	11703	7314	18728	73765	62783	86669	0.606	0.516	0.712	34595	98744	84817	114956
1987	11335	7151	17967	62208	53739	72012	0.487	0.413	0.574	21391	77929	67772	89609
1988	17284	10925	27344	53898	47630	60991	0.62	0.534	0.721	23182	66044	58212	74930
1989	5008	3115	8053	38326	34120	43052	0.797	0.69	0.92	22068	59078	51528	67733
1990	6419	3956	10414	29658	25825	34061	0.674	0.574	0.792	13692	38499	33231	44602
1991	11151	6836	18189	21826	18663	25525	0.505	0.42	0.606	8750	27259	23369	31798
1992	11854	7308	19226	17844	15168	20991	0.401	0.327	0.49	6396	31089	25882	37345
1993	27821	17464	44321	30351	25540	36069	0.269	0.218	0.331	6107	43902	36365	53002

Year	R(age 1)	Low	High	SSB	Low	High	Fbar(3–7)	Low	High	Catch	TSB	Low	High
1994	44812	28206	71196	64753	54364	77128	0.252	0.208	0.305	9046	74551	61838	89876
1995	12228	7879	18976	63142	55053	72420	0.358	0.303	0.422	23045	134350	112306	160721
1996	6377	4123	9862	84012	73537	95979	0.675	0.588	0.776	40422	134961	116327	156580
1997	7902	5155	12115	78141	67554	90386	0.802	0.703	0.916	34304	90991	78961	104853
1998	15491	10191	23548	52457	45429	60572	0.665	0.576	0.766	24005	62722	54881	71684
1999	24901	16426	37748	41635	36474	47527	0.579	0.497	0.675	19245	60659	53349	68971
2000	36648	24181	55543	42309	37461	47784	0.428	0.364	0.504	21833	88637	76482	102722
2001	15254	10133	22964	57715	51094	65195	0.463	0.398	0.539	28577	113845	97802	132520
2002	7414	4883	11258	57539	50932	65003	0.767	0.669	0.878	38834	102618	89482	117682
2003	4794	3107	7396	43166	37669	49464	0.747	0.65	0.86	25167	62690	54994	71464
2004	7065	4648	10738	27315	23990	31102	0.64	0.553	0.742	12840	36878	32591	41728
2005	9181	6061	13908	23008	20388	25965	0.609	0.525	0.708	10119	31189	27663	35163
2006	5943	3920	9011	19441	17244	21917	0.598	0.513	0.697	9844	28723	25389	32494
2007	6227	4076	9514	16625	14720	18777	0.484	0.413	0.568	7511	25962	22872	29471
2008	10091	6684	15234	19714	17428	22299	0.484	0.414	0.566	7315	27252	23907	31066
2009	15137	9990	22936	19864	17629	22383	0.538	0.462	0.627	9979	29721	26221	33688
2010	5085	3333	7756	21623	19209	24341	0.675	0.581	0.786	12762	39487	34182	45614
2011	1415	900	2225	19524	17099	22293	0.566	0.481	0.667	9692	31191	27090	35913

Year	R(age 1)	Low	High	SSB	Low	High	Fbar(3–7)	Low	High	Catch	TSB	Low	High
2012	3325	2150	5140	17747	15443	20394	0.585	0.494	0.692	7205	21812	19022	25011
2013	8370	5424	12915	17957	15559	20724	0.351	0.293	0.422	4473	20604	17927	23681
2014	3343	2150	5199	18760	16532	21289	0.392	0.331	0.465	5711	25940	22460	29959
2015	5264	3417	8110	18494	16351	20917	0.487	0.413	0.574	7329	27220	23743	31207
2016	6793	4427	10423	22434	19478	25838	0.405	0.341	0.479	5876	28448	24564	32946
2017	11482	7475	17636	24610	21384	28322	0.322	0.272	0.382	5360	33081	28651	38196
2018	8425	5491	12927	29803	26489	33532	0.568	0.49	0.658	12214	47046	41095	53860
2019	2226	1432	3460	28762	25582	32336	1.018	0.897	1.155	20609	41844	36933	47407
2020	2215	1420	3456	16025	14238	18035	0.96	0.833	1.106	10438	22765	20109	25773
2021	4917	2993	8078	11407	9939	13092	0.651	0.551	0.77	5412	14839	12932	17026
2022	2643	1342	5204	10585	9099	12313	0.686	0.564	0.835	4866	16264	13517	19571
2023	2834	831	9666	9165	7283	11533	0.818	0.591	1.132	4915	12895	9852	16877

F=0 projection. Catch-at-age in 2023 of 4915 tonnes

Year	R(age 1)	Low	High	SSB	Low	High	Fbar(3–7)	Low	High	Catch	TSB	Low	High
2024	4917	1415	11482	8830	5731	13395	0	0	0	0	13205	8133	22373
2025	4917	1415	11482	14151	8522	23499	0	0	0	0	20548	12292	33893
2026	4917	1415	11482	21479	12878	37440	0	0	0	0	29176	17089	47643

4.18 Figures

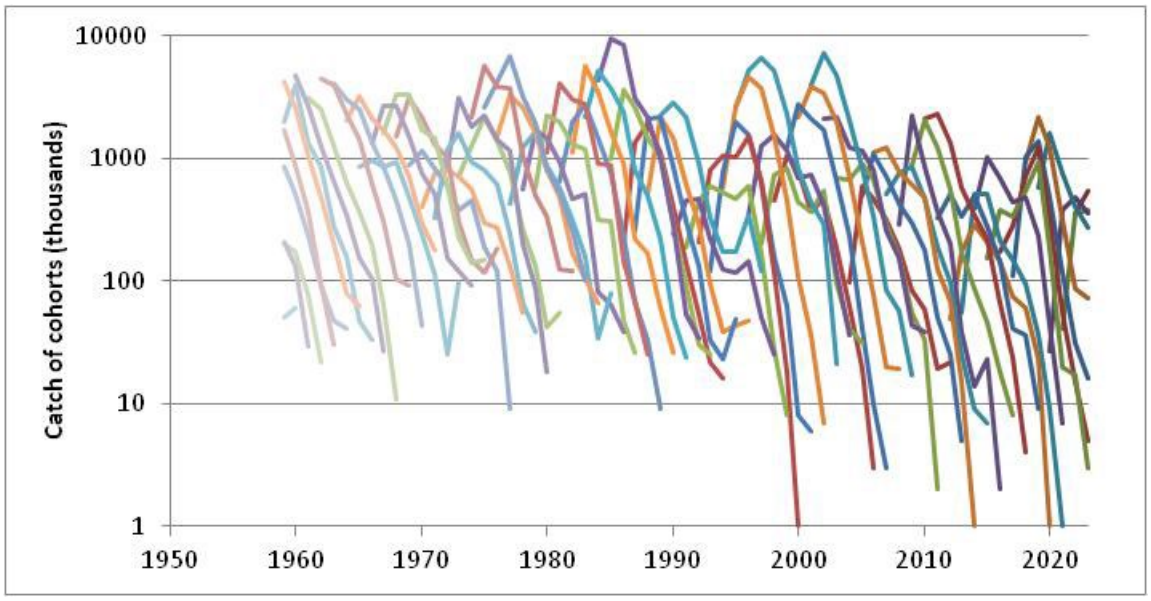


Figure 4.2.1. Faroe Plateau cod (Subdivision 5.b.1). Catch in numbers-at-age shown as catch curves.

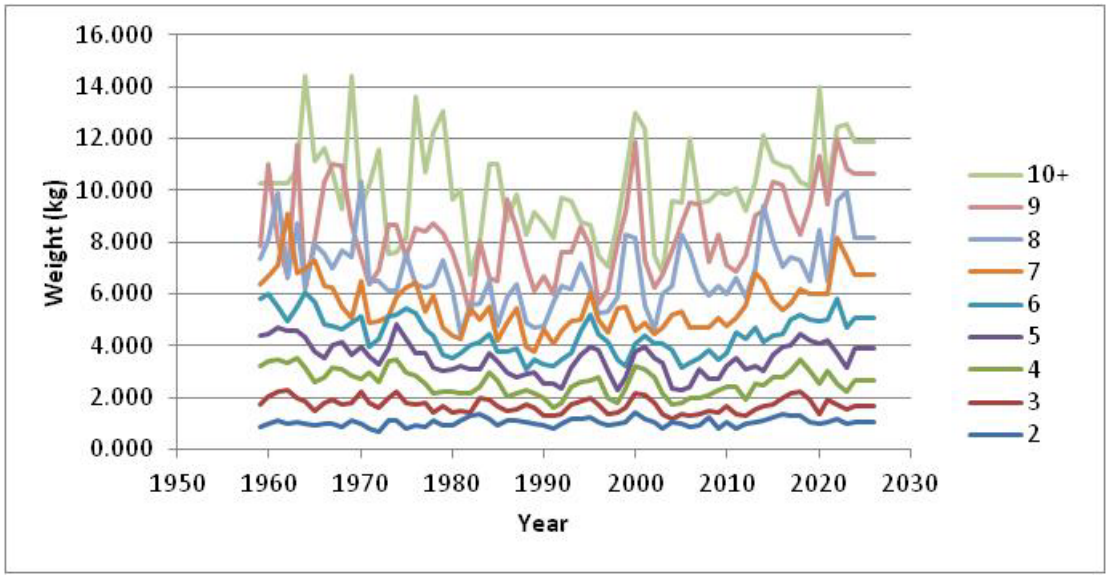


Figure 4.2.2. Faroe Plateau cod (Subdivision 5.b.1). Mean weight at age in the catches. The last three years are based on a previous 5 year average.

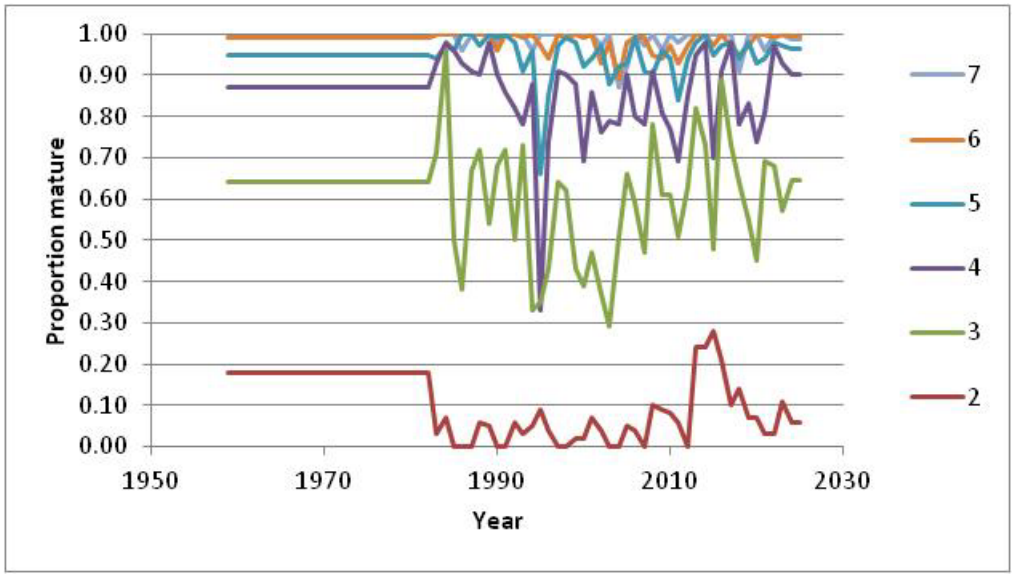


Figure 4.2.3. Faroe Plateau cod (Subdivision 5.b.1). Proportion mature at age as observed in the spring groundfish survey. The last three years are based on a previous 5 year average.

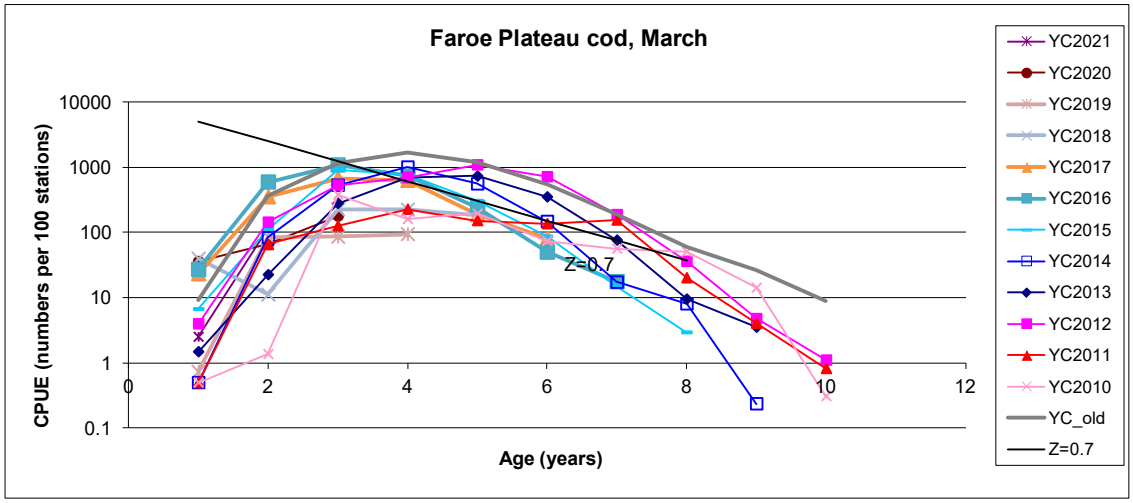


Figure 4.2.4. Faroe Plateau cod (Subdivision 5.b.1). Catch curves from the spring groundfish survey.

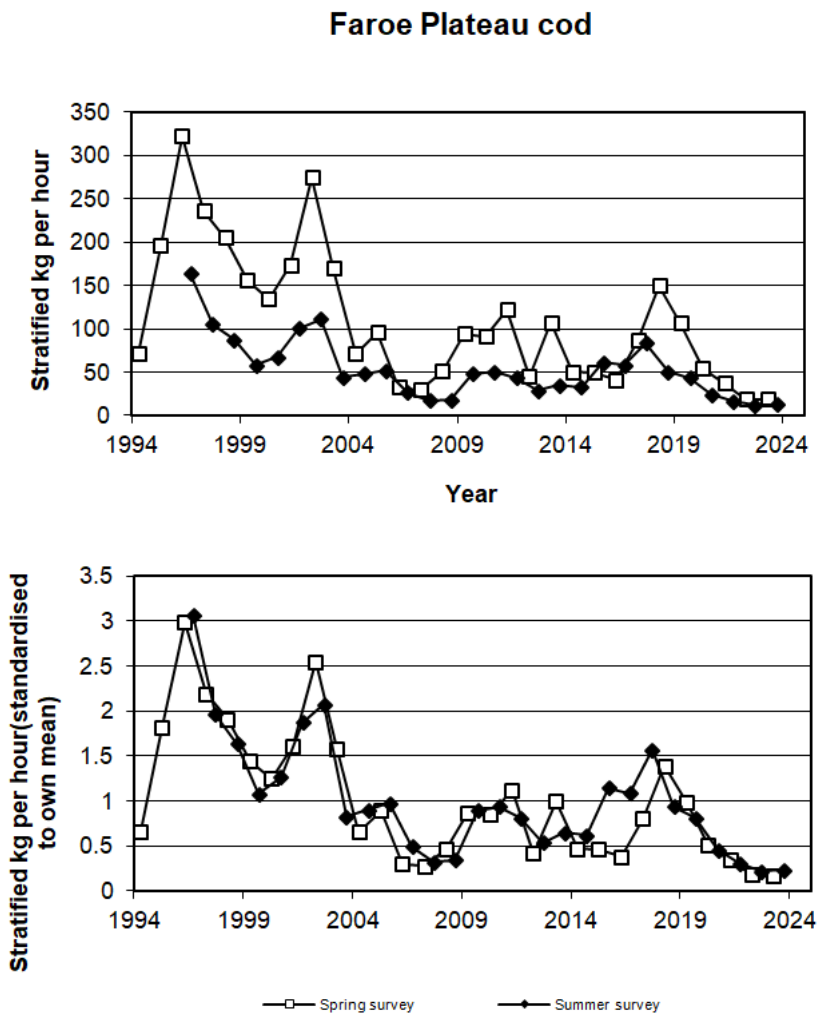


Figure 4.2.5. Faroe Plateau cod (Subdivision 5.b.1). Stratified kg/hour in the spring and summer surveys.

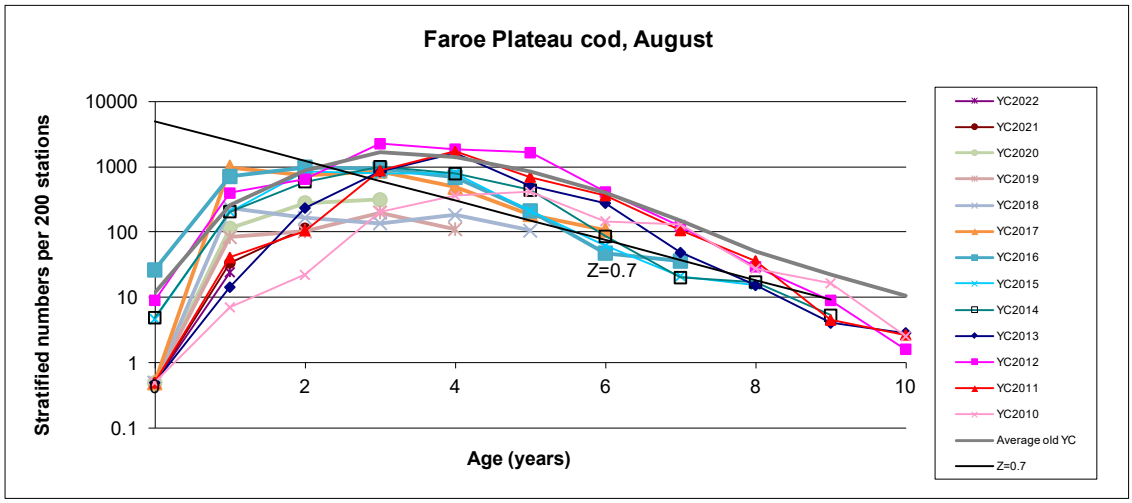


Figure 4.2.6. Faroe Plateau cod (Subdivision 5.b.1). Catch curves from the summer groundfish survey.

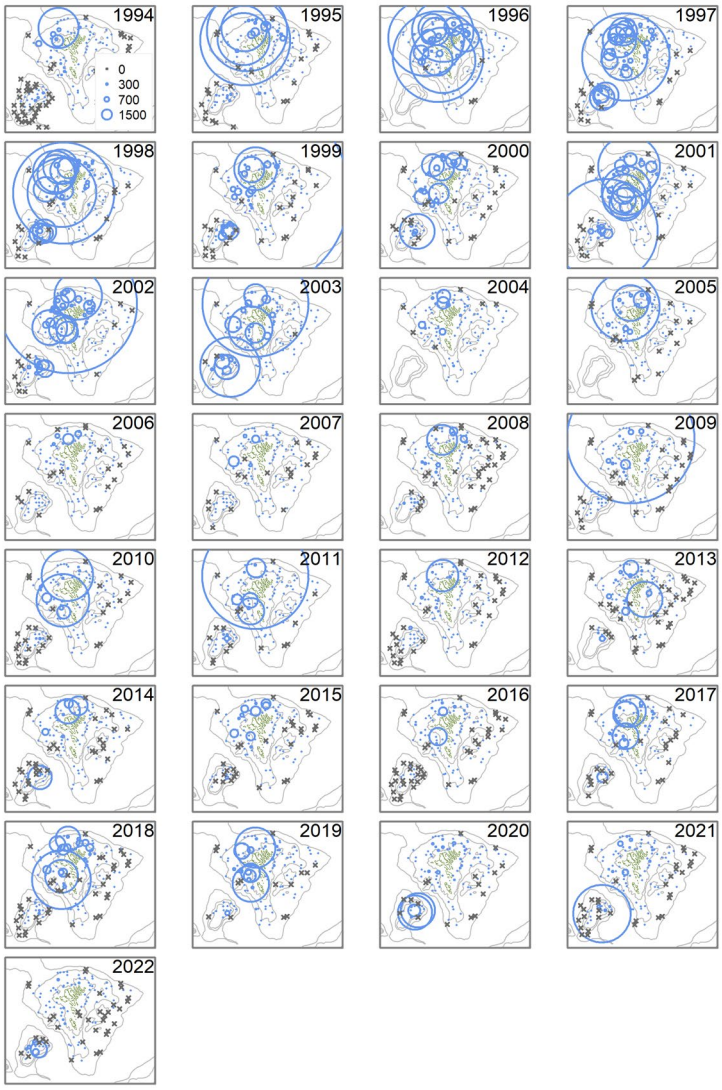


Figure 4.2.7. Faroe Plateau cod (Subdivision 5.b.1). Catch per tow in the spring groundfish survey. TO BE UPDATED

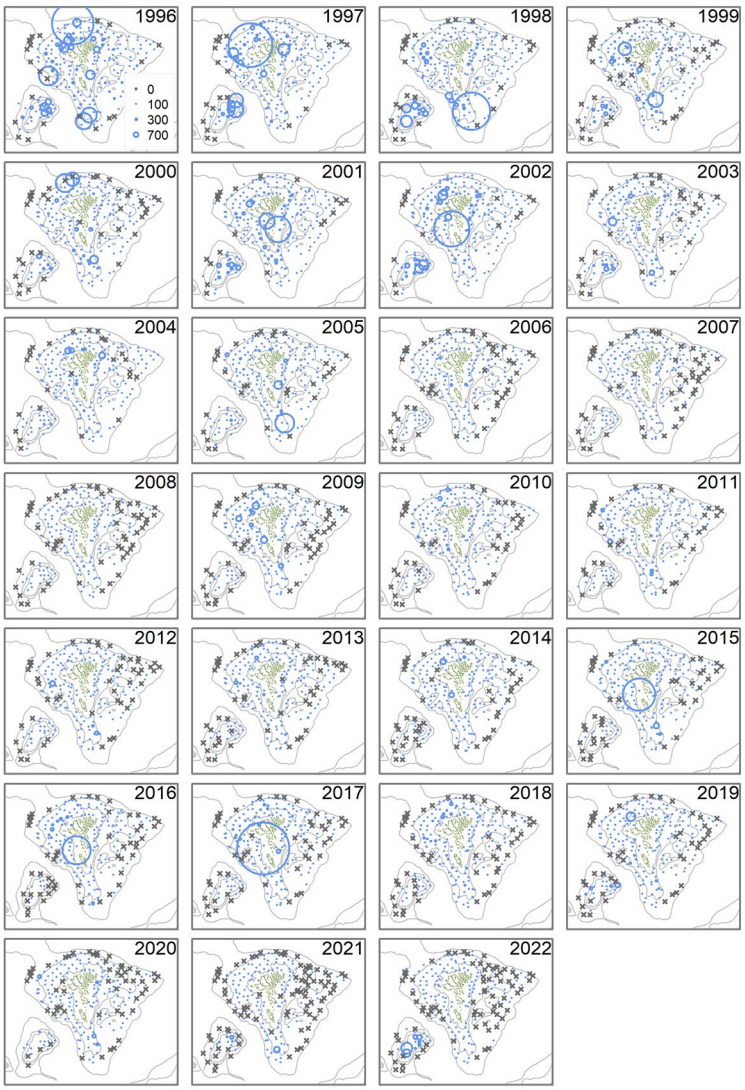
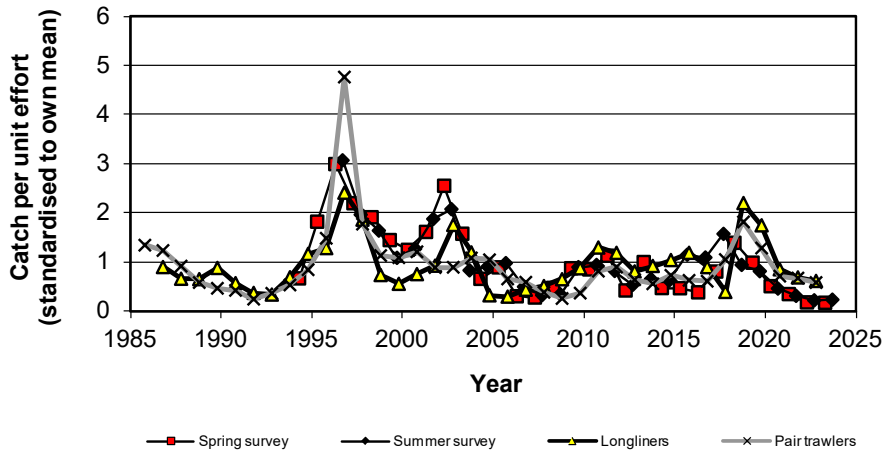


Figure 4.2.8. Faroe Plateau cod (Subdivision 5.b.1). Catch per tow in the summer groundfish survey. TO BE UPDATED



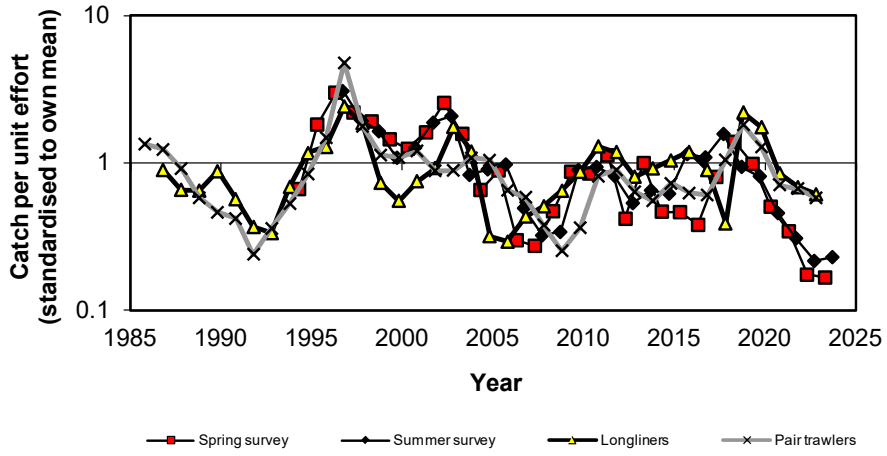


Figure 4.2.9. Faroe Plateau cod (Subdivision 5.b.1). Standardized catch per unit effort for pairtrawlers and longliners. The two surveys are shown as well. Normal scale above and on log scale below.

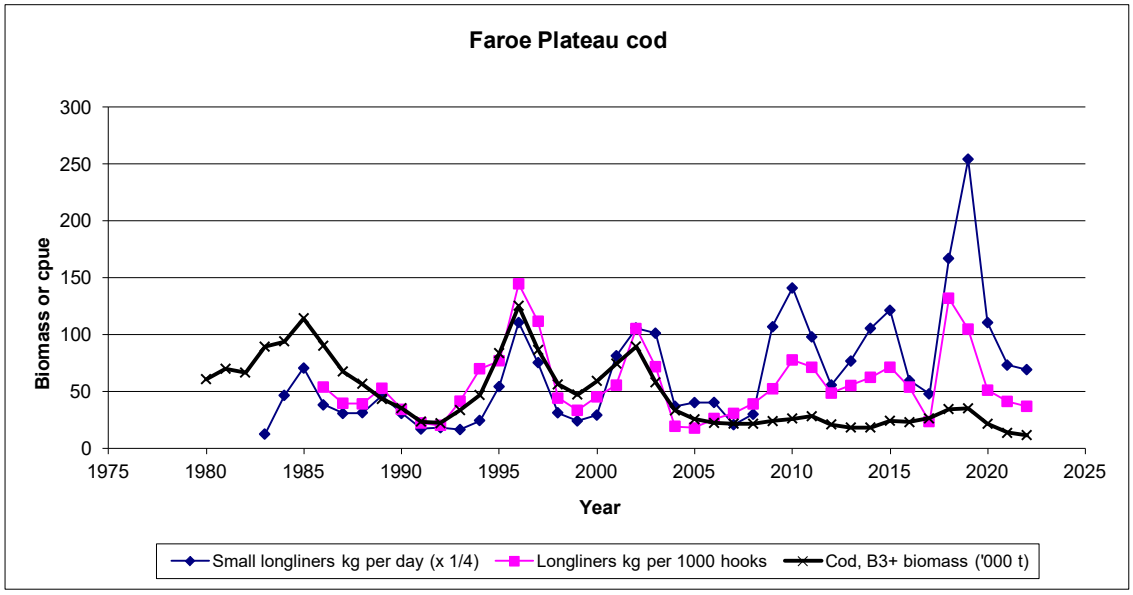


Figure 4.2.10. Faroe Plateau cod (Subdivision 5.b.1). Catch per unit effort for small and large longliners compared with the fishable (age 3+) biomass.

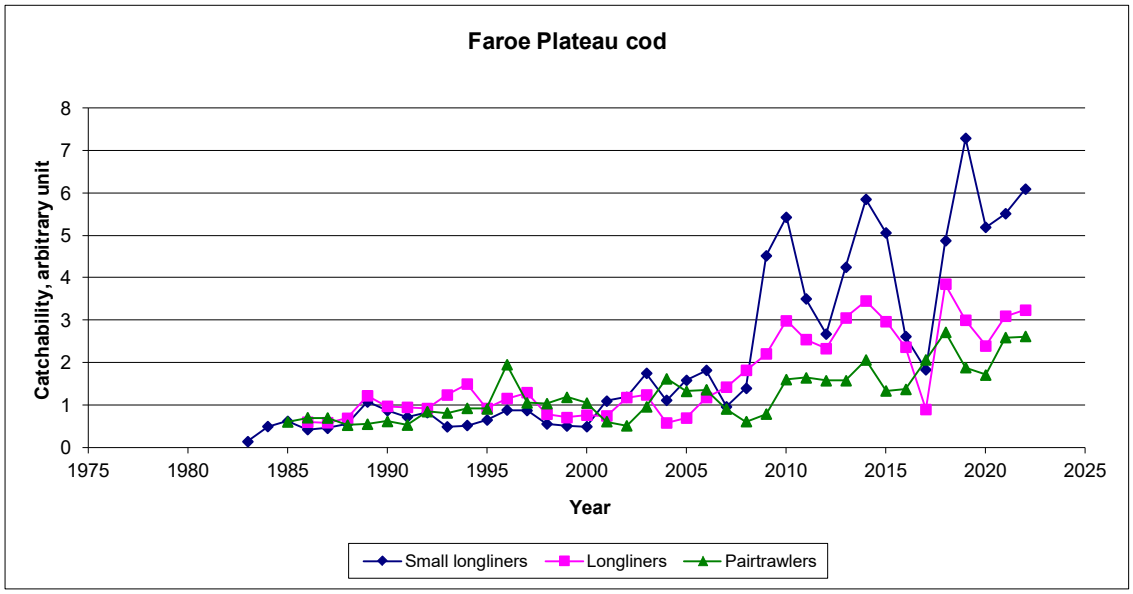


Figure 4.2.11. Faroe Plateau cod (Subdivision 5.b.1). Catchability (CPUE divided by age 3+ biomass) for small and large longliners and pairtrawlers.

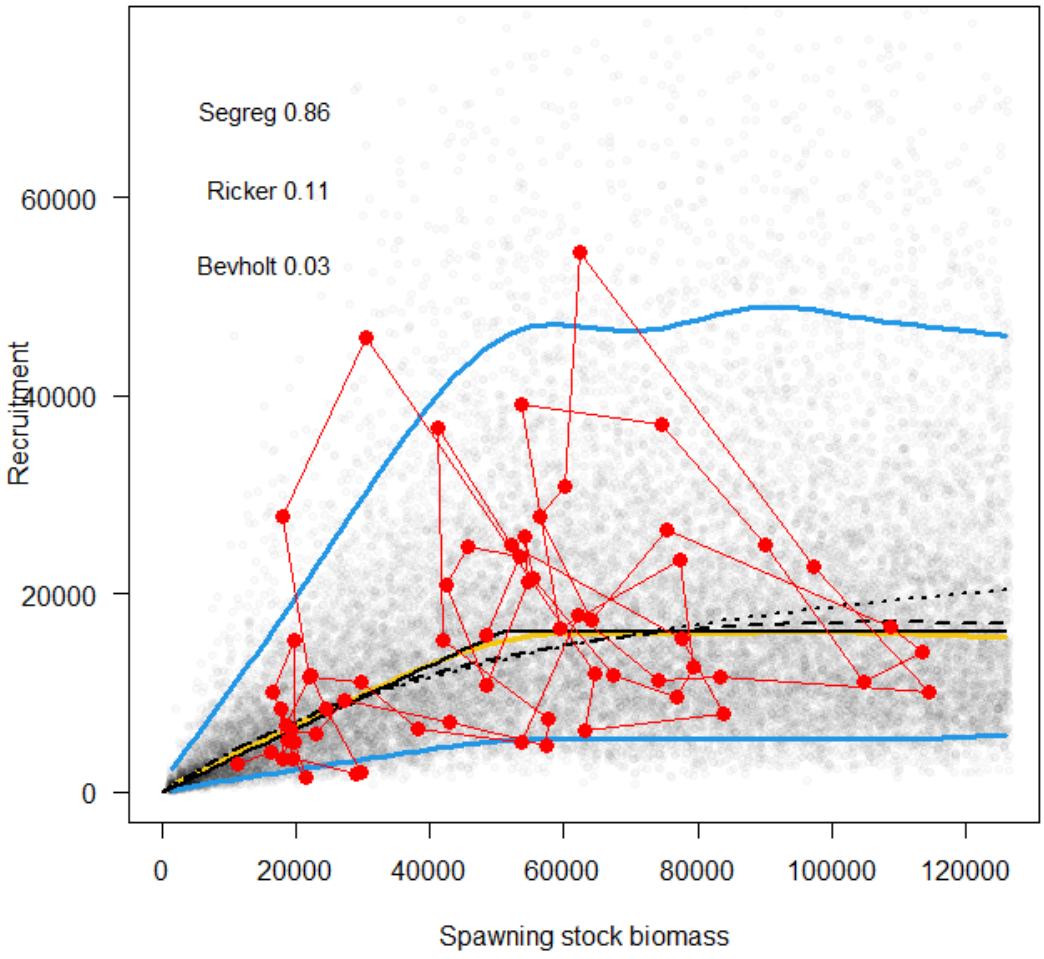


Figure 4.5.1. Faroe plateau cod stock–recruit relationships from the NWWG 2022 assessment.

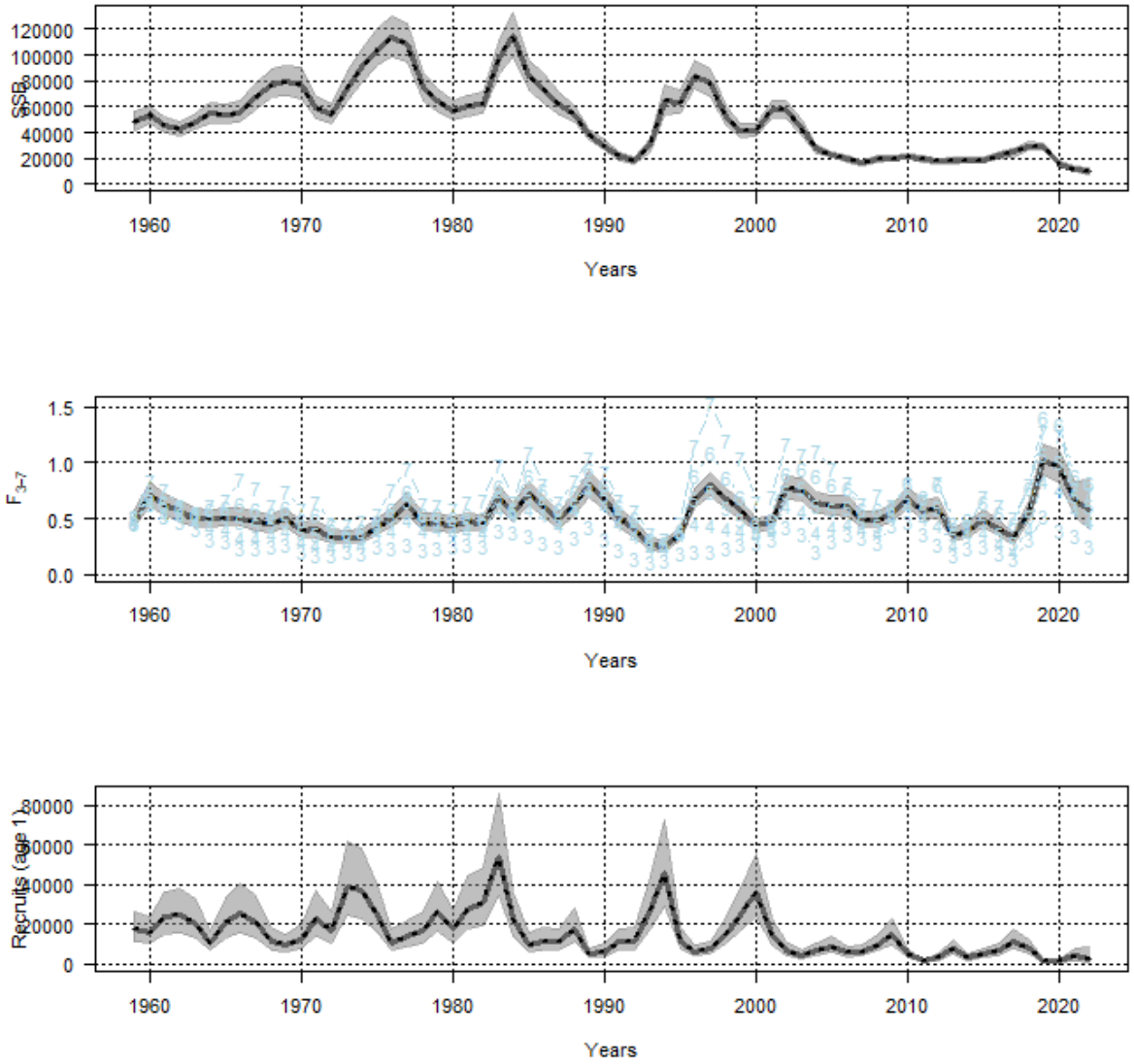


Figure 4.5.2. Faroe plateau cod SSB (top) and F (middle) and recruitment (bottom) from the NWWG 2022 assessment.

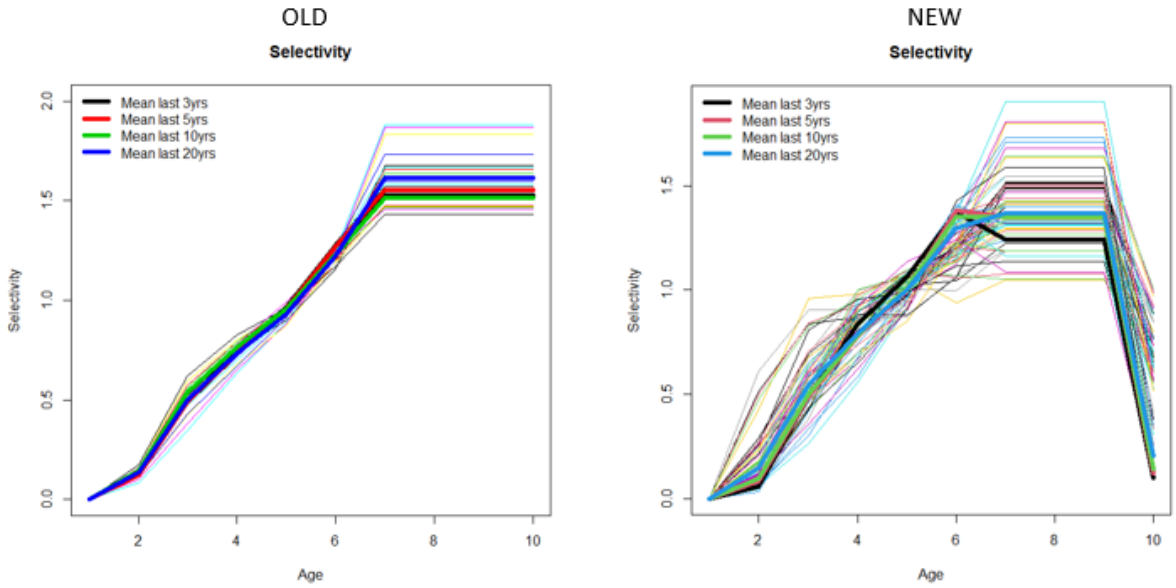


Figure 4.5.3. Faroe plateau cod selectivity from the NWWG 2022 assessment compared to the previous assessment.

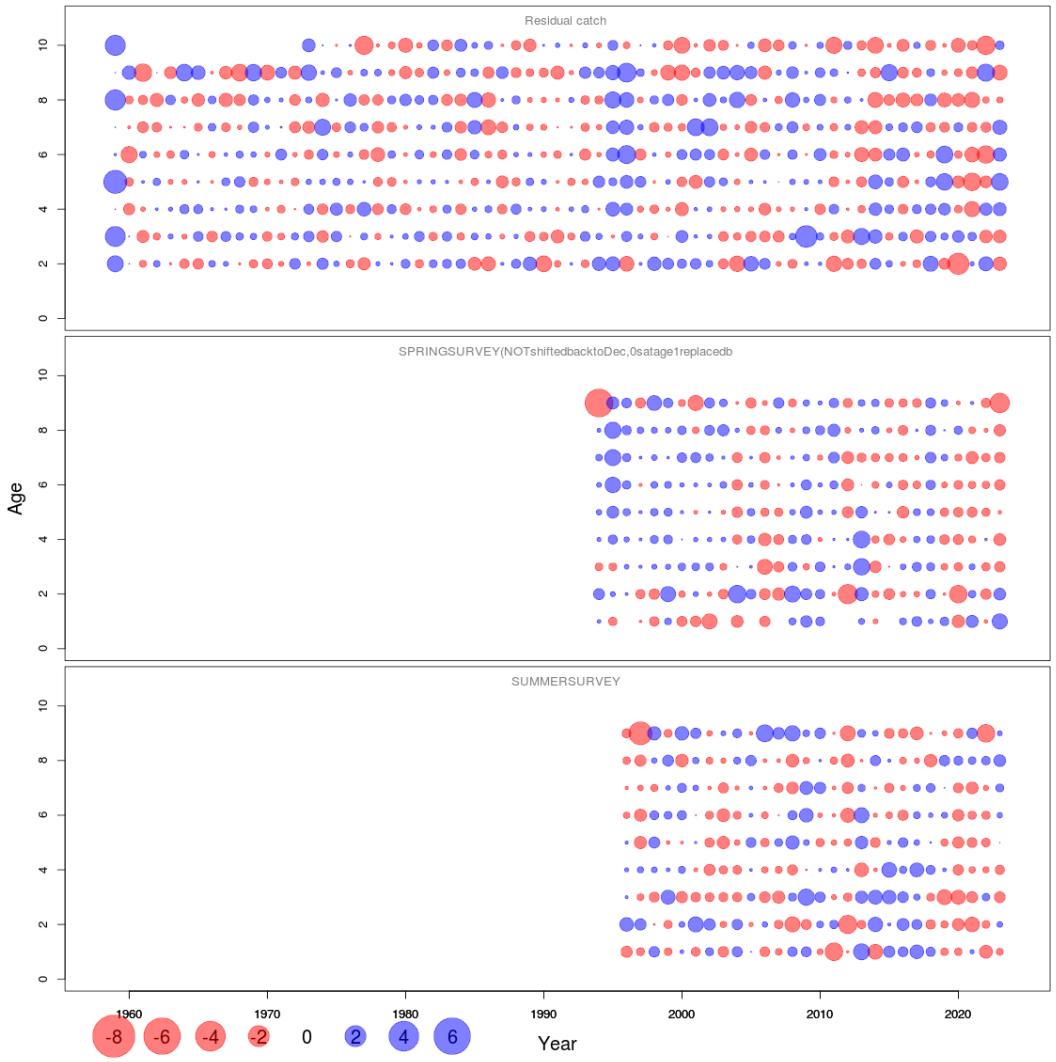


Figure 4.6.1. Faroe Plateau cod (Subdivision 5.b.1). Observation residuals for the catch, spring survey and the summer survey as estimated by the SAM model.

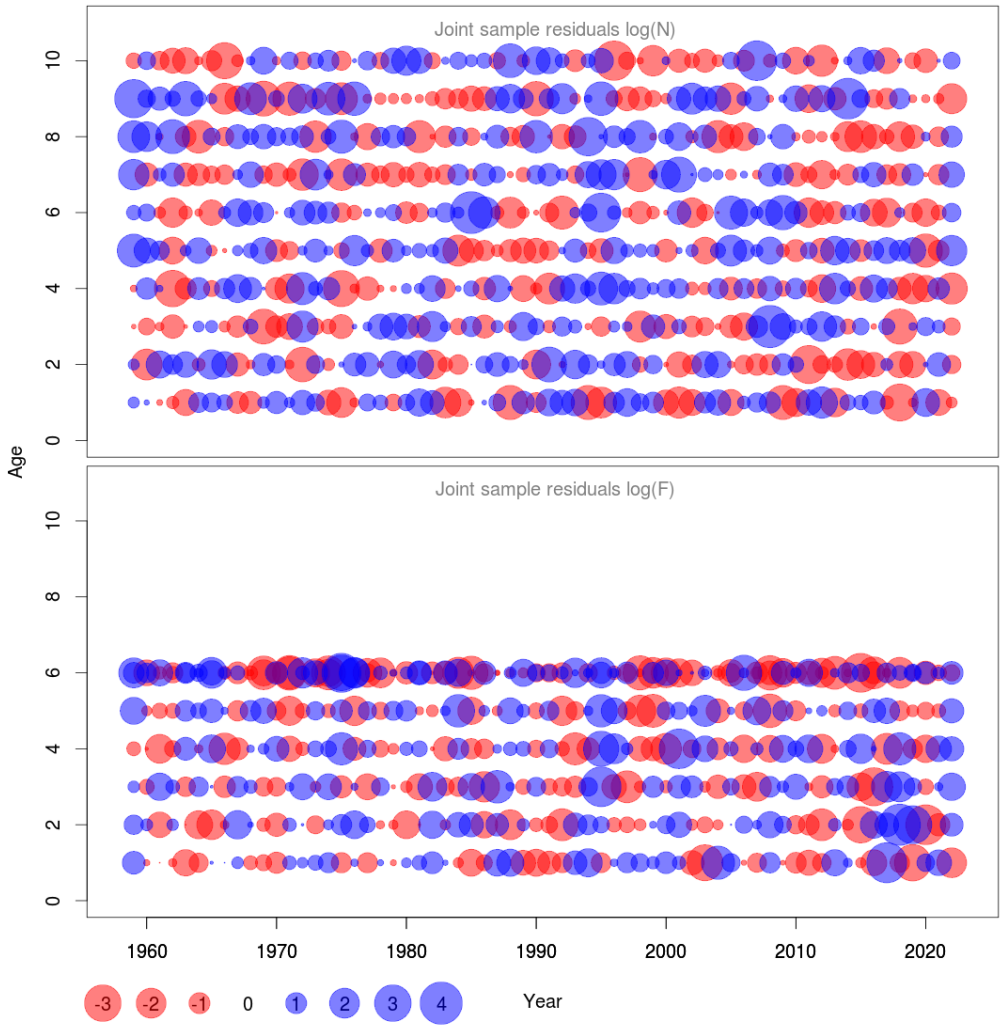


Figure 4.6.2. Faroe Plateau cod (Subdivision 5.b.1). Joint sample residuals for the population numbers and fishing mortality as estimated by the SAM model.

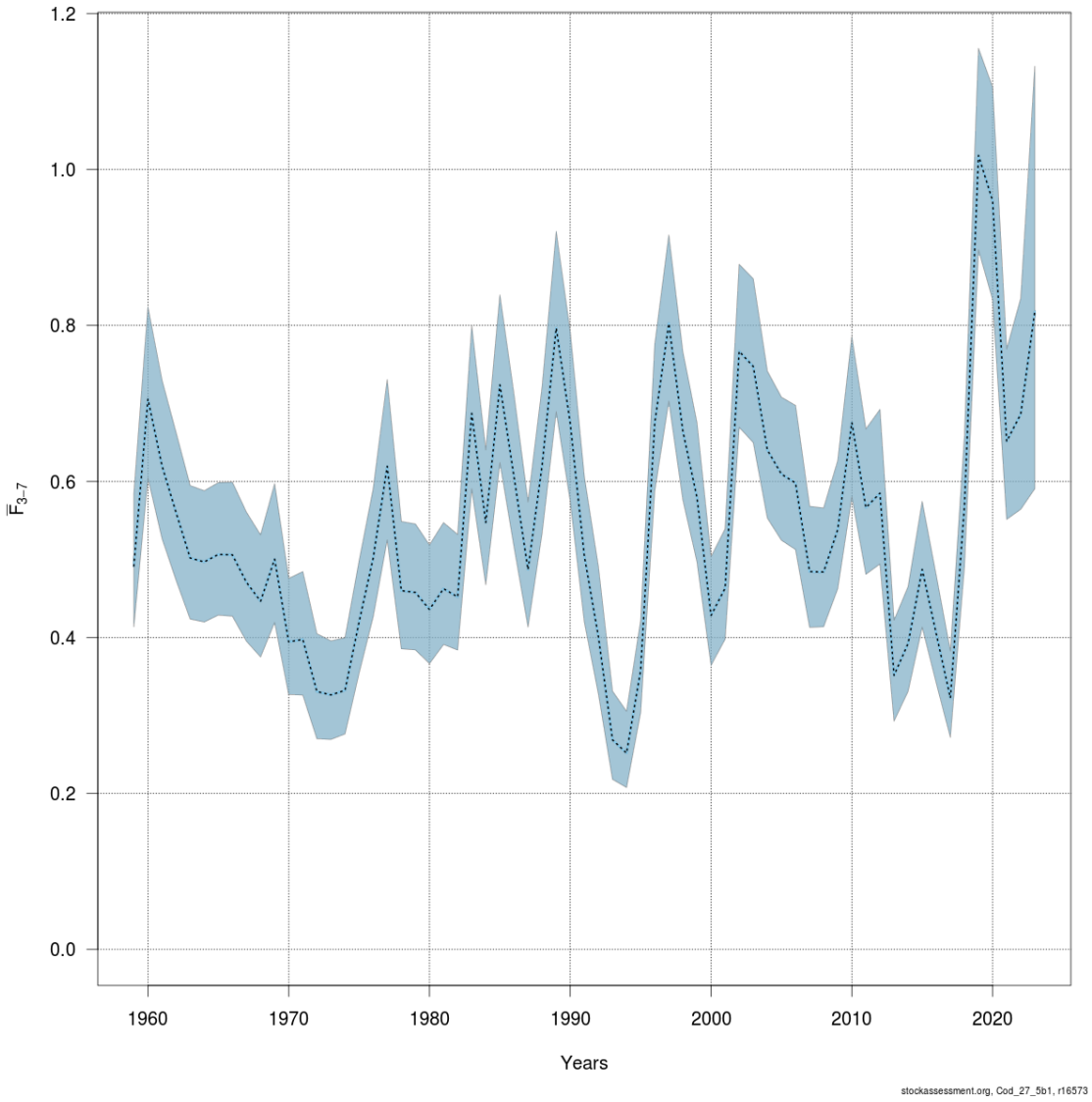


Figure 4.6.3. Faroe Plateau cod (Subdivision 5.b.1). Development of fishing mortality over time.

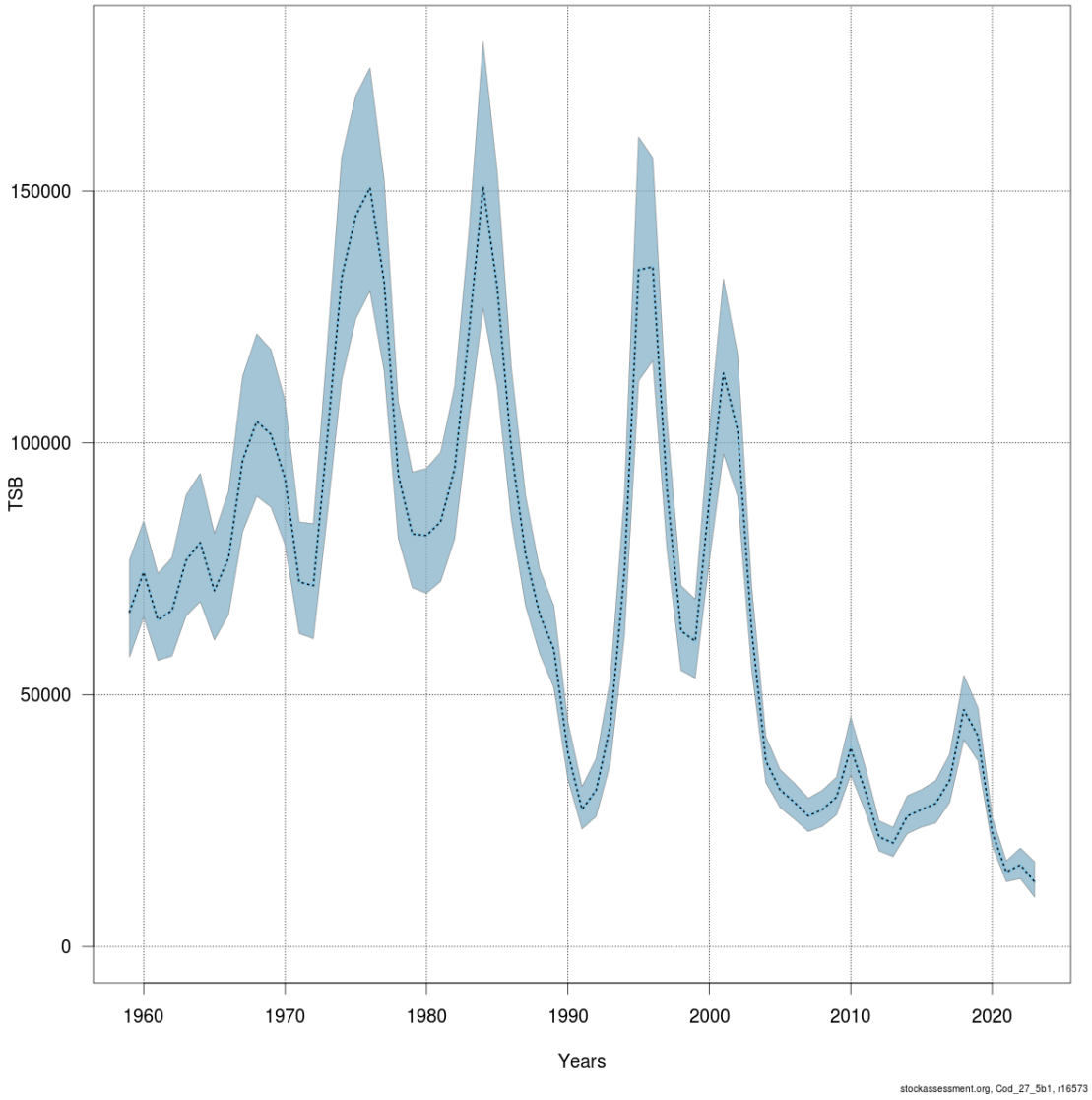


Figure 4.6.4. Faroe Plateau cod (Subdivision 5.b.1). Development of the total stock over time.

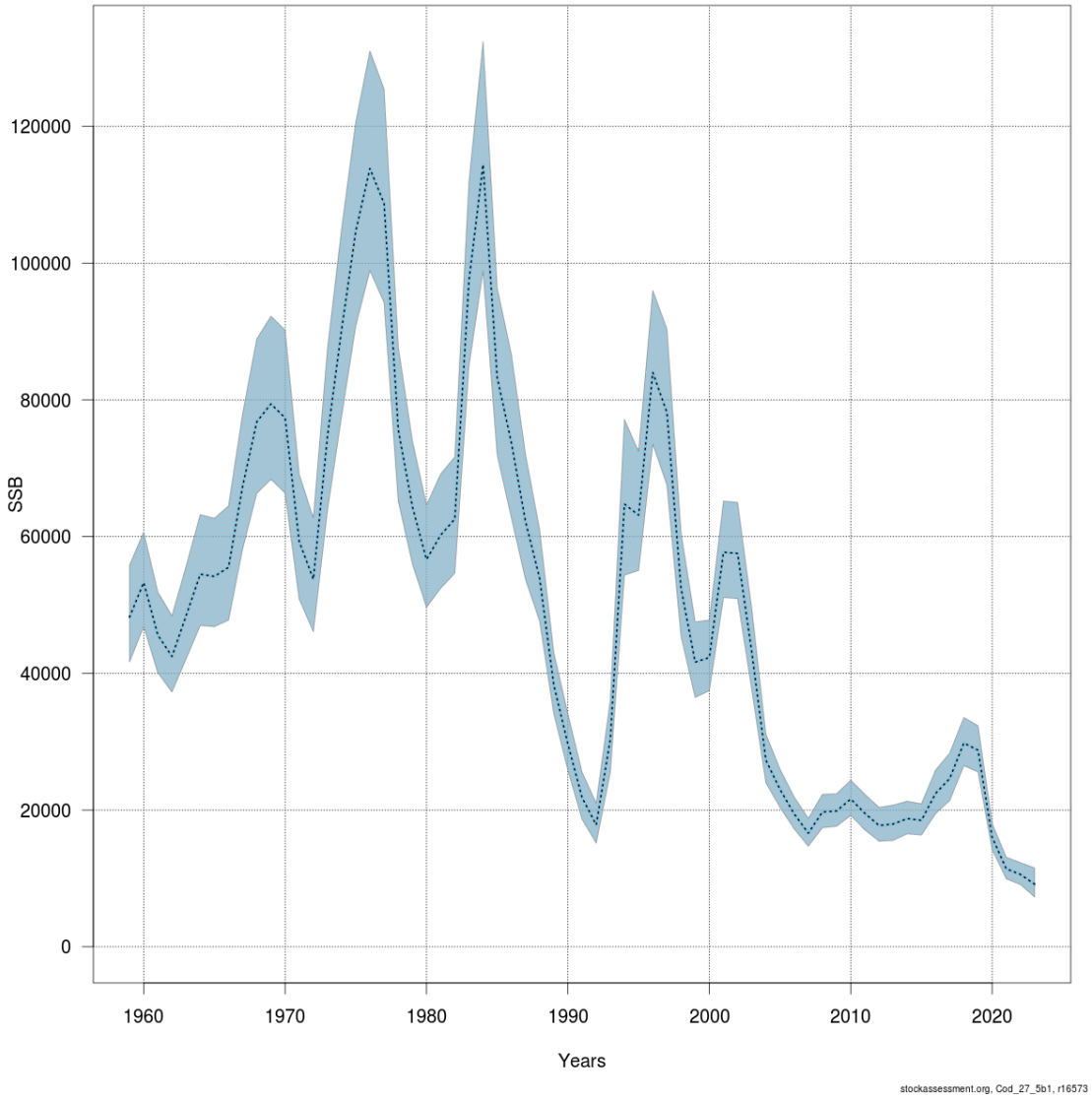


Figure 4.6.5. Faroe Plateau cod (Subdivision 5.b.1). Development of the spawning-stock biomass over time.

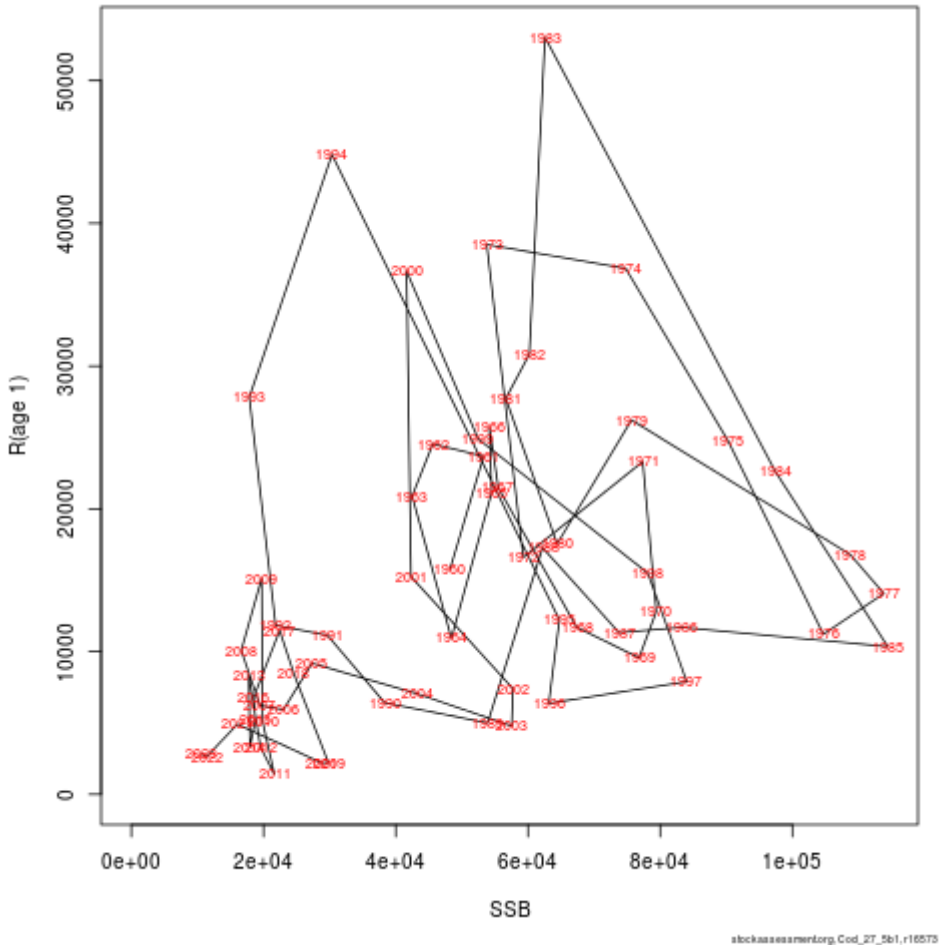


Figure 4.6.6. Faroe Plateau cod (Subdivision 5.b.1). Spawning stock (tons) – recruitment (thousands) relationship. Years are shown at each data point.

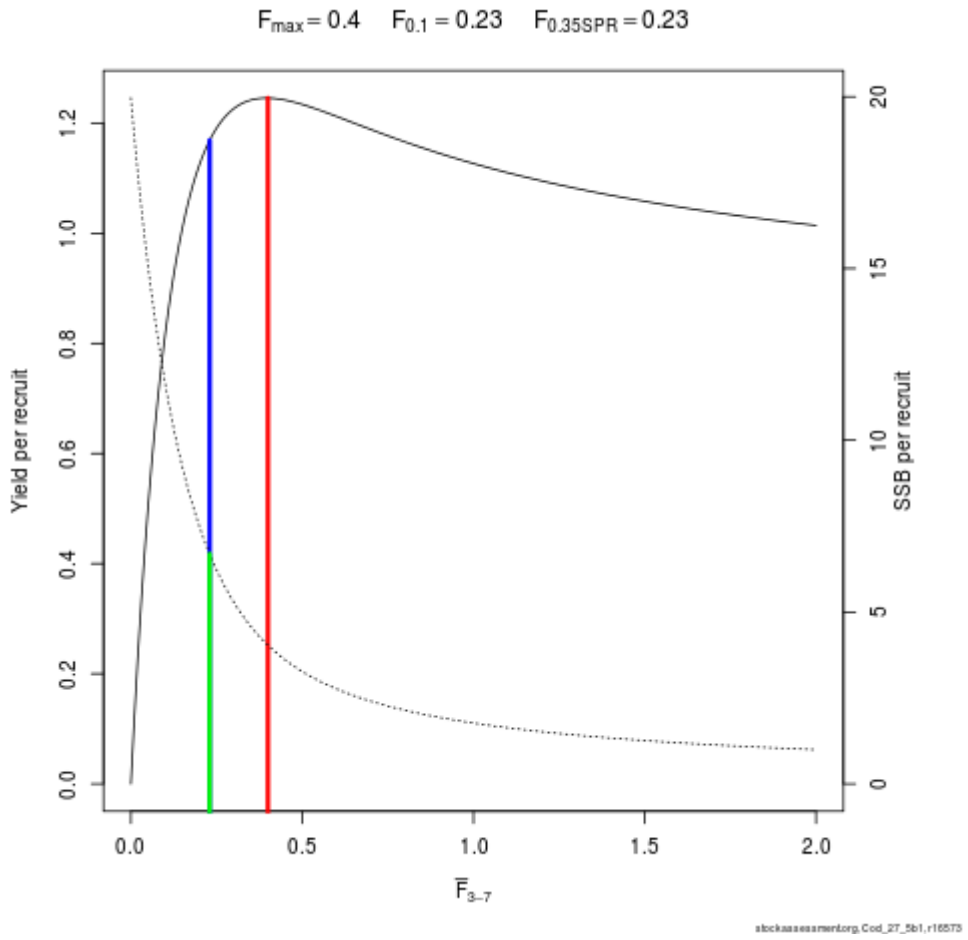


Figure 4.8.1. Faroe Plateau cod (Subdivision 5.b.1). Yield-per-recruit and spawning-stock biomass (SSB) per recruit vs. fishing mortality.

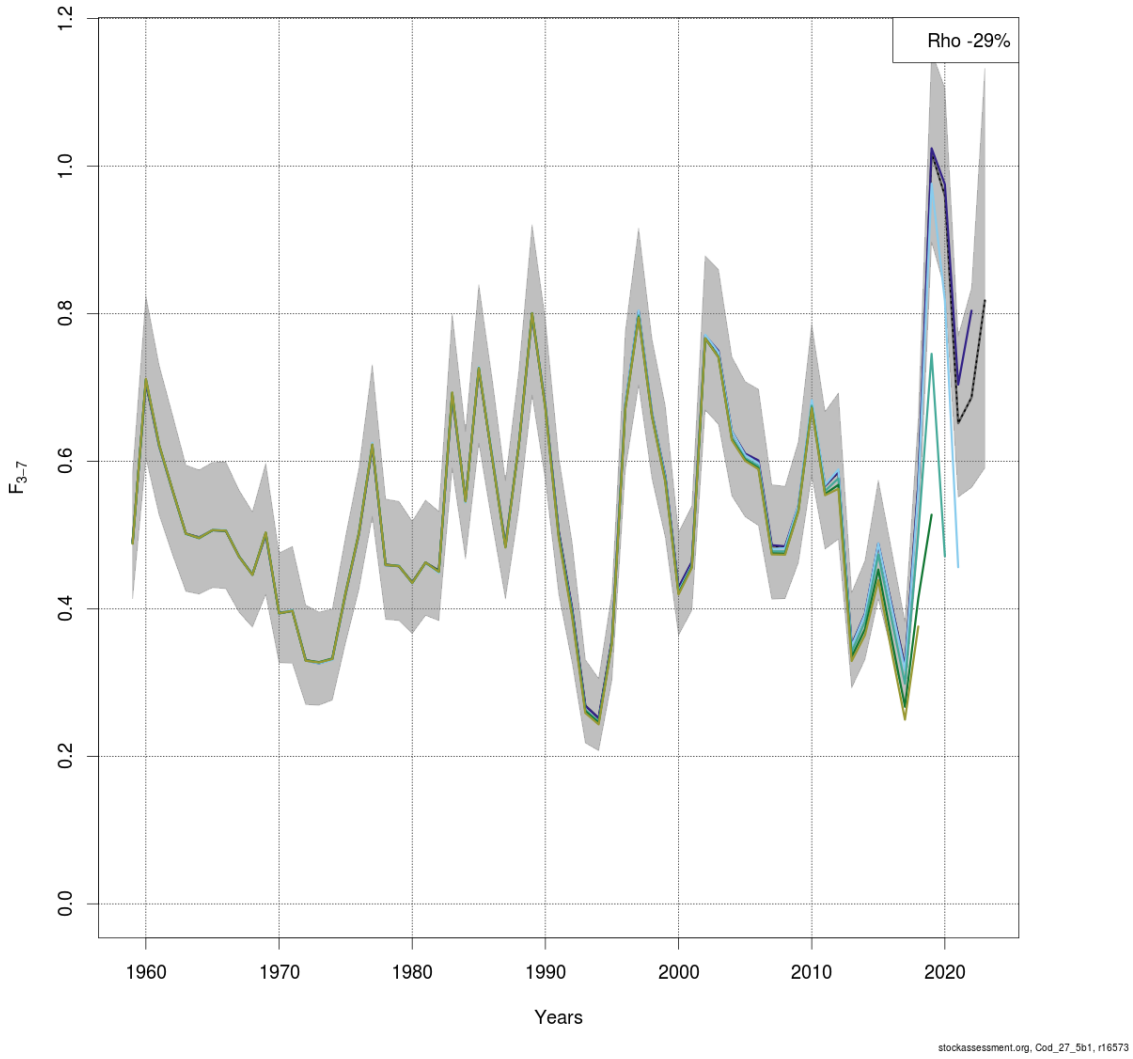


Figure 4.9.1. Faroe Plateau cod (Subdivision 5.b.1). Results from the SAM retrospective analysis of fishing mortality (ages 3–7).

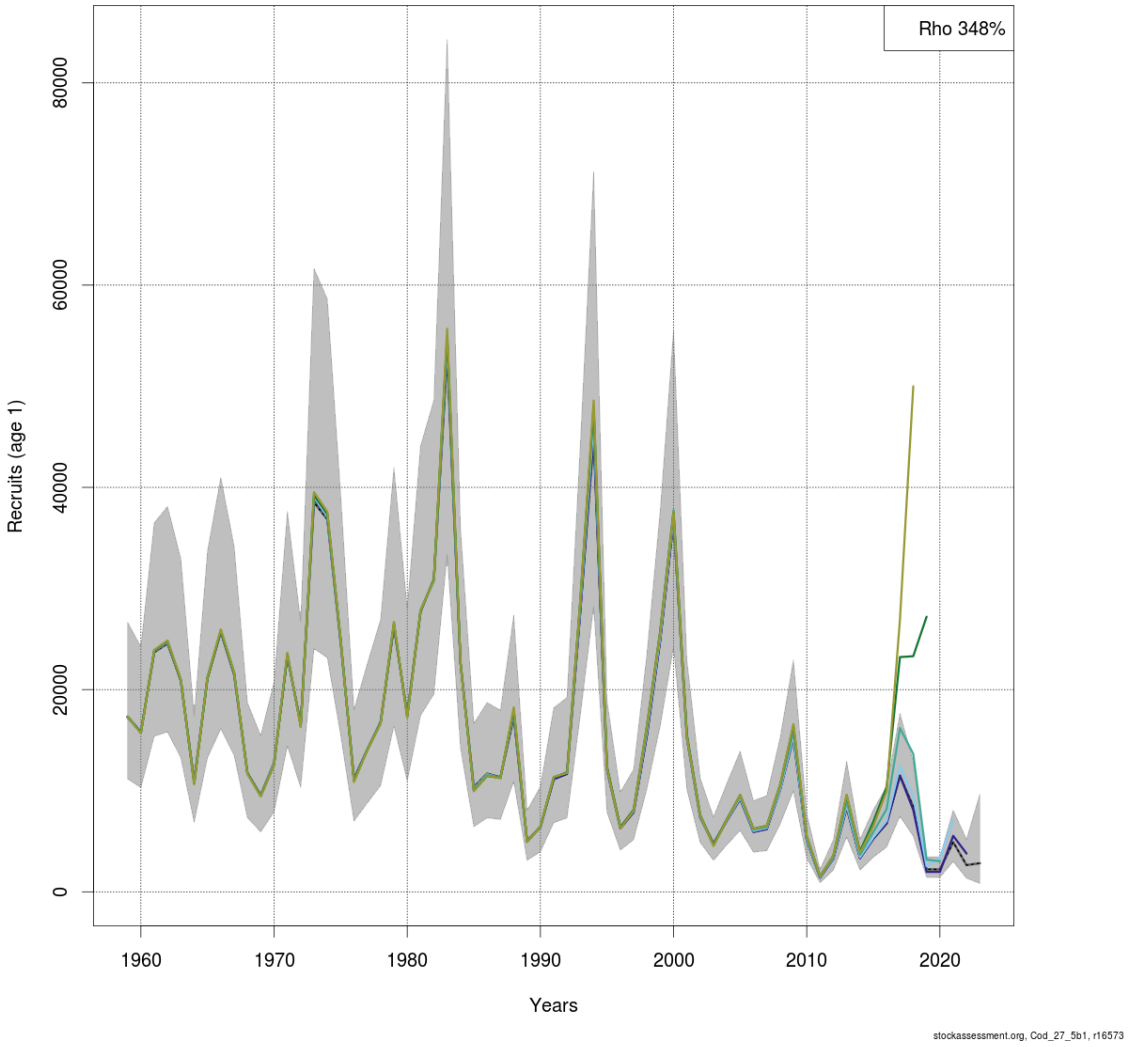


Figure 4.9.1. Faroe Plateau cod (Subdivision 5.b.1). Results from the SAM retrospective analysis (continued). Recruitment-at-age 1.

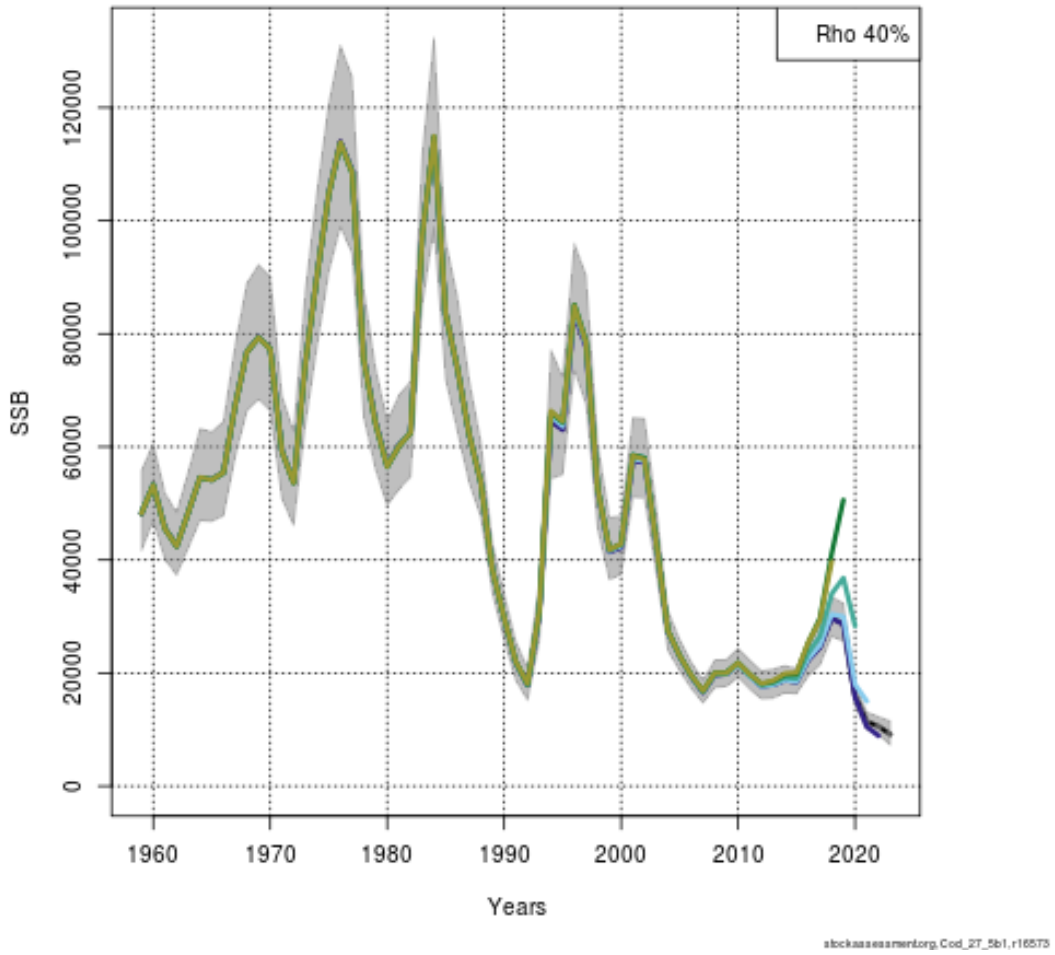


Figure 4.9.1. Faroe Plateau cod (Subdivision 5.b.1). Results from the SAM retrospective analysis (continued). Spawning-stock biomass.

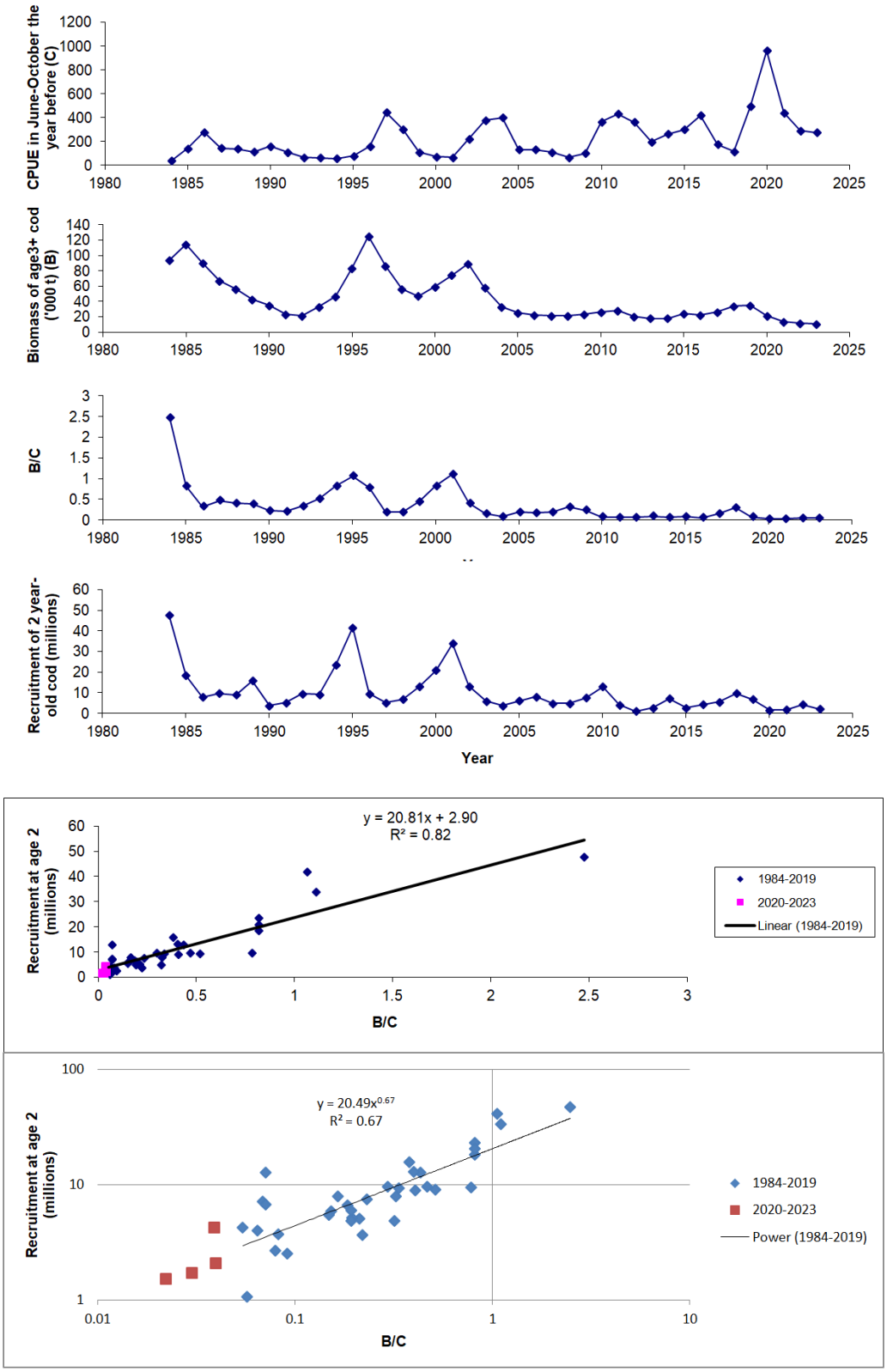


Figure 4.9.2. Faroe Plateau cod (Subdivision 5.b.1). Modelling cod recruitment in three steps. First, the catch-per-unit-effort of cod (C) for small boats operating close to land, as being indicative of the amount of cannibalistic cod. Second, the amount of cod (older than the recruiting cod) (B), as being indicative of e.g. culling-down of potential predators/competitors of recruiting cod. Third, the ratio between B and C, as indicative of recruitment success. Fourth and fifth, a comparison with observed recruitment.

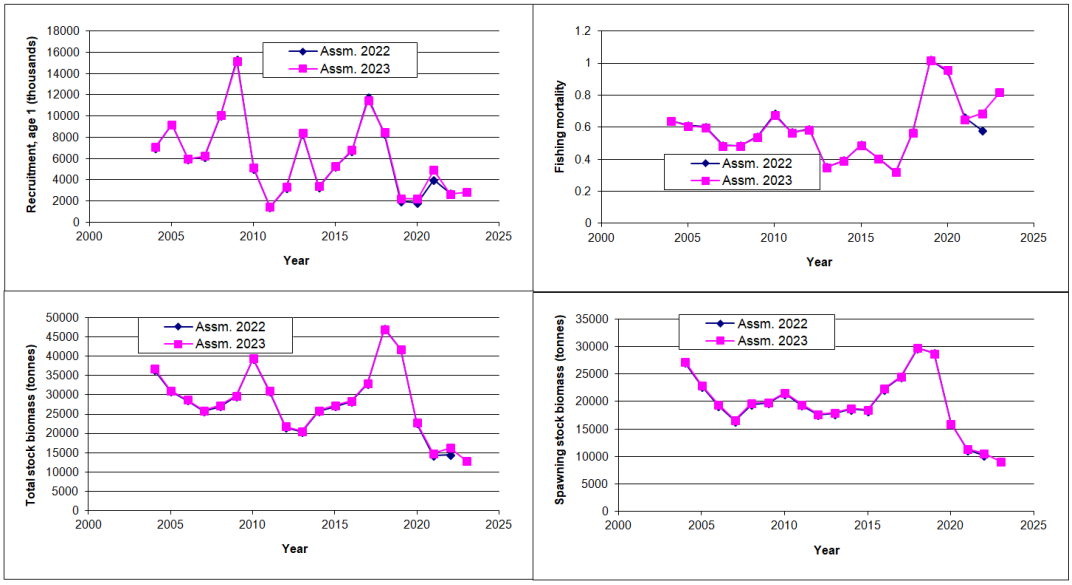


Figure 4.10.1. Faroe Plateau cod (Subdivision 5.b.1). Comparison between the results from the current autumn assessment compared with last year's assessment.