Contents

32 Sole (*Solea Solea)* in Division 7.e (western English Channel)

32.1 Introduction

Type of assessment in 2023

Last year's assessment report is available at:

https://doi.org/10.17895/ices.pub.22268980

ICES advice applicable to 2024

Last year's advice is available at https://doi.org/10.17895/ices.advice.21864300 and stated:

ICES advises that when the MSY approach is applied, catches in 2024 should be no more than 1057 tonnes.

32.2 ICES Transparent Assessment Framework

The Division 7.e sole stock is included in the ICES Transparent Assessment Framework (TAF, https://taf.ices.dk, https://github.com/ices-taf). All WGCSE assessments since 2018 are available from the ICES TAF GitHub page (please note, access to these repositories is so far restricted to ICES and members of WGCSE). Since 2024, there are two repositories for this stock. One for the data processing (processing raw data into a format for the stock assessment, https://github.com/ices-taf/2024_sol.27.7e_data) and a separate repository for the stock assessment (https://github.com/ices-taf/2024_sol.27.7e_assessment). All changes to the stock assessment and input data can be accessed with the following link: https://github.com/ices-taf/2024_sol.27.7e_assessment/compare/2b99512...main.

The TAF repositories include all input data, R scripts for processing data, preparing and running the stock assessment and forecast, and scripts for creating all figures and tables presented in this report. The repositories also contain documentation on how to reproduce the WGCSE assessment for sole.

32.3 General

Stock description and management units

The TAC specified for ICES Division 7.e is consistent with the assessment area.

Official national landings data as reported to ICES and the landings estimates as used by the Working Group are given in Table 33.1.

Official landings in 2023 were 1238 t, an 11% undershoot of the 2023 TAC (1394 t).

The TAC and the national quotas by country for 2023

Species	Sole *Solea solea*	Zone:	7e (Sol/07E.)
Belgium	46		Analytical TAC
France	487		
Union	533		
United Kingdom	861		
TAC	1394		

(Source: Council Regulation (EU) 2023/194, EU, 2023).

The TAC and the national quotas by country for 2024

Species	**Sole** ***Solea solea***	**Zone:**	**7e (Sol/07E.)**
Belgium	38		Analytical TAC
France	409		
Union	447		
United Kingdom	737		
TAC	1184		

(Source: Council Regulation (EU) 2024/257, EU, 2024).

Landing obligation

As of 2020, the EU landing obligation fully applied to sole in Division 7.e. However, a de minimis exemption allowed up to 3% of total annual catches to be discarded for trammel and gillnets and beam trawls with mesh size 80–119 mm with a Flemish panel (Commission Delegated Regulation (EU) 2020/2015, EU, 2020).

A landing obligation also applies in UK waters and includes a *de minimis* exemption for sole for trammel and gillnets (MMO, 2020a) and beam trawls with a Flemish panel (MMO, 2020b). However, the UK landing obligation specifies the de minimis exemption as a "small percentage of the total catch" without specifying a value.

The EU landing obligation was phased in between 2016–2019 (Commission Delegated Regulations (EU) 2015/2438, 2016/2375, 2018/46, EU, 2015, 2016, 2018). During the phasing in, the landing obligation applied to all catches of sole in 7.e with trammel and gillnets (gear codes GNS, GN, GND, GNC, GTN, GTR, GEN) and all beam trawls. However, a *de minimis* exemption applied, allowing up to 3% discards of annual catches for all trammel and gillnets and for beam trawls with a mesh size of 80–199 mm with increased selectivity. In 2016, the first year of the application, the landing obligation applied only to vessels for which the total landings consisted of more than 10% sole during two reference years (2013 and 2014, Commission Delegated Regulation (EU) 2015/2438, EU, 2015). This threshold was tightened for 2017, and the landing obligation applied to vessels landing more than 5% in the reference years 2014 and 2015 (Commission Delegated Regulation (EU) 2016/2375, EU, 2016). Subsequently, this restriction was lifted

altogether, and for 2018 (Commission Delegated Regulation (EU) 2018/46, EU, 2018), the landing obligation applied to all vessels using trammel and gillnets and beam trawls, as described above.

Given the low discards observed in the fishery, the landing obligation is unlikely to impact this stock or the advice significantly.

32.4 Data

InterCatch

International catch data are collated using the ICES InterCatch platform. For 2023, data for Belgium, France, Ireland, and the United Kingdom (England, and the Channel Island Guernsey) were uploaded into InterCatch (Figures 33.1 and 33.2). All submitted age samples are presented in Figure 33.8 and length samples in Figure 33.9. The raising procedure is described in the Stock Annex.

Landings

Landings of sole in Division 7.e have been increasing in recent years but decreased in 2023 and were 1239 t in 2023.

The UK, France and Belgium provided age-structured landings samples in InterCatch (Figure 33.8).

Total international landings numbers-at-age (Table 33.2 and Figure 33.5) and landings and stock weights-at-age (Tables 33.3 and 33.4 and Figure 33.6), as used in the assessment, were derived following the procedures outlined in the Stock Annex.

The fleets for which age distributions were submitted accounted for 92.5% of the 2023 total international landings, based on the InterCatch level (year, country, fleet, and quarter), the same level as in 2022.

Discards

Discards for this stock are very low and not included in the assessment. Discards submitted to InterCatch were 2.2t in 2023.

For 2023, discards estimates were provided by Belgium, France, and the UK for some fleets in InterCatch based on discard sampling. Discard age samples were provided for the annual Belgian TBB_DEF_70-99 and the Q2 UK TBB_DEF_70-99 data.

Discards data are only available from InterCatch since 2012. In general, the discard rates are low (Figure 33.3). A higher discard rate was observed in 2015, attributed to high discards from the multirig otter trawl (mesh size 90–99 mm) fleet. The three-year average (2021–2023) discard rate is 0.45%.

The discard rate by fleet and country is shown in Figure 33.4 (shown are only discards submitted to InterCatch, discards are not raised).

No discard information is included in the assessment, given that it is currently not possible to provide discard estimates for the entire time-series. Nevertheless, excluding discard estimates from the assessment is unlikely to have any major impact on the perception of stock status given the minor scale of the problem.

Biological data

Natural mortality was assumed to be constant over all ages and years at 0.1. The maturity ogive used for this stock was originally borrowed from divisions 7.f and 7.g, following the procedures outlined in the Stock Annex and adopted in previous assessments.

In agreement with the Stock Annex, stock and catch weights-at-age were derived by fitting a second-degree polynomial model to the raw landings weights-at-age extracted from InterCatch (Figure 33.7). For 2023 data, the youngest age for which data (catch numbers and weights) were provided was age 1.

Survey indices

Abundance estimates derived from the surveys as used in the assessment are given in Table 33.6 and shown in Figures 33.11–33.13, and internal consistencies in Figures 33.14–33.16. In general, cohort tracking and internal consistency are better in the commercial tuning fleets and less pronounced in the scientific surveys.

The UK-FSP survey

The UK Western Channel sole and plaice survey (previously called Fisheries Science Partnership survey; UK-FSP, quarter 3, ICES survey code B4381, Burt *et al*., 2024) conducted another survey of sole and plaice abundance in the Western English Channel in 2023. The survey uses two 4 m beam trawls with 80 mm nominal codend mesh and focuses on the area around the English coast. 90 out of 90 tows were completed in 2023. 350 sole otoliths were collected for ageing in 2023.

Catch rates are reported standardised as numbers per hour per meter of beam length. The results indicate that sole continues to be widespread in the area (Figure 33.17). The total CPUE decreased since 2019 to its lowest value of the time-series in 2022 and a small increase in 2023. The index is mainly driven by ages 3, 4, and 6. The internal consistency in the survey is good for ages 3+. Some year and cohort effects are visible.

The Q1SWBeam survey

The second survey used for sole is the Quarter 1 South West Beam trawl (Q1SWBeam, also called Q1SWECOS, ICES survey code B2732), which started in 2006. This survey deploys two 4 m beam trawls and uses a fully random stratified approach. In contrast to the FPS survey, the Q1SWBeam covers the entire western English Channel and, if conditions permit, adjacent areas. Figure 33.18 shows the spatial distribution catches for the entire Q1SWBeam time series.

The 2022 survey was disrupted and only 55 out of 81 planned tows were fished. This meant that the 2022 values from this survey were excluded from the assessment from 2023 onwards. In 2023, 77 out of 81 tows were completed.

Similar to previous years, the highest catches of sole were around the English coast. Fish aged 3, 5, 7, and 9 were most abundant.

Commercial fleets effort and lpue

Two commercial tuning series from the UK are used (commercial beam trawl UK-CBT and commercial otter trawl UK-COT).

Effort for under 24 m UK beam trawlers in days fished steadily increased from 1992, and reached the highest levels on record in 2012 and stayed around this level until the end of the time-series (Figure 33.10). Currently, the effort is well above the long-term average. In contrast, the effort for over 24 m UK beam trawlers increased from 1992 to 2004 and then decreased to below the average of the time-series, reaching a minimum in 2013. Since then, the effort increased again and has exceeded the long-term average in recent years. When the effort of all UK beam trawl vessels

is combined, the effort stayed relatively constant since the early 2000s with a slight increase in recent years.

UK otter trawl (UK-COT) effort has been in continual decline since the early 1970s and was at the lowest levels on record in 2015. For 2016, this fleet reported zero effort and landings. This could be explained by a shift in the size of fishing vessels to smaller vessels. Since 2017, a new database is being used for recording, but the data are not consistent with historical data and are therefore not used in the stock assessment.

Age-disaggregated commercial abundance indices for the UK-CBT-late (UK-CBT values from 2003 onwards) and UK-COT fleets as used in the assessment are given in Tables 33.5 and 33.6 and plotted in Figures 33.11–33.13.

32.5 Stock assessment

Model used: Extended Survivors Analysis (XSA) as outlined in the Stock Annex by IBPWCFlat2 2015.

Software used: FLR – FLXSA.

Model options chosen: Data included in the assessment were identical to previous years, apart from one additional data year.

Assessment input data characteristics: catch numbers-at-age excluding discards and four tuning fleets (two fishery-independent surveys: UK-FSP and Q1SWBeam; and two commercial LPUE time-series: UK-CBT-late and UK-COT).

Data screening

Data screening procedures identified no major anomalies in the catch numbers-at-age, weights or tuning information used in the WGCSE 2024 assessment.

Over the past years, there have been several notable strong cohorts and these track well in the landings at age; starting with fish aged 3 in 2017 (not visible anymore in 2023), age 3 in 2019 (age 7 in 2023), age 3 in 2021 (age 5 in 2023). Compared to previous years, the age distribution does not have one or two large age classes in 2023, instead ages 3, 5, and 7 are fairly strong but well below the peaks seen in previous years (Figure 33.5).

Tuning information consisted of four fleets: two UK commercial time-series (UK-CBT-late and UK-COT) and two UK standardised research surveys (UK-FSP and Q1SWBeam).

The UK commercial otter trawl fleet (UK-COT) reported zero effort in 2016. Therefore, there is no LPUE value for this fleet for 2016. Consequently, this tuning index only influences the assessment up to and including 2015.

Details of the derivation of the tuning fleets are presented in the Stock Annex. The tuning information available for this assessment is shown in Table 33.6.

Final update assessment

The working group fitted the XSA model developed by WKFLAT 2012 (ICES, 2012) using the updated assessment settings agreed at IBPWCFlat2 (ICES, 2015).

The XSA assessment settings used at the last three working groups are shown in the table below, and more historical settings have been included in the Stock Annex.

	WGCSE 2022	WGCSE 2023	WGCSE 2023
Assessment age range	2–12+	2–12+	2–12+
F_{bar} age range	F(3–9)	F(3–9)	F(3–9)
Assessment method	XSA	XSA	XSA
Tuning Fleets:			
Q1SWBeam	2006–2021 Ages 2–11 (non-offset)	2006–2021 Ages 2–11 (non-offset)	2006–2021, 2023 Ages 2–11 (non-offset)
UK-FSP	2014–2021 Ages 2–11	2014–2022 Ages 2–11	2014–2023 Ages 2–11
UK combined beam (late)	2003–2021 Ages 3–11	2003–2022 Ages 3–11	2003–2023 Ages 3–11
UK otter trawl	1988–2016 Ages 3–11	1988–2016 Ages 3–11	1988–2016 Ages 3–11
Time taper	Yes	Yes	Yes
Power model	Tricubic	Tricubic	Tricubic
Taper range	15 years	15 years	15 years
P shrinkage	No	No	No
Q plateau age	7	7	7
F shrinkage S.E	0.5	0.5	0.5
Number of years	3	3	3
Number of ages	5	5	5
Fleet S.E.	0.4	0.4	0.4

Figure 32.19 shows the results from the final XSA model fit, Figure 32.20 the model residuals, Figure 32.21 a comparison of the current assessment with last years' assessments, Figure 32.22 XSA survivor weightings for the last two years and Figure 32.23 a five-year retrospective.

The survey residuals show relatively large values in earlier years. This is an expected feature of the XSA assessment, which includes a taper range of 15 years. This means that older survey observations are down-weighted and any observations 15 years or older are not used in the assessment.

A Mohn's rho analysis with five peels was conducted based on the XSA stock assessment results, i.e. the last data year (2023) was used as the final year for comparison of SSB, F, and recruitment and based on a five-year retrospective analysis. The results from the Mohn's rho analysis are shown in the following table:

	SSB	F (ages 3–9)	recruitment
Mohn's rho value	-0.088	0.151	0.188

The Mohn's rho values for this assessment are well within the ICES WKFORBIAS thresholds (+0.20, -0.15), i.e. the current assessment indicates sufficient consistency for advice purposes.

XSA diagnostic of the final assessment are presented in Table 33.7, stock numbers-at-age in Table 32.8, fishing mortalities-at-age in Table 32.9 and an assessment summary in Table 32.10.

Consistency of the stock assessment

The comparison of historical stock assessment results (historical retro, Figure 32.21) and the analytical retrospective analysis (Figure 32.23) show slightly different retrospective patterns. It is worth noting that the historical comparison (Figure 32.21) shows the assessment results (including short-term forecast assumptions for the intermediate year) from conducting the stock assessment in the corresponding years. These values are stored in an ICES database and not updated afterwards. On the other hand, the analytical retrospective analysis (Figure 32.23) is conducted with the most recent version of the input data, and its retrospective runs are also based on these most recent (possibly updated or revised) data and only removing data years from the end.

The differences between the historical and analytical retro can be explained through revisions of historical input data over the years, namely:

- Q1SWBeam: The scientific Q1SWBeam survey was revised in 2020 and again in 2022 because of a quality control process of the survey data and data processing. This is described in previous reports. This has led to some changes in historical data, which means historical assessment results are based on slightly different historical Q1SWBeam data compared to the assessment afterwards.
- Q1SWBeam: WGCSE 2023 decided not to include 2022 values of this survey because of a substantially reduced survey coverage, however, values from 2023 were included again.
- FSP: The FSP survey index values used in the assessment are a product of a model fitting to the raw data. This means that the entire time-series is updated every year, including historical values.
- The 2017 and 2018 catch data were revised in 2023, which would have led to lower estimates of SSB and higher estimates of F in recent years.

Furthermore, the terminal year of the historical retro includes assumptions for the intermediate year. In the following year's assessment, the observed perception of the fishery can be different from that assumed in the previous year.

State of the stock

Stock trends are shown in Table 32.10 and plotted in Figure 32.19. The SSB is in a desirable state above all biomass reference points but declining over the past two years. F has increased in previous years but is estimated to be below F_{MSY}.

The age structure of sole in 7.e continues to be more extended than other sole stocks in European waters, implying low mortality rates, with the plus group at age 12 containing a relatively high proportion of the catches and including some individuals aged 33–38 in recent years.

32.6 Short-term projections

Forecast assumptions

Figure 32.24 shows three different targets for the intermediate year: status quo ($F = F_{2023}$), average ($F = F_{average\ 2021–2023}$), and the F corresponding to the TAC.

Landings have been below the international TAC and the advised catch in previous years (Figure 32.25). However, TACs have been decreasing since 2021 and the 2023 landings (1237t) were close to the TAC for 2024 (1184t). Anecdotal information from England (the main country fishing in this area) suggests that the TAC is becoming restrictive for some fleet segments. This indicates that the TAC for 2024 of 1184 t is likely to be taken by the fishery. Three options were considered for the intermediate year of the short-term forecast (Figure 32.24) and lead to very similar outcomes. The three-year average (2021-2023) F assumption and the TAC assumption are nearly identical (landings of 1184t vs 1179t in 2024). The landings when using the last F (2023) are slightly higher (1140t). The working group decided to select the option corresponding to the TAC for the intermediate year (2024). However, the impact of the intermediate year assumption on the projected landings in the advice year (2025) is minor. Because the assessment is based on landings only, the TAC of 1184 t was corrected for the assumed discard rate (average of 2021–2023, 0.45%), and a landings value of 1179 t was used for the intermediate year in the short-term forecast.

Weights-at-age were calculated as the average of the last three historical years, as in previous years.

Recruitment estimates do not indicate periods of consistent high or low recruitment periods in recent years. Consequently, the long-term average (geometric mean of 1969–2023) of the recruitment was used for the intermediate year and advice year, following the Stock Annex.

The forecast was conducted with FLR's FLash R package using the output from the landings only XSA assessment. The resulting yield was obtained by adding discards to the landing with an average discard rate of the last three historical years (2021–2023, 0.45%).

The input data for the short-term forecast are shown in Table 32.11.

MSY forecast

Table 32.12 shows a detailed output of the forecast targeting F_{MSY} for 2025–2026, and Table 32.13 the year classes contributing to the forecast yield and SSB.

Figure 32.26 shows the forecast results for F_{MSY}, and Figure 33.27 the forecast, including F_{MSY} ranges.

Implementing the MSY approach with F_{MSY}=0.29 leads to a total catch of 1151 t in 2025 (1146 t of landings, 5 t of discards), and an SSB of 3706 t in 2026 in the short-term forecast.

A management options table is provided in Table 32.14, and Table 32.15 shows additional options.

The advice is an increase of 8.9% compared to the advice for 2024. The following report section describes the changes in the advice.

32.7 Explanation of the change in advice

This year's assessment (WGCSE 2024) led to a rescaling of SSB and F for around the past 10 years. SSB is now estimated to be higher and F lower than estimated by last year's assessment (WGCSE 2023). However, this year's assessment (WGCSE 2024) is much closer to the estimates from the

stock assessment from two years ago (WGCSE 2022). Despite the rescaling in SSB, the terminal SSB value (2024) is now very similar to the terminal estimate from last year (2023 SSB from WGCSE 2023). The fishing mortality is now estimated to be below F_{MSY}.

Last year's assessment (WGCSE 2023) showed some rescaling to the previous assessment (WGCSE 2023) because of a revision of historical catch data (2017 and 2018) and the loss of 2022 Q1SWBeam survey data. This year's rescaling (WGCSE 2024) was caused by (1) the addition of an additional year of data (including the addition of 2023 Q1SWBeam survey data after no 2022 data were available) which changed the perception of the stock and (2) F is now estimated to be below F_{MSY}, giving some scope for increasing F and the corresponding increase in the catch.

This year's advice is an increase to the previously advised catch value because the addition of an additional year of data led to a more optimistic perception of the stock status.

Figure 32.28 shows a comparison of this year's assessment (including intermediate year) to last year's assessment. Figure 33.29 shows a comparison of this year's values-at-age (stock numbers, stock weight, stock biomass, selectivity) for the assessment and forecast and the corresponding values from last year's analysis.

Figure 32.30 illustrates the contribution of cohorts to the SSB and the catch from this year's assessment and short-term forecast. Figure 32.31 shows the same but for numbers.

32.8 Biological reference points

The most recent reference points for this stock were developed by WKMSYREF4 in 2015 (ICES, 2016). These reference points are presented in the following table. Please note that ICES changed the basis for F_{pa} to $F_{p.05}$ in 2021, and the updated F_{pa} value is shown here.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2900 t	The 5th percentile of the distribution of SSB when fishing at F_{MSY} (0.29) with no error.	ICES (2016, 2017)
	F_{MSY}	0.29	The peak of the median landings yield curve.	ICES (2016, 2017)
	F_{MSY} lower	0.16	Minimum F which produces at least 95% of maximum yield.	ICES (2016, 2017)
	F_{MSY} upper	0.34	Maximum F which produces at least 95% of maximum yield.	ICES (2016, 2017)
	B_{lim}	2000 t	Rounded B_{pa}/1.4.	ICES (2016, 2017)

Framework	Reference point	Value	Technical basis	Source
Precautionary approach	B_{pa}	2900 t	Rounded B_{loss} (1999 year class). Lowest SSB with high recruitment.	ICES (2016, 2017)
	F_{lim}	0.44	Segmented regression simulation of recruitment with B_{lim} as the breakpoint and no error.	ICES (2016, 2017)
	F_{pa}	0.39	Fp.05; the F that leads to SSB ≥ B_{lim} with 95% probability.	ICES (2016, 2017)
Previous management plan	SSB_{MGT}	Not defined		
	F_{MGT}	0.27		EU (2007)

32.9 Management plan

The European Commission implemented a management plan for the recovery of the stock early in 2007 (Council Regulation (EC) No 509/2007). The management plan has not been formally evaluated, but the working group concluded that: The long-term management target (F_{MGT} = 0.27) is precautionary in the sense that it ensures that there is a less than 5% chance of SSB declining below previously observed levels, as well as maintaining yield within 10% of MSY (*WGCSE note: long-term yield at* F_{MAX}) (working group, 2005; working group, 2006).

This management plan has not been used in recent years, and the ICES advice has been based on the MSY approach, targeting F_{MSY}.

The management plan (Council Regulation (EC) No 509/2007) is no longer in force since 2019 and has been repealed by an EU multiannual plan for stocks fished in the Western Waters and adjacent waters (Regulation (EU) 2019/472, EU, 2019) which aims at targeting MSY.

32.10 Uncertainties in assessment and forecast

The methodology provided is as robust as possible and does not currently appear to suffer from a serious retrospective pattern.

Discarding

Discarding is considered negligible in the sole fishery, averaging <1% of the total international catch weight in the past years. Nevertheless, a time-series of available discards information raised to the fleet level should be developed to effectively deal with potential future discard issues and improve estimates of total mortality. The EU landing obligation was implemented during 2016–2019 with a discard plan and seemed to have reduced the already low discards even more. The landings advice has been topped up with the available discard information to give catch advice. Developing a time-series of discard information appears to be less urgent than in the past.

Surveys

The assessment methodology includes two survey indices. The UK-Q1SWBeam survey added to the assessment in 2012 covers the entire management area, providing fishery-independent tuning information for the entire age range used in the assessment. Therefore, the assessment relies much less on the commercial tuning information and is less susceptible to localised exploitation by the fishery. Consequently, commercial tuning information is still used in the assessment to maintain the balance between accuracy and precision required by management. Survey information for the recruiting year class remains temporally variable and is not used in the forecast for this reason.

Sampling

Age and length sampling for this stock is mostly adequate. Age data from the largest sector operating in this fishery (UK) are included in the assessment. There are limited discard age samples, but this does not impose a problem on the assessment or forecast due to very low discarding.

Consistency

The assessment for this stock was last benchmarked in 2012, and an inter-benchmark was held in 2015. The 2024 assessment is fairly consistent with the previous assessments conducted in recent years.

32.11 Recommendation for the next benchmark

There is no urgent requirement to benchmark this stock in the short term.

The XSA assessment uses a taper range of 15 years for the tuning indices, effectively down-weighting older tuning data and removing data older than 15 years altogether. As tuning time-series become longer, potentially important information might get lost in the process. Therefore, a re-evaluation of assessment parametrisation should be considered.

LPUE estimates for the UK-CBT and UK-COT fleets should be closely monitored to avoid the recurrence of inaccuracies in commercial tuning information observed at the 2014 and 2015 working groups. A rescaling observed in the 2018 and 2019 assessments can be explained by underlying data. Consequently, the next benchmark should evaluate the temporal stability of the retrospective patterns and determine whether the assessment settings need to be revised.

The UK-COT effort has been in continuous decline and reported no activity in 2016 and subsequently, due to a new database system, cannot be replicated anymore. Consequently, a benchmark could investigate the removal of commercial tuning information altogether from the assessment.

As the time-series on discards increases, a future benchmark might look into including discard estimates in the assessment and estimating historical discards. Discards are very low and, due to the implementation of the landing obligation in 2016, unlikely to become a problem in the future.

Age samples for 2017 and 2018 catches from England were revised in 2023 due to an error found in the data. The data for remaining years could also be checked if similar issues occurred in other years.

Some genetic work on the stock identity for sole in the Celtic Seas ecoregion has been conducted and there is also further work ongoing. The outcome of such work should be closely followed and could inform future benchmarks for this stock.

The current reference points were estimated at ICES WKMSYREF4 in 2015 (ICES, 2016). While some rescaling of the stock assessment results has occurred in the past years, this has mainly affected later years in the time series and not the overall trends and magnitude, so is unlikely to

substantially alter reference point estimates. Any re-estimation of reference points should likely wait for the outcomes of the WKNEWREF workshop series.

32.12 Management considerations

France provided discard estimates for the first time at the 2016 working group. Discard estimates from France are higher than from the other countries.

Plaice is taken as bycatch in this fishery, and therefore management advice for sole must also consider the advice for plaice. Anglerfish, cuttlefish, and lemon sole are also important bycatches in this fishery.

32.13 Ecosystem considerations and changes in the environment

See Stock Annex.

32.14 Regulations and their effects

Management of this stock is mainly by TAC. In 2005, effort restrictions were implemented for beam trawlers and entangling gears targeting sole in this fishery to enforce the TAC and improve data quality. The effort restrictions were included in the 2007 management plan (EU, 2007) and are continued in the EU multiannual plan (EU, 2019). The effort restrictions limit the number of days at sea for vessels in 7.e using beam trawls (≥80 mm mesh size) and static nets (≤120 mm mesh size). The limits for effort are set annually in the EU council with the TAC and apply only for vessels which catch more than 300 kg of sole annually.

Mesh restrictions for towed gears are set to 80 mm codends, which correspond well with the minimum landing size of sole at 24 cm (25 cm for Belgian vessels since December 2017).

32.15 References

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32.16 Tables

Table 32.1. Sole in Division 7.e. History of official landings and ICES estimates. All weights are in tonnes.

Year	Belgium	France	Netherlands	Ireland	UK and Channel Islands	Official total	ICES landings	ICES discards
1974		323				323	427	
1975	3	271			217	491	491	
1976	4	352			260	616	616	
1977	3	331			272	606	606	
1978	4	384			453	841	861	
1979	1	515			665	1181	1181	
1980	45	447		13	764	1269	1269	
1981	16	415	1		788	1220	1215	
1982	98	321			1028	1447	1446	
1983	47	405	3		1043	1498	1498	
1984	48	421			901	1370	1370	
1985	58	130			911	1099	1409	
1986	62	467			840	1369	1419	
1987	48	432			632	1112	1280	
1988	67	98			784	949	1444	
1989	69	112	6		613	800	1390	
1990	41	81			636	758	1315	
1991	35	325			477	837	852	
1992	41	267			468	776	895	
1993	59	236			498	793	904	
1994	33	257			546	836	800	
1995	21	294			565	880	856	
1996	8	297			428	733	833	
1997	13	348		1	496	858	949	
1998	40	343			389	772	880	
1999	13				396	409	957	
2000	4	241			413	658	914	
2001	19	224			407	650	1069	
2002	33	198			309	540	1106	
2003	1	363		1	255	620	1078	
2004	7	302			185	494	1075	
2005	26	406			527	959	1039	

Year	Belgium	France	Netherlands	Ireland	UK and Channel Islands	Official total	ICES landings	ICES discards
2006	32	357			575	964	1022	
2007	34	384			536	953	1015	
2008	28	312		< 1	474	815	908	
2009	17	386			382	785	701	
2010	17	375			369	761	698	
2011	22	424			431	877	801	
2012	39	325		< 1	506	871	872	2
2013	30	319			540	889	883	1
2014	25	351		< 1	510	886	885	10
2015	42	245		< 1	490	777	774	54
2016	46	245			624	915	913	10
2017	56	198		< 1	746	1000	1007	4
2018	68	217	< 1	< 1	801	1086	1075	3
2019	47	208	< 1	< 1	926	1182	1185	4
2020	58	194	< 1		969	1222	1219	< 1
2021	104	252	< 1	< 1	1048	1403	1392	13
2022*	132	231		< 1	1044	1407	1409	3
2023*	104	193	< 1	< 1	941	1238	1239	2

*** Preliminary.**

Table 32.2. Sole in Division 7.e. Landings numbers-at-age (thousands).

YEAR\AGE	2	3	4	5	6	7	8	9	10	11	12+	TOTAL
1969	89	322	80	148	210	21	50	26	20	9	63	1037
1970	53	232	322	90	83	112	13	35	52	22	113	1127
1971	51	200	246	198	65	80	156	10	35	54	113	1207
1972	146	412	167	115	112	14	25	134	38	54	106	1323
1973	71	396	433	89	99	120	17	52	30	4	136	1446
1974	45	349	220	178	71	80	43	32	24	55	106	1202
1975	82	567	170	199	115	28	53	26	22	24	171	1456
1976	167	419	472	161	135	92	46	58	51	14	213	1830
1977	426	318	384	206	102	70	74	10	24	32	159	1804
1978	250	1123	347	214	189	103	72	77	38	27	203	2644
1979	227	803	811	250	229	174	103	90	104	28	290	3108

YEAR\AGE	2	3	4	5	6	7	8	9	10	11	12+	TOTAL
1980	175	559	497	630	126	183	140	65	56	130	342	2902
1981	245	806	651	467	389	179	126	76	58	55	211	3262
1982	128	1451	916	553	352	240	136	113	81	61	294	4324
1983	91	753	1573	583	351	267	294	119	73	37	262	4401
1984	333	663	826	758	325	204	129	152	54	28	255	3727
1985	287	1700	756	469	585	179	97	103	85	29	125	4414
1986	246	1618	971	421	321	336	84	75	90	74	127	4363
1987	487	808	1090	427	204	224	229	47	50	41	162	3770
1988	443	1438	596	728	374	153	162	109	39	50	171	4262
1989	390	871	1233	497	509	225	110	107	113	48	214	4316
1990	341	902	581	553	244	264	143	103	75	85	235	3525
1991	450	415	482	289	220	93	111	68	37	31	145	2341
1992	316	1434	417	297	115	112	61	74	26	23	90	2964
1993	209	704	1107	350	219	151	78	60	56	31	79	3045
1994	97	657	558	558	112	106	49	57	44	50	99	2388
1995	95	308	629	427	411	131	101	61	33	18	142	2356
1996	365	445	364	298	235	257	68	61	49	37	143	2321
1997	216	831	724	325	180	194	173	44	20	40	88	2835
1998	265	606	536	336	209	151	80	127	35	34	162	2543
1999	280	915	500	398	255	114	103	54	107	25	123	2874
2000	307	599	751	367	229	107	53	68	51	88	91	2710
2001	145	1401	531	497	268	178	100	55	43	42	159	3419
2002	332	1251	843	387	322	129	105	94	33	18	85	3599
2003	598	835	953	645	130	74	50	58	63	14	61	3482
2004	398	1080	448	445	526	164	116	61	54	35	85	3412
2005	258	468	834	449	366	293	113	80	45	24	96	3027
2006	500	786	472	606	250	224	185	85	56	31	87	3282
2007	201	852	755	293	362	179	130	110	55	27	99	3062
2008	281	752	678	376	163	184	105	71	67	39	89	2805
2009	166	540	385	333	202	66	74	37	50	35	65	1955
2010	68	348	394	329	204	127	49	71	20	34	78	1723
2011	91	499	476	405	233	156	80	39	34	28	93	2136
2012	31	227	525	400	355	231	137	67	44	39	124	2180
2013	120	324	483	595	280	214	147	98	48	23	110	2441

YEAR\AGE	2	3	4	5	6	7	8	9	10	11	12+	TOTAL
2014	198	320	466	426	410	168	112	79	61	27	97	2364
2015	177	329	395	336	261	206	115	78	45	30	82	2054
2016	92	420	469	276	249	242	189	67	50	33	107	2194
2017	134	747	561	288	238	196	142	130	83	64	124	2708
2018	130	375	768	429	203	209	155	98	95	73	156	2691
2019	115	874	659	633	381	198	168	123	70	86	157	3463
2020	169	558	1194	613	444	254	137	83	72	33	159	3716
2021	115	841	693	1182	576	329	173	122	80	48	178	4338
2022	356	505	937	648	845	311	213	107	55	55	194	4226
2023	271	659	480	610	429	549	180	136	69	56	141	3581

Table 32.3. Sole in Division 7.e. Landings weights-at-age (kg).

year\age	2	3	4	5	6	7	8	9	10	11	12+
1969	0.188	0.245	0.332	0.329	0.367	0.522	0.455	0.463	0.606	0.648	0.661
1970	0.188	0.224	0.295	0.315	0.355	0.436	0.500	0.444	0.514	0.530	0.596
1971	0.151	0.222	0.296	0.367	0.350	0.359	0.431	0.455	0.476	0.388	0.654
1972	0.194	0.227	0.272	0.369	0.408	0.458	0.496	0.402	0.454	0.509	0.601
1973	0.203	0.224	0.262	0.311	0.382	0.415	0.460	0.467	0.538	0.655	0.562
1974	0.183	0.224	0.281	0.379	0.434	0.372	0.465	0.476	0.488	0.475	0.732
1975	0.178	0.210	0.293	0.351	0.395	0.427	0.487	0.580	0.638	0.525	0.663
1976	0.170	0.218	0.287	0.324	0.391	0.455	0.414	0.476	0.479	0.585	0.629
1977	0.197	0.249	0.303	0.357	0.400	0.503	0.464	0.518	0.485	0.553	0.683
1978	0.178	0.239	0.300	0.387	0.435	0.374	0.482	0.485	0.484	0.535	0.665
1979	0.189	0.239	0.330	0.427	0.464	0.472	0.481	0.570	0.527	0.574	0.732
1980	0.189	0.254	0.343	0.389	0.525	0.560	0.609	0.646	0.655	0.600	0.783
1981	0.174	0.225	0.321	0.381	0.477	0.514	0.533	0.598	0.619	0.708	0.660
1982	0.214	0.209	0.278	0.347	0.426	0.498	0.510	0.523	0.526	0.564	0.663
1983	0.187	0.250	0.271	0.306	0.388	0.417	0.473	0.530	0.608	0.551	0.665
1984	0.210	0.243	0.306	0.381	0.391	0.481	0.542	0.562	0.604	0.726	0.643
1985	0.163	0.226	0.298	0.360	0.391	0.472	0.523	0.534	0.522	0.588	0.822
1986	0.174	0.237	0.297	0.354	0.407	0.456	0.502	0.544	0.583	0.618	0.703
1987	0.174	0.245	0.310	0.370	0.425	0.474	0.518	0.557	0.590	0.618	0.665
1988	0.170	0.244	0.312	0.375	0.432	0.484	0.531	0.572	0.608	0.639	0.694
1989	0.167	0.222	0.275	0.326	0.375	0.422	0.467	0.510	0.551	0.590	0.692

year\age	2	3	4	5	6	7	8	9	10	11	12+
1990	0.217	0.272	0.324	0.372	0.419	0.461	0.501	0.538	0.571	0.601	0.669
1991	0.182	0.255	0.323	0.386	0.445	0.499	0.549	0.594	0.634	0.669	0.741
1992	0.166	0.238	0.305	0.366	0.423	0.474	0.520	0.561	0.597	0.627	0.683
1993	0.146	0.209	0.268	0.324	0.376	0.425	0.470	0.513	0.551	0.587	0.672
1994	0.183	0.241	0.295	0.347	0.396	0.442	0.484	0.524	0.561	0.595	0.671
1995	0.192	0.248	0.301	0.351	0.397	0.441	0.481	0.518	0.552	0.583	0.652
1996	0.214	0.262	0.308	0.354	0.399	0.442	0.484	0.524	0.564	0.602	0.694
1997	0.186	0.244	0.300	0.354	0.406	0.455	0.503	0.548	0.592	0.633	0.734
1998	0.191	0.247	0.300	0.350	0.397	0.441	0.482	0.520	0.555	0.586	0.661
1999	0.208	0.257	0.303	0.347	0.389	0.429	0.468	0.503	0.536	0.567	0.637
2000	0.202	0.258	0.310	0.358	0.401	0.441	0.476	0.508	0.535	0.558	0.647
2001	0.203	0.245	0.287	0.326	0.365	0.402	0.438	0.472	0.505	0.537	0.616
2002	0.181	0.236	0.290	0.342	0.391	0.439	0.485	0.529	0.570	0.610	0.706
2003	0.173	0.241	0.306	0.367	0.425	0.479	0.530	0.577	0.620	0.660	0.746
2004	0.176	0.230	0.282	0.334	0.385	0.435	0.485	0.534	0.582	0.629	0.757
2005	0.180	0.236	0.290	0.343	0.394	0.444	0.493	0.540	0.586	0.630	0.747
2006	0.169	0.228	0.282	0.333	0.381	0.424	0.464	0.501	0.533	0.562	0.672
2007	0.183	0.244	0.299	0.350	0.395	0.436	0.471	0.501	0.526	0.546	0.616
2008	0.197	0.245	0.292	0.337	0.382	0.425	0.468	0.509	0.549	0.588	0.652
2009	0.176	0.252	0.322	0.385	0.443	0.494	0.540	0.579	0.612	0.639	0.703
2010	0.169	0.258	0.339	0.412	0.476	0.532	0.580	0.619	0.650	0.673	0.699
2011	0.200	0.261	0.319	0.375	0.428	0.480	0.528	0.575	0.618	0.660	0.749
2012	0.162	0.240	0.311	0.373	0.428	0.476	0.516	0.548	0.572	0.589	0.664
2013	0.172	0.228	0.283	0.337	0.389	0.439	0.489	0.536	0.583	0.628	0.740
2014	0.191	0.254	0.313	0.366	0.415	0.459	0.499	0.533	0.563	0.588	0.709
2015	0.182	0.250	0.313	0.370	0.423	0.471	0.513	0.551	0.583	0.611	0.697
2016	0.215	0.282	0.345	0.401	0.453	0.499	0.541	0.576	0.606	0.631	0.720
2017	0.209	0.264	0.315	0.364	0.409	0.451	0.490	0.527	0.56	0.59	0.664
2018	0.237	0.289	0.338	0.383	0.425	0.463	0.498	0.529	0.558	0.582	0.666
2019	0.18	0.233	0.284	0.333	0.379	0.423	0.464	0.503	0.54	0.574	0.682
2020	0.188	0.235	0.28	0.323	0.365	0.406	0.445	0.483	0.519	0.553	0.642
2021	0.157	0.213	0.265	0.313	0.358	0.399	0.435	0.468	0.498	0.523	0.592
2022	0.144	0.207	0.266	0.322	0.375	0.424	0.47	0.512	0.551	0.586	0.665
2023	0.212	0.249	0.286	0.324	0.362	0.4	0.439	0.479	0.518	0.559	0.668

Table 32.4. Sole in Division 7.e. Stock weights-at-age (kg).

year\age	2	3	4	5	6	7	8	9	10	11	12+
1969	0.125	0.200	0.270	0.330	0.380	0.425	0.460	0.490	0.520	0.550	0.609
1970	0.120	0.195	0.255	0.305	0.355	0.395	0.430	0.465	0.490	0.510	0.541
1971	0.090	0.170	0.240	0.295	0.345	0.390	0.420	0.445	0.470	0.490	0.544
1972	0.130	0.200	0.265	0.325	0.380	0.420	0.460	0.490	0.520	0.540	0.558
1973	0.105	0.170	0.235	0.290	0.340	0.390	0.435	0.475	0.510	0.540	0.585
1974	0.125	0.200	0.265	0.320	0.370	0.410	0.455	0.490	0.515	0.530	0.571
1975	0.144	0.221	0.267	0.327	0.385	0.435	0.479	0.516	0.545	0.569	0.628
1976	0.146	0.198	0.247	0.294	0.338	0.380	0.417	0.456	0.491	0.523	0.595
1977	0.156	0.221	0.278	0.332	0.382	0.425	0.462	0.497	0.527	0.553	0.629
1978	0.156	0.217	0.276	0.330	0.380	0.425	0.463	0.498	0.526	0.555	0.630
1979	0.141	0.216	0.287	0.352	0.414	0.463	0.502	0.539	0.574	0.608	0.719
1980	0.125	0.206	0.288	0.360	0.436	0.513	0.575	0.620	0.650	0.674	0.714
1981	0.119	0.197	0.276	0.358	0.427	0.490	0.543	0.582	0.616	0.645	0.699
1982	0.117	0.195	0.265	0.335	0.398	0.455	0.506	0.536	0.562	0.585	0.632
1983	0.120	0.195	0.250	0.307	0.365	0.420	0.475	0.520	0.570	0.615	0.709
1984	0.108	0.192	0.268	0.339	0.400	0.453	0.501	0.545	0.577	0.607	0.696
1985	0.150	0.204	0.258	0.311	0.364	0.416	0.468	0.520	0.571	0.621	0.790
1986	0.140	0.206	0.268	0.326	0.381	0.432	0.480	0.524	0.564	0.601	0.691
1987	0.137	0.210	0.278	0.341	0.398	0.450	0.497	0.538	0.574	0.605	0.659
1988	0.131	0.208	0.278	0.344	0.404	0.459	0.508	0.552	0.591	0.624	0.687
1989	0.139	0.195	0.249	0.300	0.350	0.398	0.444	0.488	0.531	0.571	0.675
1990	0.187	0.243	0.296	0.346	0.393	0.437	0.478	0.516	0.551	0.583	0.654
1991	0.144	0.219	0.290	0.355	0.416	0.473	0.524	0.572	0.614	0.652	0.731
1992	0.128	0.202	0.272	0.336	0.395	0.449	0.498	0.542	0.580	0.613	0.677
1993	0.114	0.178	0.239	0.296	0.350	0.401	0.448	0.492	0.532	0.570	0.659
1994	0.153	0.212	0.268	0.322	0.372	0.419	0.463	0.505	0.543	0.578	0.659
1995	0.163	0.221	0.275	0.326	0.374	0.419	0.461	0.500	0.536	0.568	0.641
1996	0.189	0.238	0.285	0.331	0.376	0.420	0.463	0.504	0.544	0.583	0.677
1997	0.156	0.215	0.272	0.327	0.380	0.431	0.480	0.526	0.570	0.612	0.717
1998	0.162	0.220	0.274	0.325	0.374	0.419	0.462	0.501	0.537	0.571	0.650
1999	0.183	0.233	0.280	0.326	0.369	0.410	0.448	0.485	0.519	0.551	0.624
2000	0.172	0.230	0.284	0.333	0.379	0.421	0.458	0.492	0.521	0.546	0.643

year\age	2	3	4	5	6	7	8	9	10	11	12+
2001	0.181	0.224	0.266	0.307	0.346	0.384	0.420	0.455	0.489	0.521	0.602
2002	0.152	0.209	0.263	0.316	0.367	0.415	0.462	0.507	0.550	0.591	0.688
2003	0.137	0.207	0.274	0.337	0.396	0.452	0.505	0.554	0.599	0.641	0.732
2004	0.149	0.203	0.256	0.308	0.360	0.410	0.460	0.509	0.557	0.605	0.734
2005	0.152	0.208	0.263	0.316	0.368	0.419	0.468	0.516	0.562	0.607	0.726
2006	0.138	0.197	0.254	0.306	0.355	0.400	0.442	0.479	0.514	0.544	0.661
2007	0.151	0.214	0.272	0.325	0.373	0.416	0.454	0.486	0.514	0.536	0.614
2008	0.172	0.221	0.268	0.315	0.360	0.404	0.447	0.489	0.529	0.569	0.640
2009	0.136	0.215	0.287	0.354	0.415	0.469	0.518	0.560	0.596	0.626	0.698
2010	0.121	0.215	0.300	0.376	0.445	0.505	0.557	0.600	0.636	0.663	0.696
2011	0.169	0.231	0.290	0.347	0.402	0.454	0.504	0.552	0.597	0.639	0.738
2012	0.120	0.202	0.276	0.343	0.402	0.453	0.497	0.532	0.561	0.581	0.664
2013	0.144	0.200	0.256	0.310	0.363	0.414	0.464	0.513	0.560	0.606	0.729
2014	0.157	0.223	0.284	0.340	0.391	0.438	0.480	0.517	0.549	0.576	0.706
2015	0.147	0.217	0.282	0.342	0.397	0.448	0.493	0.533	0.568	0.598	0.692
2016	0.178	0.248	0.313	0.373	0.427	0.476	0.519	0.557	0.59	0.617	0.714
2017	0.181	0.237	0.290	0.340	0.387	0.430	0.471	0.509	0.543	0.575	0.655
2018	0.210	0.264	0.314	0.361	0.404	0.444	0.481	0.514	0.544	0.570	0.660
2019	0.152	0.207	0.259	0.309	0.356	0.401	0.444	0.484	0.522	0.557	0.672
2020	0.165	0.212	0.257	0.302	0.344	0.386	0.426	0.464	0.501	0.536	0.632
2021	0.128	0.186	0.240	0.290	0.336	0.379	0.417	0.452	0.483	0.511	0.586
2022	0.111	0.176	0.237	0.295	0.349	0.400	0.447	0.491	0.532	0.569	0.656
2023	0.193	0.23	0.267	0.305	0.343	0.381	0.42	0.459	0.498	0.538	0.657

Table 32.5. Sole in Division 7.e. Landings, effort and mean standardised LPUE for the UK commercial fleets.

Fleet	Year	Effort [days]	Landings [tonnes]	Lpue [tonnes/1000 days]	means standardised lpue
UK-CBT<24 m	1988	2527	293	115.97	1.93
	1989	1956	162	83.06	1.38
	1990	1958	179	91.51	1.52
	1991	1458	134	92.22	1.53
	1992	1342	142	106.22	1.76
	1993	1432	154	107.71	1.79
	1994	2241	161	71.97	1.19
	1995	2017	134	66.28	1.10
	1996	1999	106	52.99	0.88
	1997	1991	132	66.30	1.10
	1998	2357	99	42.12	0.70
	1999	2518	115	45.70	0.76
	2000	2913	134	45.85	0.76
	2001	3746	148	39.57	0.66
	2002	3482	110	31.55	0.52
	2003	3785	93	24.44	0.41
	2004	3512	64	18.12	0.30
	2005	3305	191	57.72	0.96
	2006	3277	224	68.27	1.13
	2007	4027	225	55.77	0.93
	2008	4629	213	45.94	0.76
	2009	4040	185	45.85	0.76
	2010	4727	201	42.42	0.70
	2011	5913	258	43.65	0.72
	2012	7188	314	43.65	0.72
	2013	6322	329	52.02	0.86
	2014	5870	308	52.54	0.87
	2015	6260	310	49.54	0.82
	2016	6114	355	58.1	0.96
	2017	6578	402	61.08	1.01
	2018	6366	386	60.66	1.01

Fleet	Year	Effort [days]	Landings [tonnes]	Lpue [tonnes/1000 days]	means standardised lpue
	2019	6067	397	65.49	1.09
	2020	5643	393	69.61	1.15
	2021	5354	399	74.5	1.24
	2022	6085	377	61.94	1.03
	2023	6034	350	57.93	0.96
UK-CBT>24 m	1988	2971	391	131.77	2.74
	1989	3938	340	86.37	1.79
	1990	3518	314	89.12	1.85
	1991	2412	206	85.47	1.78
	1992	1993	197	98.63	2.05
	1993	2678	194	72.54	1.51
	1994	4574	236	51.50	1.07
	1995	4917	257	52.30	1.09
	1996	5592	178	31.84	0.66
	1997	5377	199	37.10	0.77
	1998	4945	164	33.19	0.69
	1999	4512	141	31.32	0.65
	2000	5237	151	28.84	0.60
	2001	5874	142	24.11	0.5
	2002	5957	104	17.51	0.36
	2003	6810	94	13.78	0.29
	2004	7100	69	9.66	0.20
	2005	6684	236	35.27	0.73
	2006	6595	236	35.79	0.74
	2007	5594	196	35.10	0.73
	2008	4924	154	31.36	0.65
	2009	3523	115	32.66	0.68
	2010	3064	94	30.64	0.64
	2011	2790	92	32.95	0.68
	2012	2609	86	33.01	0.69
	2013	2444	93	38.13	0.79
	2014	2900	104	35.95	0.75
	2015	3039	101	33.12	0.68

Fleet	Year	Effort [days]	Landings [tonnes]	Lpue [tonnes/1000 days]	means standardised lpue
	2016	4064	166	40.79	0.84
	2017	4556	207	45.41	0.93
	2018	4116	231	56.17	1.15
	2019	4329	313	72.36	1.48
	2020	4335	321	74.07	1.52
	2021	4505	354	78.56	1.61
	2022	5329	349	65.48	1.34
	2023	5614	318	56.7	1.16
UK-CBT	1988	5497	684	124.51	2.34
	1989	5894	503	85.27	1.6
	1990	5476	493	89.97	1.69
	1991	3870	341	88.02	1.65
	1992	3334	339	101.69	1.91
	1993	4111	349	84.79	1.59
	1994	6814	397	58.23	1.09
	1995	6935	391	56.37	1.06
	1996	7591	284	37.41	0.70
	1997	7368	331	44.99	0.84
	1998	7302	263	36.07	0.68
	1999	7031	256	36.47	0.68
	2000	8150	285	34.92	0.66
	2001	9620	290	30.13	0.57
	2002	9439	214	22.69	0.43
	2003	10596	186	17.59	0.33
	2004	10612	132	12.46	0.23
	2005	9990	427	42.70	0.80
	2006	9873	460	46.57	0.87
	2007	9621	421	43.75	0.82
	2008	9552	367	38.42	0.72
	2009	7563	300	39.70	0.75
	2010	7791	294	37.79	0.71
	2011	8703	350	40.22	0.75
	2012	9797	400	40.82	0.77

Fleet	Year	Effort [days]	Landings [tonnes]	Lpue [tonnes/1000 days]	means standardised lpue
	2013	8767	422	48.15	0.90
	2014	8769	413	47.05	0.88
	2015	9298	411	44.17	0.82
	2016	10178	521	51.19	0.96
	2017	11114	606	54.57	1.02
	2018	10482	617	58.9	1.1
	2019	10396	711	68.35	1.27
	2020	9978	714	71.55	1.33
	2021	9859	753	76.35	1.42
	2022	11414	726	63.59	1.18
	2023	11648	668	57.34	1.07
UK-COT	1988	4265	29	6.77	1.43
	1989	4607	28	6.18	1.31
	1990	4423	26	5.97	1.27
	1991	4004	14	3.39	0.72
	1992	4108	12	3.02	0.64
	1993	3761	15	3.95	0.84
	1994	3423	18	5.27	1.12
	1995	3294	13	3.99	0.84
	1996	2589	12	4.83	1.02
	1997	3011	15	4.96	1.05
	1998	2699	11	4.22	0.89
	1999	2486	13	5.16	1.09
	2000	2681	11	4.11	0.87
	2001	2732	13	4.90	1.04
	2002	2448	9	3.66	0.78
	2003	2273	8	3.31	0.70
	2004	2334	6	2.46	0.52
	2005	1762	12	6.86	1.45
	2006	1699	8	4.57	0.97
	2007	1917	9	4.90	1.04
	2008	1750	7	4.26	0.90
	2009	1847	10	5.36	1.14

Fleet	Year	Effort [days]	Landings [tonnes]	Lpue [tonnes/1000 days]	means standardised lpue
	2010	2213	10	4.53	0.96
	2011	1930	8	4.08	0.86
	2012	2068	12	5.96	1.26
	2013	1587	8	4.96	1.05
	2014	1440	8	5.56	1.18
	2015	978	5	4.98	1.06
	2016	0	0	NA	NA
UK-COT new	2016	2020	14	7.08	0.68
	2017	2398	15	6.1	0.58
	2018	1986	17	8.42	0.81
	2019	1548	14	9.33	0.89
	2020	1076	15	14.17	1.35
	2021	1369	20	14.7	1.4
	2022	1252	17	13.85	1.32
	2023	1346	14	10.03	0.96

Table 32.6. Sole in Division 7.e. Tuning data file. Not all tuning time-series, years and ages shown here were used in the assessment.

sol.27.7e WGCSE 2024

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UK-CBT-late

2003 2023

1 1 0 1

3 14

10.59557 130.7 168.87 129.96 21.43 18.32 10.28 13.49 6.67 2.19 2.06 3.35 2.82

10.61183 146.5 61.53 53.46 75.23 11.35 14.96 7.49 5.98 4.27 2.12 1.18 1.89

9.98951 210.39 326.3 132.94 155.21 132.09 27.41 32.6 22.54 14.24 8.3 5.95 4.84

9.87254 376.87 186.46 243.45 85.59 108.34 106.98 37.22 20.67 13.69 13.61 6.68 2.99

9.6207 456.04 261.42 105.82 103.55 54.21 62.07 51.47 15.34 11.12 10.41 8.44 8.17

9.55231 294.03 286.06 126.1 67.89 65.42 42.34 39.54 36.27 14.54 11.8 4.3 6

7.56283 190.03 182.63 152.83 89.59 26.02 27.9 13.23 16.1 12.91 4.85 3.74 1.92

7.79112 80.09 179.7 157.57 101.24 51.98 25.24 22.59 8.23 16.75 25.39 7.42 3.88

8.70287 243.76 148.58 186.66 121.43 81.66 35.56 15.79 20.25 10.83 14.11 8.26 2.1

9.79734 129.79 307.88 139.02 143.59 91.49 66.22 30.49 17.81 14.83 8.55 12.25 11.03

8.76655 81.92 242.49 288.92 134.34 93.18 72.27 44.15 24.5 10.73 9.84 8.14 9.84

8.7692 111.72 201.15 169.62 201.19 99.91 67.46 43.84 30.63 15.94 7.71 9.34 4.9

9.29849 137.05 178.21 198.83 135.74 117.19 65.74 45.95 31.78 20.59 11.01 5.52 5.96

10.17804 263.46 217.34 158.93 161.88 118.88 102.14 49.07 45.22 21.3 23.14 13.03 5.69

11.11408 454.27 353.27 177.37 142.06 120.28 81.72 72.95 42.23 28.03 16.59 11.97 9.63

10.48248 217.63 454.82 260.75 116.59 118.4 76.79 51.54 49.36 33.91 24.42 21.84 10.92

10.39628 618.98 411.51 357.08 217.83 105.4 69.38 57 36.74 40.95 22.94 13.23 10.34

9.97809 366.92 668.85 351.1 232.9 155.35 85.53 44.65 28.78 13.68 12.36 13.5 10.39

9.85862 489.94 449.21 574.6 243.75 181.18 96.72 47.65 40.73 26.66 25.03 24.62 14.92

11.4142 314.76 615.56 308.94 431.17 155.05 97.63 53.46 28.42 22.66 18.31 11.61 14

11.64815 369.56 308.81 394.31 224.1 286.77 100.46 72.9 45.59 25.81 21.33 16.77 9.98

UK-COT

1988 2016

1 1 0 1

3 11

4264.71 30.97 15.73 19.29 8.63 2.55 2.55
1.83 0.35 0.76

4607.04 15.09 18.34 9.22 11.75 4.72 2.42
2.36 2.01 1.4

4422.52 18.3 12.56 9.21 6.09 5.53 2.08
1.83 1.12 0.9

4004.37 10.04 7.03 4.12 2.46 0.96 1.44
0.42 0.41 0.23

4107.71	26.24 0.65	6 0.17	3.6 0.09	1.19	1.14	0.48
3761	12.45 1	17.56 0.92	5.38 0.56	3.44	2.49	1.26
3423.03	12.42 1.35	11.46 1.03	12.35 1.18	2.5	2.6	1.23
3294.06	5.25 0.91	9.75 0.52	6.34 0.25	6.17	1.89	1.49
2589.38	9.47 0.76	6.54 0.68	4.37 0.45	3.15	3.54	0.95
3010.66	15.16 0.63	8.81 0.28	4.78 0.43	2.83	2.9	2.53
2698.6	8.74 1.47	7.58 0.31	4.25 0.44	2.49	1.53	0.93
2486.17	11.56 0.74	5.84 1.49	4.91 0.39	2.89	1.45	1.46
2680.63	6.67 0.81	8.41 0.62	4.03 0.99	2.64	1.24	0.59
2731.54	18.02 0.7	5.27 0.51	4.96 0.5	2.69	2.01	1.12
2448.37	9.88 0.33	6.12 0.2	2.39 0.25	2.67	1.27	0.82
2272.9	4.61 0.54	5.87 0.27	4.8 0.13	1.04	0.85	0.49
2334.16	6.05 0.3	2.58 0.24	2.23 0.18	3.25	0.46	0.57
1762.36	6.44 0.9	9.56 0.58	3.53 0.45	4.13	3.44	0.74
1699.49	6.93 0.6	3.27 0.31	4.13 0.2	1.36	1.63	1.75
1916.84	9.32 1.13	5.44 0.36	2.3 0.21	2.32	1.19	1.41
1750.36	5.61 0.75	4.85 0.7	2.08 0.32	1.15	1.18	0.75
1847.2	7.97 0.39	5.47 0.52	3.92 0.45	2.17	0.64	0.83
2212.85	2.71 0.74	5.85 0.3	4.74 0.6	3.15	1.63	0.81
1930.5	6.51 0.31	3.32 0.37	3.89 0.19	2.46	1.64	0.58
2068.16	4.24 0.82	9.16 0.49	3.97 0.46	4.06	2.3	1.76

1586.58 2.01 4.55 5.64 2.66 1.74 1.49
0.89 0.56 0.26

1440.22 2.13 3.57 2.99 3.56 1.8 1.29
0.9 0.68 0.34

977.63 1.62 1.98 1.86 1.59 1.35 0.7
0.5 0.42 0.25

0 0 0 0 0 0 0
0 0 0

Q1SWBeam-nonoffset

2006 2023

1 1 0.1 0.25

1 27

1 0 10.2831 14.4378 7.2725 14.4377 5.5961
7.13 6.861 2.907 2.82859 3.60271
0.64983 1.18363 0.42807 0.658 6.79316
0.83462 0.39699 0 0 0 0
0 0 0 0 0

1 0.16687 9.8812 27.8597 10.5167 1.6884 5.7311
2.0168 2.1298 3.7204 2.51892 3.10315
0.11374 1.15808 0.96954 0.33416 0
0.63993 0.28599 0 0 0
0.40667 0 0 0.09932 0 0

1 0 10.8269 22.4315 19.0395 8.8652 6.4496
2.5605 6.4218 6.1821 3.83386 1.82804 1.542
1.64694 0.84895 0.4194 0.09932 0.87867
1.39078 2.27897 0 0 0 0
0 0 0 0

1 0 2.7029 18.4684 14.3973 9.4283 5.5118
1.9591 2.4189 0.8923 3.0406 3.50273
0.66769 0.63782 0.14701 0.72372 0
1.16367 1.29584 1.49235 0 0 0
0 0 0.10455 1.05699 1.05699

1 0 17.4225 17.8979 19.3542 13.2345 8.318
7.1591 1.6078 1.6558 1.39785 0.81183
1.18174 0.71617 0.66769 0.51741 0
0.49475 0 0.66245 0 0.66769 0
0 0 0 0 0

1 0 9.6518 17.797 14.2866 10.5999 4.6691
2.7641 2.5717 1.4705 0.22467 1.24853
0.77389 0.31664 0.3873 0.12102 0.09459 0.3333
0 0.11919 0 0 0.09459 0
0 0 0 0

1 0 1.7917 16.9977 18.5256 7.7153 6.3403
8.0401 4.0948 2.8642 0.13376 1.0617
1.84127 0.33928 0.98069 0.09932 0.44749 0

	0.09932	0.66245	0	0	0	
	0.33416	0	0	0	0	
1	0	3.0941	10.5562	18.2857	17.3685	
	11.5663	9.7466	6.5411	6.149	5.15539	
	0.85402	4.97234	0.82806	3.43062	0.7629	0
	0	0	0	0	0	
	1.88505	0.66831	0	0	0	0
1	0.7539	3.9292	20.2852	24.4269	9.9905	
	14.2817	10.2697	18.9533	5.8138	2.3858	
	3.74314	1.0254	1.32124	0.7671	1.01737	
	0.92041	1.23376	0	0	0.92041	
	0.21026	0	0	0	0	0
	0					
1	0.56543	4.112	8.5863	8.7851	7.6517	7.4502
	8.6561	5.0026	5.0313	2.451	1.65758	
	0.81713	1.80827	1.7988	0	2.41582	
	0.27347	0.92815	0.14558	0.178	1.25309	0
	0	0	0	0	0	
1	0.20429	10.1608	22.8495	9.7784	10.0088	7.0214
	6.1444	10.0515	1.772	1.58774	3.13678	
	1.70091	0.90133	0.06207	0	0.33416	0
	0	0	0.79506	0	0.1204	0
	0	0	0	0		
1	1.3311	4.2408	13.9577	12.7983	7.3733	5.7578
	4.9765	2.1543	1.766	1.74008	1.29402	
	3.12057	0.99117	0.94877	0.1442	0.24464	0
	0	0.95282	0.31664	0.19391	0	0
	0	0	0	0		
1	0	9.7449	15.9118	22.0253	16.018	5.515
	7.3314	5.4841	4.6341	4.26519	1.04742	
	3.18642	3.36517	3.81071	0.83888	0	0
	0	0	0.32885	0	0	0
	0	0	0	0		
1	0.35174	14.1628	35.5258	15.708	15.9896	8.4814
	2.9977	2.5971	2.6027	1.74875	4.73319	
	0.12722	2.11464	1.22713	2.10488	0	0
	0.34295	0	0.22567	0	0	
	0.66769	0	0	0	0	
1	0.23884	13.4637	18.2356	21.9305	11.0805	8.2492
	5.533	3.5814	2.3138	1.46077	3.42926	2.0927
	0.66215	0.66769	0.15604	0	0	0
	0	0	0	0.18073	0	0
	0	0	0			
1	0.18772	5.0725	37.1815	20.8599	32.7296	
	11.1961	9.7452	14.9424	1.9538	3.94729	
	2.14387	0.17896	0.338	1.96585	0	0

1.85926 0 0 0 0.1093 0
0.11083 0 0 0 0

1 0.27394 10.2775 11.6372 17.2343 14.7067
19.2967 8.2653 1.9945 4.0839 6.22742
1.93206 1.88248 1.19079 1.98107 1.39072 0
0 0.18058 0 0 0
0.19917 0 0 0 0 0

1 0.15195 9.4657 18.8168 10.6968 18.0547 9.7368
21.7861 5.0311 12.7096 4.37038 1.32971
4.28408 1.92774 0.24723 1.12406 0.6146
0.14579 1.41607 0 0 0 0
0 0 0 0 0

FSP-UK

2003 2023

1 1 0.7 0.75

1 27

1 0.0005996525 0.1640287001 0.3331577428 0.3421042854 0.3077896855
0.0276877607 0.0434349878 0.0011860104 0.0608003593 0.0451763227
0.0762193328 0.0041632567 0.0044569891 0.0017184351 0.0003489357
0.0014186342 0 0 0.0001163119 0.0001163119 0
0.0002326238 0.0001163119 0 0.0001163119 0 0

1 0.0001223836 0.148565371 0.5397033838 0.3098782034 0.2630863645
0.129056707 0.0616661114 0.0863136593 0.0352755756 0.0161903753
0.0177121487 0.0099731816 0.0063903378 0.0068742824 0.0044894467
0.0015712354 0.0011647284 0.0011509869 0.0035892687 0.0013945057
0.0005120651 0.0013717113 0.0023661077 0.0007329086 0.0008245222 0
0

1 0 0.1033295175 0.19641048 0.2419913717 0.1091266279
0.1568026119 0.145326301 0.036140277 0.0293963588 0.0143508007
0.0153718894 0.0071929565 0.0067527739 0.0018681385 0.009940521
0.00740716 0.0023788354 0.002716705 0.0021409311 0.0017422746
0.0005904058 0.0033955813 0.0006752624 0 0
0.0002352598 0

1 0.0039596329 0.1530500071 0.3381328362 0.1553895918 0.2150083739
0.0964529823 0.1165659253 0.1314578928 0.0263335654 0.0257367117
0.0180380169 0.0143720469 0.0090822273 0.0017959477 0.0041795766
0.0037964376 0.0035431007 0.0026203905 0.0019622031 0.0012689076
0.0005610368 0.0007510883 0.000569457 0.0012689076 3.21242e-05
3.21242e-05 0

1 0.0010962171 0.1222741336 0.4498553047 0.2031795541 0.0752568916
0.0913421932 0.0585642238 0.0482046412 0.0990784093 0.0183456175
0.0234301884 0.0051412317 0.0112336251 0.0042618881 0.0040821708
0.0039301402 0 0.0003138761 0.0004997104 0.0009808918
0.0008212451 0.0011351212 0.001694755 0.0009721986 0 0
0

1	2.13237e-05	0.2195359609	0.3064631629	0.2655855663	0.2476263144	
	0.043108973	0.0375100475	0.0146095245	0.057007758	0.0329403724	
	0.0020443892	0.0103735097	0.005214212	0.00033916	0.0019450962	
	0.0012325515	0.0002575085	0.0023031566	0.0017526933	0.0001122039	
	0.0019527171	0.0014567991	3.94624e-05	0.0001032939	0.0016011921	
	1.01841e-05	0				
1	0	0.0871756844	0.2996241409	0.3111598691	0.1612888821	
	0.0607181418	0.0399573377	0.0280004615	0.0151930886	0.0179131136	
	0.047375509	0.0070657871	0.0029069767	0.0028085641	0.0034248136	0
	0.0023009922	0	0	0	0.0014487729	0
	0	0	0	0	0	
1	0	0.1198634134	0.196874246	0.2457977047	0.1811689438	
	0.1272699744	0.0356769991	0.020992322	0.0271910269	0.0175688686	
	0.0235333828	0.0111317663	0.0040175529	0.0028670567	0.0098378335	
	0.0061571312	0	0	0.0017165606	0	
	0.0014381202	0.001962611	0.0014381202	0	0	0
	0					
1	0	0.06241178	0.4007807363	0.0936432403	0.1661392336	
	0.0841713673	0.0489667592	0.0045350684	0.0133309554	0.0072992036	
	0.0107241145	0.0124110167	0.0133136094	0.0012401452	0.003746497	
	7.47075e-05	0.0047437213	4.48245e-05	0.0012252037	1.49415e-05	
	2.9883e-05	5.9766e-05	2.9883e-05	1.49415e-05	1.49415e-05	
	0.0034480627	0				
1	0	0.0462429317	0.3661074051	0.3751123378	0.171327639	
	0.1173729434	0.0335259216	0.0443997936	0.0276582094	0.0030666751	
	0.0064196299	0.0001183835	0.0090514008	0.0102432905	0.0064879186	
	0.0063170946	0.0019806469	0	5.91917e-05	5.91917e-05	
	0.0012992471	0.0001183835	5.91917e-05	0	5.91917e-05	0
	0					
1	0	0.0497881333	0.3584337435	0.4301705234	0.3611324055	
	0.1699642895	0.0915132656	0.0522974874	0.0372679269	0.0063585644	0
	0.0155682804	0.0169229843	0.0150488511	0	0.0065329235	
	0.0065015519	0	0	0	0.0005752481	0
	0	0	0	0	0	
1	0	0.0992979309	0.3132769061	0.404824384	0.3187756661	
	0.2144234295	0.1202334108	0.0707920098	0.0346720214	0.0427286271	
	0.0019981129	0.0122453312	0.0035399024	0.0091491166	0.0040710437	
	0.0080827697	0.0039462729	0.0059770088	9.99056e-05	0.0015076265	
	9.99056e-05	0	0	9.99056e-05	0	0
	0					
1	0.0048896085	0.1093931233	0.2409909098	0.342222128	0.1843469436	
	0.1273706237	0.1082327865	0.0763853928	0.0576452317	0.0237495021	
	0.0250038238	0.00933254	0.0036693854	0.0111649666	0.0028229153	
	0.0031227752	0.0034365469	0.0047588703	0.0011504961	0	0
	0	0	0	0.0014642678	0	0
1	0	0.106692296	0.462891223	0.1532642147	0.1442259017	
	0.1230641606	0.0781141924	0.102312786	0.0301074486	0.0478016471	
	0.014684173	0.0168037935	0.0050194129	0.0033997592	0.0021956008	

0.0063508475 0.0048557028 0.003975375 0.0011243485 0.0027226531 0
0.0017564806 0 0 0 0 0

1 0 0.12886873 0.4887237516 0.3304347223 0.0960669305
0.0858467213 0.0726999591 0.0391128558 0.0589537549 0.0200598221
0.0122974024 0.0180049259 0.0119845876 0.0039815527 0.0027961056 0
0.0024247625 0.005117608 0.0059944095 0.0011243485 0 0
0 0 0 0 0

1 0 0.1586709782 0.2933003672 0.4153420564 0.2476762135
0.0907601391 0.0694807344 0.0922203076 0.0271016214 0.0610983845
0.0369478639 0.0380261073 0.0120135944 0.0073046846 0.0019174935 0
0 0.0011504961 0.0014381202 0.0026932068 0.0024055828 0
0 0 0.0011504961 0 0

1 0 0.2112724882 0.9077480144 0.1994578656 0.1528107317
0.0897784456 0.0471313352 0.0455976848 0.0374275951 0.0276157117
0.0403826099 0.0079840292 0.0096721581 0.0032406206 0.0017564806 0
0.0017564806 0.0028808291 0.0064020338 0 0.0045777045 0
0.00148414 0 0 0 0

1 0.001278329 0.3004545955 0.3368668308 0.4213025839 0.1902005191
0.136689404 0.0642090392 0.0395978829 0.0304360262 0.0543729347
0.0184030591 0.0425811321 0.0141248287 0.0039849478 0.0064433092
0.0041423169 0.0024755343 0.0012205598 0.0001167728 2.33546e-05
0.0022739516 0.0053185882 4.67091e-05 2.33546e-05 2.33546e-05
2.33546e-05 0

1 0 0.0457153066 0.3479819938 0.2646579215 0.3520245785
0.0947774833 0.0712985299 0.0333363482 0.0224343434 0.0129740757
0.0234239362 0 0.0232988167 0.0018886193 0.0018886193
0.0064010685 0.0081597965 0.0029903139 0 0
0.0019875965 0.0018886193 0 0 0 0
0

1 0.0004082631 0.0787689915 0.1276190299 0.2410218467 0.0760160683
0.1630479195 0.0575640538 0.0266022743 0.020039252 0.0144115392
0.0125687649 0.0060149665 0.0056990821 0.0147704741 0.0034450312
0.0089225878 0.0020648209 0.0037529077 1.9588e-05 3.9175905e-06
0.0011282661 1.17528e-05 0.0014991313 0 0 0
0

1 0 0.0567422771 0.3046803054 0.073854748 0.15984611
0.0745462583 0.1700907935 0.0790899025 0.0514997681 0.0157802539
0.0301199806 0.0057913537 0.0040140523 0.0021735887 0.0049551029
0.008168637 0.0021576863 0.0113345956 0.0046875515 5.15572e-05
0.0020626069 0.0001149993 6.34421e-05 2.37698e-05 3.96723e-05
1.18849e-05 0

UK-CBT-early

1988 2002

1 1 0 1

3 11

5.50	660.36	337.83	439.11	199.29	63.46	62.34
	58.95	13.18	21.70	13.33	27.52	6.95
5.89	334.92	420.18	206.01	239.87	86.59	36.69
	36.30	34.02	21.23	13.23	14.64	8.91
5.48	330.59	249.78	187.83	120.79	118.15	45.22
	34.04	22.00	18.96	10.14	16.62	8.71
3.87	169.69	178.00	138.03	89.94	39.06	50.15
	27.73	13.14	9.08	16.74	3.98	7.26
3.33	569.33	159.31	112.20	42.39	44.18	21.30
	30.70	7.94	5.60	5.48	5.88	5.21
4.11	276.52	436.07	135.24	82.61	58.75	29.82
	23.11	22.81	11.35	3.31	8.58	5.80
6.81	347.00	282.99	271.57	54.29	49.16	24.17
	27.27	20.69	23.17	11.03	8.54	4.49
6.93	139.39	287.26	193.06	187.53	57.49	45.54
	26.86	14.72	8.08	17.93	7.45	5.17
7.59	146.04	118.70	100.89	81.14	87.63	23.24
	21.23	16.83	12.69	13.77	12.60	5.11
7.37	300.18	244.82	114.67	60.06	66.02	58.33
	14.54	6.74	13.71	5.51	6.41	4.75
7.30	188.05	166.31	103.86	61.72	44.52	23.65
	35.65	9.80	9.76	8.10	8.57	3.78
7.03	264.75	137.13	101.88	64.10	27.00	25.49
	13.29	26.52	5.87	9.91	2.81	2.98
8.15	194.23	235.47	112.00	69.45	33.41	16.90
	19.70	14.88	26.19	2.84	4.35	1.86
9.62	400.24	142.06	135.26	69.22	46.01	25.81
	13.47	11.17	10.68	12.43	4.64	3.50
9.44	280.20	169.83	62.21	62.54	27.88	19.67
	8.64	3.97	4.69	2.63	4.92	2.28

UK-WEC-BTS

1988 2013

1 1 0.75 0.8

1 9

128.20	2.00	39.00	129.00	52.00	75.00	22.00
	0.00	12.00	3.00			
165.70	5.00	56.00	120.00	107.00	34.00	40.00
	17.00	5.00	7.00			
175.70	23.00	52.00	76.00	31.00	24.00	7.00
	15.00	3.00	6.00			
171.70	11.00	231.00	79.00	51.00	23.00	21.00
	5.00	17.00	4.00			

196.60	5.00 7.00	140.00 5.00	316.00 11.00	44.00	36.00	12.00
189.20	5.00 9.00	54.00 3.00	115.00 3.00	105.00	14.00	10.00
205.90	6.00 5.00	47.00 2.00	106.00 3.00	62.00	44.00	5.00
187.20	14.00 4.00	37.00 5.00	44.00 5.00	42.00	26.00	31.00
184.40	28.00 17.00	112.00 3.00	67.00 2.00	25.00	32.00	20.00
184.70	11.00 13.00	130.00 14.00	126.00 5.00	43.00	14.00	16.00
185.50	11.00 14.00	141.00 6.00	114.00 8.00	76.00	22.00	10.00
187.90	11.00 4.00	97.00 4.00	128.00 4.00	47.00	23.00	8.00
180.40	12.00 5.00	136.00 3.00	70.00 5.00	52.00	23.00	16.00
178.00	9.00 12.00	197.00 4.00	162.00 1.00	52.00	31.00	12.00
180.00	6.00 3.00	37.00 2.00	113.00 0.00	48.00	27.00	6.00
170.70	23.00 1.00	124.00 1.00	78.00 2.00	56.00	28.00	6.00
164.90	16.00 16.00	110.00 9.00	120.00 4.00	24.00	15.00	10.00
186.60	8.00 6.00	110.00 2.00	39.00 4.00	53.00	12.00	12.00
184.70	5.00 7.00	120.00 9.00	95.00 0.00	26.00	37.00	10.00
181.00	7.00 3.00	188.00 3.00	135.00 1.00	50.00	11.00	23.00
174.70	10.00 14.00	85.00 3.00	158.00 6.00	77.00	40.00	2.00
172.00	11.00 13.00	104.00 12.00	126.00 1.00	96.00	49.00	13.00
179.90	20.00 20.00	175.00 7.00	154.00 12.00	84.00	59.00	31.00
176.20	9.00 24.00	156.00 8.00	231.00 2.00	62.00	39.00	25.00
179.70	3.00 13.00	47.00 3.00	162.00 6.00	125.00	40.00	27.00

181.60	4.00	36.00	100.00	106.00	80.00	21.00
	9.00	6.00	3.00			

Table 32.7. Sole in Division 7.e. Detailed XSA survivor diagnostics.

FLR XSA Diagnostics 2024-04-18 16:29:27

CPUE data from indices

Catch data for 55 years 1969 to 2023. Ages 2 to 12.

	fleet	first age	last age	first year	last year	alpha	beta
1	UK-CBT-late	3	11	2003	2023	<NA>	<NA>
2	UK-COT	3	11	1988	2015	<NA>	<NA>
3	Q1SWBeam-nonoffset	2	11	2006	2023	<NA>	<NA>
4	FSP-UK	2	11	2004	2023	<NA>	<NA>

Time series weights :

Tapered time weighting applied

Power = 3 over 15 years

Catchability analysis :

Catchability independent of size for all ages

Catchability independent of age for ages > 6

Terminal population estimation :

Survivor estimates shrunk towards the mean F

of the final 3 years or the 5 oldest ages.

S.E. of the mean to which the estimates are shrunk = 1

Minimum standard error for population
estimates derived from each fleet = 0.4

prior weighting not applied

Regression weights

age	year 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
all	0.482	0.61	0.725	0.82	0.893	0.944	0.976	0.993	0.999	1

Fishing mortalities

age	year 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2	0.064	0.044	0.017	0.028	0.014	0.024	0.026	0.041	0.079	0.070
3	0.124	0.128	0.124	0.165	0.092	0.114	0.139	0.156	0.224	0.184
4	0.209	0.198	0.244	0.217	0.228	0.208	0.201	0.229	0.233	0.307
5	0.264	0.205	0.185	0.207	0.229	0.265	0.271	0.280	0.310	0.210
6	0.249	0.228	0.206	0.215	0.198	0.291	0.268	0.390	0.294	0.309
7	0.207	0.171	0.305	0.222	0.265	0.269	0.286	0.291	0.335	0.282
8	0.188	0.191	0.210	0.262	0.245	0.314	0.269	0.286	0.276	0.294
9	0.207	0.174	0.145	0.196	0.260	0.278	0.226	0.362	0.258	0.254
10	0.215	0.156	0.144	0.244	0.191	0.266	0.232	0.315	0.246	0.236
11	0.202	0.140	0.148	0.246	0.308	0.236	0.173	0.215	0.330	0.373
12	0.202	0.140	0.148	0.246	0.308	0.236	0.173	0.215	0.330	0.373

XSA population number (Thousand)

year	age 2	3	4	5	6	7	8	9	10	11	12
2014	3376	2894	2599	1933	1955	944	689	442	332	156	558
2015	4371	2867	2314	1908	1344	1379	694	517	325	242	661
2016	5805	3786	2282	1718	1407	968	1052	519	393	252	816
2017	5089	5165	3027	1618	1292	1036	646	772	406	308	596
2018	9564	4477	3963	2205	1190	943	750	450	574	288	618
2019	5110	8529	3694	2855	1588	884	655	532	314	429	783

2020 6932 4514 6886 2716 1981 1074 611 433 364 218 1048

2021 3039 6111 3554 5095 1875 1371 730 423 313 261 966

2022 4941 2640 4730 2557 3485 1149 927 496 266 206 721

2023 4197 4132 1909 3389 1697 2349 744 637 347 188 475

Estimated population abundance at 1st Jan 2024

age

year 2 3 4 5 6 7 8 9 10 11 12

2024 0 3540 3112 1270 2486 1127 1603 501 447 248 117

Fleet: UK-CBT-late

Log catchability residuals.

year

age 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015

3 -0.469 -0.672 0.394 0.581 0.696 0.351 0.076 -0.762 -0.095 -0.503 -0.853 -0.433 -0.275

4 -0.654 -1.332 0.120 0.197 0.186 0.135 -0.064 -0.237 -0.489 -0.236 -0.023 -0.196 -0.265

5 -0.784 -1.391 -0.109 0.306 0.112 -0.080 0.099 0.035 -0.035 -0.368 0.094 -0.069 0.016

6 -1.698 -0.939 0.095 -0.123 -0.045 0.083 0.165 -0.081 -0.078 -0.107 0.005 0.030 -0.058

7 -1.306 -2.020 0.158 0.190 -0.085 0.008 -0.271 -0.049 -0.108 -0.130 -0.051 0.038 -0.257

8 -1.381 -1.162 -0.702 0.408 0.074 0.162 -0.213 -0.033 -0.208 -0.114 0.130 -0.049 -0.139

9 -0.706 -1.368 0.141 0.008 0.136 -0.005 -0.375 -0.096 -0.306 -0.148 -0.062 -0.027 -0.211

10 -1.234 -1.046 0.207 0.208 -0.448 0.200 -0.341 -0.607 0.041 0.075 0.100 -0.096 -0.125

11 -1.333 -1.204 0.387 0.162 0.114 -0.084 -0.240 -0.014 -0.143 -0.021 0.095 0.001 -0.272

year

age 2016 2017 2018 2019 2020 2021 2022 2023

3 0.008 0.173 -0.396 0.024 0.190 0.197 0.479 0.152

4 -0.121 -0.018 0.029 -0.002 -0.101 0.187 0.072 0.304

5 -0.203 -0.110 0.034 0.116 0.192 0.072 0.009 -0.096

6 -0.028 -0.158 -0.223 0.166 0.042 0.212 -0.029 0.023

7 0.083 -0.099 0.057 0.016 0.258 0.182 0.077 -0.068

8 -0.196 0.005 -0.157 -0.081 0.217 0.183 -0.199 0.039

9 -0.253 -0.318 -0.036 -0.086 -0.108 0.057 -0.184 -0.146

10 -0.058 -0.200 -0.356 -0.004 -0.372 0.179 -0.199 -0.016
11 -0.363 -0.332 0.013 -0.222 -0.629 -0.113 -0.131 0.090

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

	3	4	5	6	7	8	9	10	11
Mean_Logq	-4.8832	-4.3839	-4.3590	-4.3051	-4.3051	-4.3051	-4.3051	-4.3051	-4.3051
S.E_Logq	0.4508	0.3627	0.3697	0.4269	0.5300	0.4317	0.3292	0.3907	0.4156

Fleet: UK-COT

Log catchability residuals.

year													
age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
3	1.161	0.800	1.072	0.798	0.765	0.723	0.955	0.400	0.842	1.173	0.839	0.937	0.501
4	0.678	0.494	0.492	0.038	-0.005	0.233	0.487	0.568	0.556	0.367	0.375	0.273	0.352
5	0.574	0.454	0.339	-0.222	-0.381	0.309	0.237	0.228	0.346	0.389	0.063	0.322	0.126
6	0.387	0.344	0.504	-0.525	-1.306	-0.071	-0.083	-0.205	0.056	0.021	0.197	0.025	-0.081
7	-0.316	0.202	0.112	-0.796	-0.948	-0.164	0.125	0.049	-0.174	0.259	-0.062	0.220	-0.529
8	-0.125	-0.067	-0.076	-0.751	-1.167	-0.435	-0.466	-0.023	0.016	-0.337	-0.355	0.456	-0.349
9	-0.507	0.175	0.141	-1.112	-1.270	0.040	0.050	-0.467	-0.051	-0.180	-0.456	-0.171	0.316
10	-1.233	-0.114	-0.043	-0.826	-1.699	-0.542	0.635	-0.567	-0.207	-0.887	-0.407	-0.026	-0.063
11	-0.343	0.451	-0.408	-1.082	-2.053	-0.101	0.116	-0.305	-0.156	-0.479	-0.012	0.309	-0.133

year													
age	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
3	0.888	0.566	0.275	0.204	1.191	0.893	0.968	0.637	0.862	-0.341	0.336	0.179	-0.303
4	-0.014	-0.319	-0.053	-0.569	0.746	0.333	0.347	0.176	0.258	0.018	-0.364	0.225	0.131
5	0.168	-0.409	-0.229	-0.739	0.312	0.304	0.212	-0.173	0.160	0.104	-0.085	-0.053	0.182
6	0.041	0.046	-0.956	-0.339	0.431	-0.278	-0.002	-0.070	0.082	-0.065	-0.243	0.110	0.020
7	0.071	-0.130	-0.609	-1.484	0.472	-0.019	-0.063	-0.083	-0.338	-0.025	-0.282	-0.030	-0.095
8	-0.321	-0.247	-0.658	-0.688	-0.351	0.282	0.130	0.053	-0.091	0.015	-0.591	0.042	0.186
9	0.216	-1.026	-0.157	-0.843	0.514	-0.133	0.158	-0.046	-0.261	-0.028	-0.503	0.019	-0.029

10 0.409 -0.445 -0.674 -0.519 0.509 -0.005 -0.360 0.177 -0.137 -0.433 -0.228 0.265 0.258
11 0.145 0.352 -0.390 -0.628 0.895 -0.077 -0.014 0.024 0.041 0.144 -0.452 0.289 0.312

year
age 2014 2015
3 -0.038 0.088
4 0.000 -0.091
5 0.014 -0.088
6 0.029 -0.025
7 0.056 -0.241
8 0.028 -0.202
9 0.121 -0.251
10 0.130 0.029
11 0.188 -0.203

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

	3	4	5	6	7	8	9	10	11
Mean_Logq	-14.3394	-13.7124	-13.5817	-13.4405	-13.4405	-13.4405	-13.4405	-13.4405	-13.4405
S.E_Logq	0.4296	0.3158	0.2964	0.3779	0.4048	0.3513	0.4355	0.5197	0.5405

Fleet: Q1SWBeam-nonoffset

Log catchability residuals.

year
age 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
2 0.412 0.517 0.562 -0.721 0.833 0.593 -1.092 -0.466 -0.238 -0.454 0.162 -0.578 -0.379
3 0.019 0.577 0.449 0.209 0.251 -0.091 0.217 -0.270 0.489 -0.360 0.340 -0.457 -0.195
4 -0.024 -0.040 0.433 0.210 0.384 0.116 0.033 0.346 0.652 -0.257 -0.127 -0.146 0.130
5 0.427 -1.092 0.204 0.049 0.328 -0.027 -0.270 0.160 -0.026 -0.290 0.080 -0.162 0.308
6 0.181 0.041 0.730 0.163 0.258 -0.391 -0.189 0.494 0.325 0.046 -0.063 -0.175 -0.139
7 0.504 -0.385 -0.241 -0.049 0.792 -0.546 0.477 0.629 0.716 0.160 0.194 -0.099 0.390
8 0.692 -0.278 1.265 0.143 0.052 0.109 0.156 0.661 1.641 0.302 0.587 -0.456 0.325

9	0.500	0.522	1.171	-0.263	0.099	0.264	0.538	0.908	0.906	0.600	-0.453	-0.845	0.671
10	1.222	0.764	0.967	0.792	0.475	-1.515	-1.795	1.479	0.303	0.341	-0.285	-0.209	0.332
11	1.855	1.842	0.848	1.257	-0.205	0.626	0.369	0.497	1.508	0.241	0.842	-0.228	-0.362

year

age	2019	2020	2021	2022	2023
2	0.623	0.268	0.119	NA	0.425
3	-0.033	-0.059	0.354	NA	0.069
4	-0.142	-0.432	0.185	NA	0.152
5	0.054	-0.262	0.194	NA	-0.005
6	0.020	-0.234	0.148	NA	0.094
7	-0.438	-0.018	0.305	NA	0.570
8	-0.274	0.109	1.362	NA	0.256
9	-0.070	0.009	-0.112	NA	1.331
10	0.057	-0.278	0.884	NA	0.868
11	0.735	1.080	0.435	NA	0.313

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

	2	3	4	5	6	7	8	9	10	11
Mean_Logq	-6.4896	-5.4108	-5.2649	-5.1754	-5.1834	-5.1834	-5.1834	-5.1834	-5.1834	-5.1834
S.E_Logq	0.5663	0.3064	0.2735	0.3483	0.2783	0.4216	0.5863	0.5881	0.8834	0.6700

Fleet: FSP-UK

Log catchability residuals.

year

age	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
2	0.967	0.206	0.487	0.371	0.921	0.087	0.078	-0.216	-0.528	-0.358	0.335	0.159	-0.169	0.160
3	0.566	0.184	0.327	0.510	0.210	0.093	-0.284	0.092	0.331	0.317	0.296	0.046	0.418	0.191
4	0.701	0.205	0.391	0.295	0.390	0.530	0.162	-0.743	0.275	0.765	0.718	0.658	-0.098	0.368
5	0.726	0.184	0.672	0.223	1.027	0.325	0.372	0.161	0.277	0.642	0.890	0.312	0.157	-0.173
6	0.231	0.664	0.543	0.374	0.140	0.037	0.418	-0.059	0.216	0.642	0.496	0.334	0.238	-0.030

```
 7  0.272 0.812 0.806 0.526 -0.030 0.400 -0.142 -0.236 -0.609  0.336  0.615 0.105  0.229  0.030
 8  1.209 0.115 1.160 0.328 -0.381 0.038  0.055 -1.882 -0.001  0.215  0.386 0.457  0.347 -0.089
 9  0.787 0.605 0.198 1.304  0.844 0.005  0.387 -0.089  0.268  0.170  0.130 0.458 -0.216  0.095
 10 0.599 0.309 0.999 0.239  0.604 0.014  0.409 -0.595 -1.145 -0.845  0.631 0.022  0.523 -0.306
 11 0.840 1.019 0.987 1.381 -1.539 1.307  0.600  0.246 -0.322 10.270 -1.685 0.356 -0.209 -0.517
   year
age    2018   2019   2020   2021   2022   2023
 2  -0.273  0.647  0.696 -0.352 -0.266 -0.437
 3  -0.229  0.272 -0.065 -0.323 -0.437 -0.045
 4   0.336 -0.343 -0.222 -0.005 -0.382 -0.603
 5   0.480 -0.234  0.038  0.031 -0.790 -0.401
 6   0.095 -0.137  0.046 -0.177 -0.324 -0.376
 7   0.109 -0.211 -0.084 -0.220 -0.226  0.104
 8   0.606  0.088 -0.016 -0.354 -0.826  0.497
 9  -0.095  0.073  0.034 -0.148 -0.497  0.195
 10  0.423  0.287  0.791 -0.428 -0.212 -0.394
 11  0.695  0.333  0.180  0.269 -0.034  0.963


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

               2      3      4      5      6      7      8      9      10     11
Mean_Logq -10.6509 -9.2647 -9.2612 -9.3362 -9.3605 -9.3605 -9.3605 -9.3605 -9.3605 -9.3605
S.E_Logq    0.4533  0.2807  0.4443  0.4402  0.3028  0.3744  0.6645  0.4159  0.5745  2.3856


 Terminal year survivor and F summaries:

 ,Age 2 Year class =2021

source
                scaledWts survivors yrcls
Q1SWBeam-nonoffset     0.403      5414  2021
FSP-UK                 0.488      2287  2021
fshk                   0.109      5193  2021
```

,Age 3 Year class =2020

source	scaledWts	survivors	yrcls
UK-CBT-late	0.313	3624	2020
Q1SWBeam-nonoffset	0.313	3333	2020
FSP-UK	0.313	2976	2020
fshk	0.060	3307	2020

,Age 4 Year class =2019

source	scaledWts	survivors	yrcls
UK-CBT-late	0.343	1722	2019
Q1SWBeam-nonoffset	0.343	1479	2019
FSP-UK	0.240	695	2019
fshk	0.075	1839	2019

,Age 5 Year class =2018

source	scaledWts	survivors	yrcls
UK-CBT-late	0.346	2258	2018
Q1SWBeam-nonoffset	0.346	2473	2018
FSP-UK	0.240	1665	2018
fshk	0.068	1743	2018

,Age 6 Year class =2017

source	scaledWts	survivors	yrcls
UK-CBT-late	0.311	1153	2017
Q1SWBeam-nonoffset	0.311	1239	2017
FSP-UK	0.311	774	2017
fshk	0.068	1089	2017

,Age 7 Year class =2016

source
scaledWts survivors yrcls
UK-CBT-late 0.332 1497 2016
Q1SWBeam-nonoffset 0.265 2834 2016
FSP-UK 0.332 1779 2016
fshk 0.070 1466 2016

,Age 8 Year class =2015

source
scaledWts survivors yrcls
UK-CBT-late 0.493 521 2015
Q1SWBeam-nonoffset 0.126 648 2015
FSP-UK 0.276 825 2015
fshk 0.106 536 2015

,Age 9 Year class =2014

source
scaledWts survivors yrcls
UK-CBT-late 0.405 386 2014
Q1SWBeam-nonoffset 0.106 1692 2014
FSP-UK 0.405 543 2014
fshk 0.084 395 2014

,Age 10 Year class =2013

source
scaledWts survivors yrcls
UK-CBT-late 0.501 244 2013
Q1SWBeam-nonoffset 0.140 591 2013
FSP-UK 0.258 167 2013
fshk 0.101 217 2013

,Age 11 Year class =2012

source

scaledWts survivors yrcls

UK-CBT-late 0.546 128 2012

Q1SWBeam-nonoffset 0.143 160 2012

FSP-UK 0.185 307 2012

fshk 0.127 167

Table 32.8. Sole in Division 7.e. Estimated stock numbers-at-age (thousands).

year\age	2	3	4	5	6	7	8	9	10	11	12+	total
1969	1874	2380	625	966	1513	159	507	572	262	90	636	9585
1970	1343	1611	1848	490	732	1170	124	412	494	218	1123	9564
1971	3826	1164	1237	1365	358	584	952	100	340	397	821	11144
1972	2568	3414	863	885	1047	262	452	713	81	274	542	11102
1973	2264	2185	2698	621	691	840	224	386	518	37	1222	11687
1974	3107	1981	1600	2029	478	532	646	187	300	440	850	12149
1975	2967	2769	1461	1238	1667	365	406	544	138	248	1756	13559
1976	2791	2606	1966	1160	931	1399	304	317	468	105	1598	13645
1977	6556	2367	1960	1330	896	714	1178	230	231	375	1866	17703
1978	4657	5527	1839	1408	1007	714	580	995	199	186	1385	18497
1979	4389	3976	3933	1334	1070	732	547	456	827	144	1493	18901
1980	4702	3755	2834	2787	970	751	497	397	327	650	1702	19372
1981	8130	4088	2866	2091	1923	758	506	316	298	243	934	22154
1982	4679	7124	2932	1974	1448	1370	516	337	214	214	1035	21844
1983	3866	4113	5066	1782	1260	976	1011	337	198	117	828	19554
1984	5968	3412	3006	3087	1058	806	629	635	192	110	982	19885
1985	6982	5083	2456	1934	2073	648	535	446	430	123	532	21242
1986	3765	6044	2982	1504	1303	1319	417	392	306	309	529	18870
1987	5848	3173	3930	1774	961	874	874	297	283	191	754	18959
1988	3878	4828	2102	2519	1199	675	578	573	224	208	713	17497
1989	3735	3088	3000	1335	1587	729	465	369	415	166	743	15632
1990	2818	3009	1965	1542	736	952	445	316	232	268	739	13022

year\age	2	3	4	5	6	7	8	9	10	11	12+	total
1991	7161	2225	1864	1225	870	434	610	267	189	139	656	15639
1992	3902	6052	1619	1228	834	578	304	446	177	136	528	15802
1993	3350	3230	4112	1068	829	645	416	217	334	136	344	14680
1994	2378	2832	2254	2667	633	541	440	302	140	249	487	12923
1995	3452	2059	1938	1508	1883	466	389	351	218	84	646	12996
1996	3939	3034	1570	1155	958	1312	297	256	259	167	649	13598
1997	3333	3217	2322	1074	762	644	943	205	174	188	412	13274
1998	4400	2810	2121	1412	663	518	398	689	144	138	648	13940
1999	3607	3729	1966	1409	958	401	325	284	502	97	478	13756
2000	6486	2997	2504	1304	896	624	254	197	206	352	366	16186
2001	5400	5577	2143	1552	830	593	463	179	114	138	516	17504
2002	3875	4749	3714	1433	931	497	367	323	110	62	287	16348
2003	5421	3190	3106	2559	929	536	327	232	203	68	304	16877
2004	2876	4337	2092	1904	1702	717	414	249	155	124	298	14867
2005	4017	2224	2896	1467	1300	1040	492	265	167	89	351	14307
2006	4658	3389	1566	1827	900	828	662	338	163	109	304	14744
2007	3984	3739	2319	968	1077	576	537	423	224	95	351	14293
2008	4186	3414	2573	1380	598	630	351	362	278	150	339	14262
2009	3754	3520	2373	1683	891	386	395	218	260	188	347	14016
2010	5087	3239	2671	1781	1206	614	287	287	162	188	435	15957
2011	3589	4538	2600	2042	1299	897	434	213	192	127	419	16350
2012	3583	3160	3631	1899	1463	953	663	317	155	141	454	16421
2013	3324	3213	2643	2786	1338	986	643	470	223	99	478	16203
2014	3376	2894	2599	1933	1955	944	689	442	332	156	558	15877
2015	4371	2867	2314	1908	1344	1379	694	517	325	242	661	16621
2016	5805	3786	2282	1718	1407	968	1052	519	393	252	816	18997
2017	5089	5165	3027	1618	1292	1036	646	772	406	308	596	19955
2018	9564	4477	3963	2205	1190	943	750	450	574	288	618	25022
2019	5110	8529	3694	2855	1588	884	655	532	314	429	783	25372
2020	6932	4514	6886	2716	1981	1074	611	433	364	218	1048	26777
2021	3039	6111	3554	5095	1875	1371	730	423	313	261	966	23737
2022	4941	2640	4730	2557	3485	1149	927	496	266	206	721	22118
2023	4197	4132	1909	3389	1697	2349	744	637	347	188	475	20063

Table 33.9. Sole in Division 7.e. Estimated fishing mortality-at-age.

year\age	2	3	4	5	6	7	8	9	10	11	12+	F_{bar} (3–9)
1969	0.051	0.153	0.144	0.176	0.157	0.151	0.108	0.048	0.084	0.11	0.11	0.134
1970	0.043	0.164	0.203	0.213	0.126	0.106	0.115	0.093	0.118	0.112	0.112	0.146
1971	0.014	0.2	0.234	0.165	0.212	0.155	0.188	0.109	0.113	0.156	0.156	0.181
1972	0.062	0.136	0.228	0.147	0.12	0.059	0.059	0.219	0.69	0.23	0.23	0.138
1973	0.034	0.212	0.185	0.163	0.163	0.162	0.081	0.152	0.063	0.124	0.124	0.16
1974	0.015	0.205	0.156	0.097	0.17	0.171	0.072	0.199	0.089	0.14	0.14	0.153
1975	0.029	0.243	0.13	0.185	0.075	0.083	0.147	0.051	0.181	0.108	0.108	0.131
1976	0.065	0.185	0.291	0.158	0.166	0.072	0.176	0.216	0.122	0.151	0.151	0.18
1977	0.071	0.152	0.23	0.178	0.128	0.108	0.069	0.048	0.114	0.093	0.093	0.13
1978	0.058	0.24	0.221	0.174	0.22	0.165	0.14	0.085	0.226	0.167	0.167	0.178
1979	0.056	0.239	0.244	0.219	0.254	0.287	0.221	0.232	0.142	0.228	0.228	0.242
1980	0.04	0.17	0.204	0.271	0.147	0.295	0.352	0.188	0.198	0.236	0.236	0.232
1981	0.032	0.232	0.273	0.268	0.239	0.285	0.305	0.289	0.229	0.27	0.27	0.27
1982	0.029	0.241	0.398	0.349	0.295	0.203	0.325	0.434	0.503	0.353	0.353	0.321
1983	0.025	0.214	0.395	0.421	0.347	0.34	0.365	0.462	0.489	0.402	0.402	0.363
1984	0.061	0.229	0.341	0.298	0.39	0.309	0.244	0.29	0.35	0.317	0.317	0.3
1985	0.044	0.433	0.391	0.294	0.352	0.342	0.212	0.277	0.232	0.284	0.284	0.329
1986	0.071	0.33	0.419	0.348	0.3	0.312	0.238	0.226	0.37	0.29	0.29	0.31
1987	0.092	0.312	0.345	0.292	0.253	0.314	0.322	0.182	0.205	0.256	0.256	0.288
1988	0.128	0.376	0.354	0.362	0.398	0.273	0.349	0.224	0.201	0.289	0.289	0.333
1989	0.116	0.352	0.565	0.496	0.411	0.393	0.285	0.363	0.337	0.359	0.359	0.409
1990	0.136	0.379	0.373	0.473	0.428	0.346	0.41	0.417	0.413	0.404	0.404	0.404
1991	0.068	0.218	0.318	0.285	0.309	0.256	0.212	0.311	0.23	0.264	0.264	0.273
1992	0.089	0.286	0.316	0.293	0.156	0.229	0.237	0.191	0.167	0.196	0.196	0.244
1993	0.068	0.26	0.333	0.423	0.326	0.283	0.221	0.341	0.194	0.274	0.274	0.312
1994	0.044	0.279	0.302	0.248	0.206	0.23	0.126	0.223	0.405	0.238	0.238	0.231
1995	0.029	0.171	0.418	0.353	0.261	0.349	0.317	0.202	0.171	0.261	0.261	0.296
1996	0.102	0.167	0.279	0.316	0.298	0.231	0.274	0.288	0.221	0.263	0.263	0.265
1997	0.071	0.317	0.397	0.383	0.285	0.381	0.214	0.254	0.132	0.254	0.254	0.319
1998	0.065	0.257	0.309	0.288	0.403	0.366	0.237	0.216	0.295	0.304	0.304	0.297
1999	0.085	0.298	0.311	0.352	0.328	0.357	0.403	0.223	0.255	0.314	0.314	0.325
2000	0.051	0.236	0.379	0.351	0.313	0.199	0.246	0.449	0.302	0.303	0.303	0.31
2001	0.029	0.307	0.302	0.41	0.414	0.379	0.259	0.39	0.506	0.391	0.391	0.351

year\age	2	3	4	5	6	7	8	9	10	11	12+	F_{bar} (3–9)
2002	0.094	0.324	0.273	0.334	0.452	0.318	0.358	0.364	0.374	0.374	0.374	0.346
2003	0.123	0.322	0.389	0.308	0.16	0.158	0.174	0.304	0.396	0.239	0.239	0.259
2004	0.157	0.304	0.255	0.282	0.393	0.276	0.349	0.296	0.459	0.356	0.356	0.308
2005	0.07	0.25	0.361	0.389	0.351	0.351	0.277	0.382	0.33	0.339	0.339	0.337
2006	0.12	0.279	0.381	0.429	0.346	0.334	0.347	0.308	0.444	0.357	0.357	0.346
2007	0.054	0.274	0.419	0.382	0.436	0.395	0.294	0.319	0.301	0.35	0.35	0.36
2008	0.073	0.263	0.324	0.337	0.337	0.367	0.377	0.232	0.294	0.322	0.322	0.32
2009	0.048	0.176	0.187	0.233	0.273	0.198	0.22	0.198	0.226	0.22	0.22	0.212
2010	0.014	0.12	0.169	0.216	0.196	0.246	0.198	0.3	0.142	0.208	0.208	0.206
2011	0.027	0.123	0.214	0.234	0.209	0.202	0.214	0.215	0.208	0.265	0.265	0.202
2012	0.009	0.079	0.165	0.251	0.294	0.294	0.245	0.252	0.352	0.338	0.338	0.226
2013	0.039	0.112	0.213	0.254	0.249	0.259	0.274	0.247	0.259	0.276	0.276	0.23
2014	0.064	0.124	0.209	0.264	0.249	0.207	0.188	0.207	0.215	0.202	0.202	0.207
2015	0.044	0.128	0.198	0.205	0.228	0.171	0.191	0.174	0.156	0.14	0.14	0.185
2016	0.017	0.124	0.244	0.185	0.206	0.305	0.21	0.145	0.144	0.148	0.148	0.203
2017	0.028	0.165	0.217	0.207	0.215	0.222	0.262	0.196	0.244	0.246	0.246	0.212
2018	0.014	0.092	0.228	0.229	0.198	0.265	0.245	0.26	0.191	0.308	0.308	0.216
2019	0.024	0.114	0.208	0.265	0.291	0.269	0.314	0.278	0.266	0.236	0.236	0.248
2020	0.026	0.139	0.201	0.271	0.268	0.286	0.269	0.226	0.232	0.173	0.173	0.237
2021	0.041	0.156	0.229	0.28	0.39	0.291	0.286	0.362	0.315	0.215	0.215	0.285
2022	0.079	0.224	0.233	0.31	0.294	0.335	0.276	0.258	0.246	0.33	0.33	0.276
2023	0.07	0.184	0.307	0.21	0.309	0.282	0.294	0.254	0.236	0.373	0.373	0.263

Table 32.10. Sole in Division 7.e. Assessment summary.

Year	Recruitment Age 2 [thousands]	TSB [tonnes]	SSB [tonnes]	Landings [tonnes]	Yield/SSB	F_{bar} (Ages 3–9)
1969	1874	2927	2437	353	0.14	0.134
1970	1343	3023	2652	390	0.15	0.146
1971	3826	2838	2390	432	0.18	0.181
1972	2568	3091	2395	437	0.18	0.138
1973	2264	3266	2778	458	0.16	0.160
1974	3107	3512	2896	427	0.15	0.153
1975	2967	4428	3670	501	0.14	0.131
1976	2791	4102	3403	614	0.18	0.180
1977	6556	5339	4098	605	0.15	0.130
1978	4657	5429	4074	868	0.21	0.178
1979	4389	6014	4865	1170	0.24	0.242
1980	4702	6387	5338	1268	0.24	0.232
1981	8130	5957	4572	1218	0.27	0.270
1982	4679	5916	4575	1438	0.31	0.321
1983	3866	5377	4374	1504	0.34	0.363
1984	5968	5462	4430	1363	0.31	0.300
1985	6982	5568	4009	1400	0.35	0.329
1986	3765	5257	4013	1418	0.35	0.31
1987	5848	5310	4112	1279	0.31	0.288
1988	3878	5120	4043	1443	0.36	0.333
1989	3735	4318	3442	1389	0.40	0.409
1990	2818	4222	3287	1306	0.40	0.404
1991	7161	4219	2991	852	0.28	0.273
1992	3902	4100	2937	896	0.30	0.244
1993	3350	3579	2810	904	0.32	0.312
1994	2378	3786	3053	800	0.26	0.231
1995	3452	3876	3068	856	0.28	0.296
1996	3939	4153	3054	833	0.27	0.265

Year	Recruitment Age 2 [thousands]	TSB [tonnes]	SSB [tonnes]	Landings [tonnes]	Yield/SSB	F_{bar} (Ages 3–9)
1997	3333	3831	2921	950	0.33	0.319
1998	4400	3942	2910	880	0.30	0.297
1999	3607	3952	2832	956	0.34	0.325
2000	6486	4300	2868	912	0.32	0.310
2001	5400	4502	2896	1069	0.37	0.351
2002	3875	4187	3008	1105	0.37	0.346
2003	5421	4408	3287	1078	0.33	0.259
2004	2876	4035	3106	1074	0.35	0.308
2005	4017	3981	3101	1037	0.33	0.337
2006	4658	3717	2738	1016	0.37	0.346
2007	3984	3819	2780	1015	0.36	0.360
2008	4186	3853	2727	908	0.33	0.320
2009	3754	3937	2988	700	0.23	0.212
2010	5087	4492	3470	698	0.20	0.206
2011	3589	4888	3685	801	0.22	0.202
2012	3583	4711	3857	872	0.23	0.226
2013	3324	4628	3765	882	0.23	0.230
2014	3376	4973	4061	885	0.22	0.207
2015	4371	5125	4139	774	0.19	0.185
2016	5805	6193	4690	911	0.19	0.203
2017	5089	6004	4422	998	0.23	0.212
2018	9564	7607	5065	1074	0.21	0.216
2019	5110	6778	5007	1184	0.24	0.248
2020	6932	7209	5470	1219	0.22	0.237
2021	3039	6351	5260	1391	0.26	0.285
2022	4941	5954	5078	1409	0.28	0.276
2023	4197	5971	4670	1237	0.26	0.263

Table 32.11. Sole in Division 7.e. Input data for the short-term forecast.

Age	N2024	N2025	N2026	M	Mat	PF	PM	SWt	Sel	CWt
2	4083	4083	4083	0.1	0.14	0	0	0.144	0.061	0.171
3	3540	3469	3456	0.1	0.45	0	0	0.197	0.180	0.223
4	3112	2656	2573	0.1	0.88	0	0	0.248	0.246	0.272
5	1270	2181	1833	0.1	0.98	0	0	0.297	0.255	0.320
6	2486	882	1489	0.1	1	0	0	0.343	0.317	0.365
7	1127	1618	562	0.1	1	0	0	0.387	0.290	0.408
8	1603	755	1064	0.1	1	0	0	0.428	0.273	0.448
9	501	1092	505	0.1	1	0	0	0.467	0.279	0.486
10	447	340	726	0.1	1	0	0	0.504	0.254	0.522
11	248	310	232	0.1	1	0	0	0.539	0.293	0.556
12	414	442	493	0.1	1	0	0	0.633	0.293	0.642

Table 32.12. Sole in Division 7.e. Single option output of the short-term forecast (targeting F_{MSY}).

Age	F	Catch.No	Yield	Stock.No	Biomass	SSNo	SSB
Year = 2024, F_{bar} = 0.273							
2	0.063	237	41	4083	588	572	82
3	0.187	576	128	3540	698	1593	314
4	0.255	669	182	3112	772	2738	679
5	0.265	282	90	1270	377	1245	369
6	0.329	666	243	2486	852	2486	852
7	0.301	279	114	1127	436	1127	436
8	0.284	378	169	1603	686	1603	686
9	0.29	120	59	501	234	501	234
10	0.264	99	52	447	225	447	225
11	0.304	62	35	248	134	248	134
12	0.304	104	66	414	262	414	262
Total	NA	3472	1179	18831	5264	12974	4274
Year = 2025, F_{bar} = 0.290							
2	0.067	251	43	4083	588	572	82
3	0.199	596	133	3469	685	1561	308
4	0.271	602	164	2656	659	2337	580
5	0.282	511	163	2181	647	2138	634

Age	F	Catch.No	Yield	Stock.No	Biomass	SSNo	SSB
6	0.35	248	91	882	302	882	302
7	0.32	422	172	1618	626	1618	626
8	0.302	187	84	755	323	755	323
9	0.308	276	134	1092	510	1092	510
10	0.281	79	41	340	171	340	171
11	0.323	82	45	310	167	310	167
12	0.323	116	75	442	279	442	279
Total	NA	3371	1146	17828	4958	12046	3984
Year = 2026, F_{bar} = 0.290							
2	0.067	251	43	4083	588	572	82
3	0.199	594	132	3456	682	1555	307
4	0.271	583	159	2573	638	2265	562
5	0.282	429	137	1833	544	1796	533
6	0.35	420	153	1489	510	1489	510
7	0.32	147	60	562	217	562	217
8	0.302	264	118	1064	455	1064	455
9	0.308	128	62	505	236	505	236
10	0.281	170	89	726	366	726	366
11	0.323	61	34	232	125	232	125
12	0.323	130	83	493	312	493	312
Total	NA	3175	1070	17016	4674	11259	3706

Units are thousands (for numbers) and tonnes (for weights).

Table 32.13. Sole in Division 7.e. Year-class sources and contributions for the short-term forecast (in percent).

cohort	Yield 2024	Yield 2025	SSB 2024	SSB 2025	SSB 2026
2012	5.6		6.1		
2013	2.9	6.5	3.1	7	
2014	4.4	4	5.3	4.2	8.4
2015	5	3.6	5.5	4.3	3.4
2016	14.4	11.7	16.1	12.8	9.9
2017	9.7	7.3	10.2	8.1	6.4
2018	20.6	15	19.9	15.7	12.3
2019	7.7	7.9	8.6	7.6	5.9

cohort	Yield 2024	Yield 2025	SSB 2024	SSB 2025	SSB 2026
2020	15.4	14.3	15.9	15.9	13.8
2021	10.9	14.3	7.4	14.6	14.4
2022	3.4	11.6	1.9	7.7	15.2
2023		3.8		2.1	8.3
2024					2.2

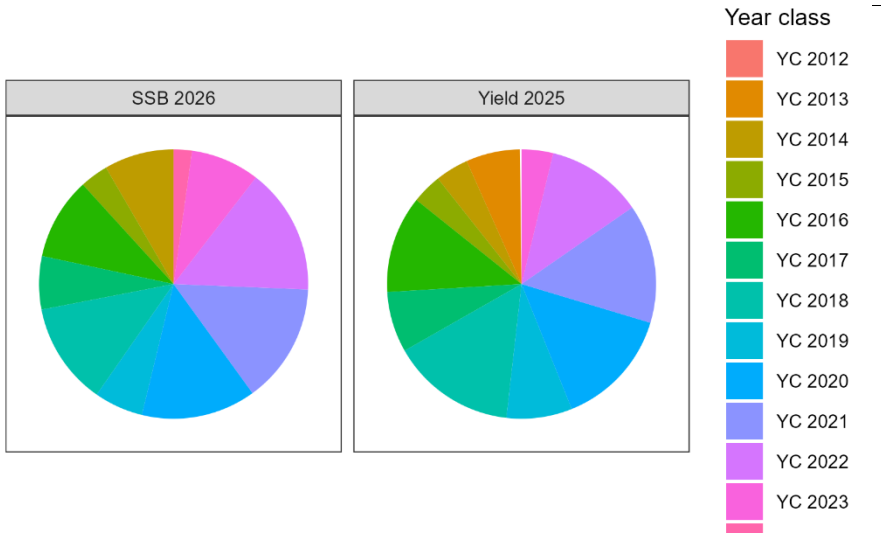

Table 32.14. Sole in Division 7.e. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch* (2025)	Projected landings (2025)	Projected discards (2025)	$F_{projected\ landings}$ (2025)	SSB (2026)	% SSB change **	% TAC change***	% advice change^
ICES advice basis								
MSY approach: F_{MSY}	1151	1146	5	0.29	3706	-7.0	-2.8	8.9
Other options								
EU MAP^^^: F_{MSY}	1151	1146	5	0.29	3706	-7.0	-2.8	8.9
F = MPA $F_{MSY\ lower}$	674	671	3	0.160	4166	4.6	-43	-36
F = $F_{MSY\ upper}$	1319	1313	6	0.34	3544	-11.0	11.4	25
F = 0	0	0	0	0	4819	21	-100	-100
F = F_{pa}	1479	1473	7	0.39	3390	-14.9	25	40
F = F_{lim}	1632	1625	7	0.44	3243	-18.6	38	54
SSB2026 = Blim	2946	2933	13	1.01	2000	-50	149	179
Rollover TAC	1184	1179	5	0.30	3674	-7.8	0	12.0
SSB_{2026} = B_{pa}= MSY $B_{trigger}$	1992	1983	9	0.57	2900	-27	68	88
SSB_{2026} = SSB_{2025}	863	859	4	0.21	3984	0	-27	-18.4
F = F_{2024}	1092	1087	5	0.27	3762	-5.6	-7.8	3.3

*** Total catch derived from the projected landings and the assumed discard rate.**

**** SSB 2026 relative to SSB 2025.**

***** Total catch in 2025 relative to TAC 2024 (1184).**

^ Advice value for 2025 relative to the advice value for 2024 (1057 tonnes).

^^ EU multiannual plan (MAP) for the Western Waters (EU, 2019).

Table 33.15. Sole in Division 7.e. Annual catch scenarios (more options and more digits provided, sorted by fishing mortality in intermediate year). All weights are in tonnes.

Basis	Total catch* (2024)	Projected landings (2024)	Projected discards (2024)	$F_{projected\ landings}$ (2024)	SSB (2025)	% SSB change **	% TAC change***	% advice change^^
F0	0	0	0	0	4819.49	20.98391	-100	-100
Fsq0.6	664.8949	661.897	2.997966	0.157652	4174.671	4.796979	-43.8433	-37.096
FMSY_lower	674.0594	671.0201	3.039288	0.16	4165.808	4.574478	-43.0693	-36.229
F=0.17	712.8564	709.6422	3.214221	0.17	4128.292	3.632735	-39.7925	-32.5585
F=0.18	751.2848	747.8973	3.387492	0.18	4091.147	2.700263	-36.5469	-28.9229
F=0.19	789.3481	785.789	3.559117	0.19	4054.367	1.776968	-33.3321	-25.3218
F=0.2	827.0501	823.321	3.729113	0.2	4017.948	0.862757	-30.1478	-21.755
SSB_stable	862.6423	858.7527	3.889596	0.209529	3983.58	-1.11E-14	-27.1417	-18.3877
F=0.21	864.3944	860.4969	3.897495	0.21	3981.888	-0.04246	-26.9937	-18.2219
Fsq0.8	865.1462	861.2453	3.900885	0.210202	3981.162	-0.06068	-26.9302	-18.1508
TAC085	901.3844	897.3202	4.064281	0.22	3946.182	-0.93878	-23.8696	-14.7224
F=0.22	938.0239	933.7944	4.229486	0.23	3910.828	-1.82629	-20.775	-11.256
F=0.23	974.3162	969.9231	4.393125	0.24	3875.821	-2.70508	-17.7098	-7.8225
F=0.24	1006.4	1001.862	4.537789	0.24892	3844.883	-3.4817	-15	-4.78713
Fsq	1010.265	1005.71	4.555215	0.25	3841.157	-3.57523	-14.6736	-4.42149
F=0.25	1045.873	1041.157	4.715771	0.26	3806.834	-4.43684	-11.6661	-1.05267
TAC	1081.145	1076.27	4.874809	0.27	3772.848	-5.29	-8.68709	2.28428
F=0.26	1081.145	1076.27	4.874809	0.27	3772.848	-5.29	-8.68709	2.28428
MP2	1081.145	1076.27	4.874809	0.27	3772.848	-5.29	-8.68709	2.28428

Basis	Total catch* (2024)	Projected landings (2024)	Projected discards (2024)	$F_{projected\ landings}$ (2024)	SSB (2025)	% SSB change **	% change***	TAC% advice change^^
MP	1091.955	1087.031	4.923551	0.273084	3762.435	-5.55141	-7.77407	3.307002
F=0.27	1116.083	1111.051	5.032342	0.28	3739.196	-6.13478	-5.73624	5.589684
F=0.28	1150.691	1145.503	5.188387	0.29	3705.874	-6.97127	-2.81326	8.863855
FMSY	1184	1178.661	5.338576	0.299715	3673.814	-7.77607	2.22E-14	12.01514
TAC115	1184.972	1179.629	5.342959	0.3	3672.878	-7.79955	0.082101	12.1071
F=0.3	1218.93	1213.434	5.496071	0.31	3640.206	-8.61972	2.950137	15.31974
F=0.31	1252.567	1246.919	5.647739	0.32	3607.854	-9.43185	5.791115	18.50206
F=0.32	1285.887	1280.089	5.797976	0.33	3575.82	-10.236	8.605305	21.65438
F=0.33	1318.893	1312.946	5.946798	0.34	3544.099	-11.0323	11.39298	24.77699
FMSY_upper	1361.6	1355.461	6.139362	0.353081	3503.072	-12.0622	15	28.81741
Fpa	1479.321	1472.651	6.670158	0.39	3390.091	-14.8984	24.94266	39.9547
Flim	1632.355	1624.995	7.360179	0.44	3243.465	-18.5791	37.86784	54.43285
Bpa	1992.098	1983.116	8.982236	0.567707	2900	-27.2012	68.25155	88.46721
Btrigger	1992.098	1983.116	8.982236	0.567707	2900	-27.2012	68.25155	88.46721
Blim	2946.139	2932.855	13.28394	1.005218	2000	-49.7939	148.8293	178.7265

*** Total catch derived from the projected landings and the assumed discard rate.**

**** SSB 2026 relative to SSB 2025.**

***** Total catch in 2025 relative to TAC 2024 (1184).**

^ Advice value for 2025 relative to the advice value for 2024 (1057 tonnes).

32.17 Figures

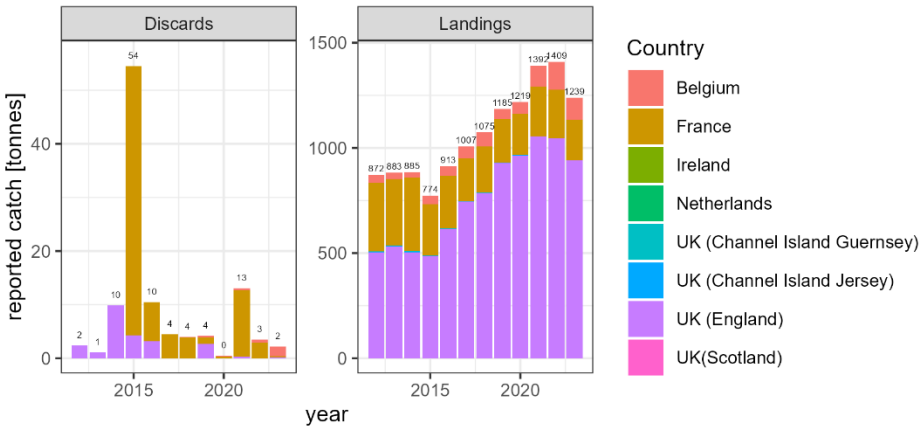

Figure 32.1. Sole in Division 7.e. Landings and discards reported in InterCatch by country.

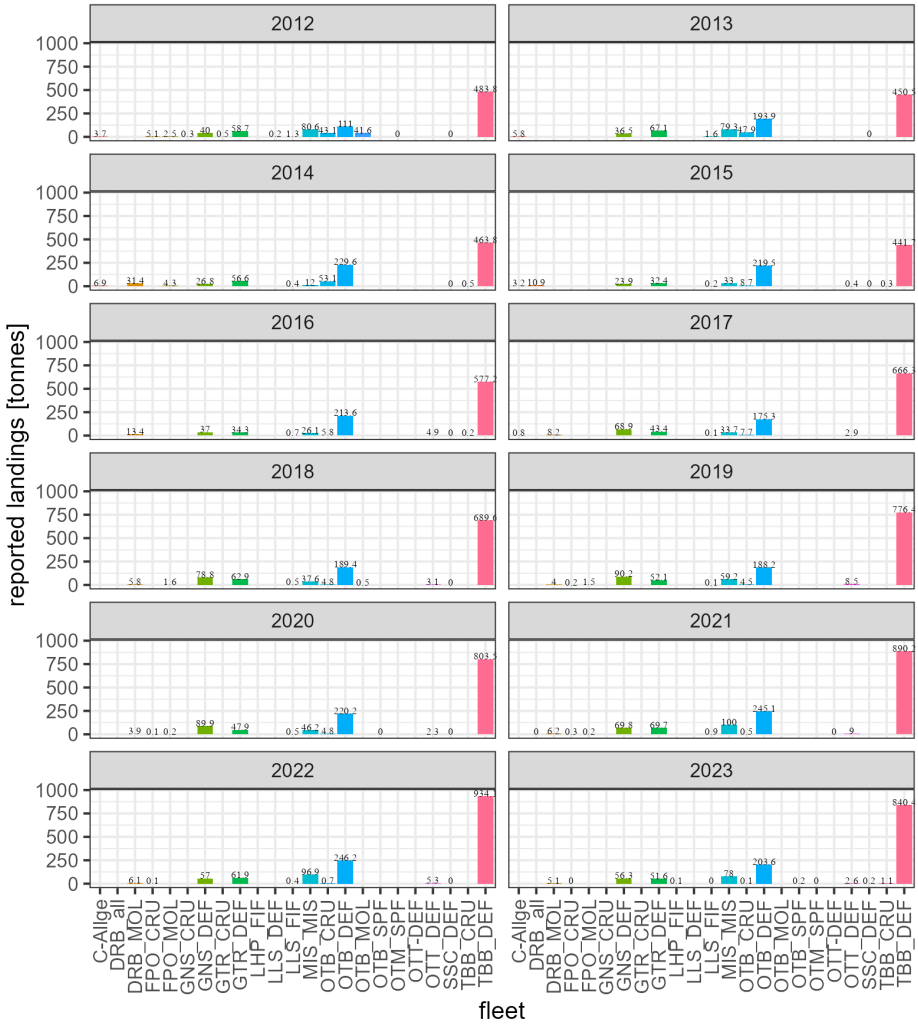

Figure 32.2. Sole in Division 7.e. International landings reported in InterCatch by fleet and year.

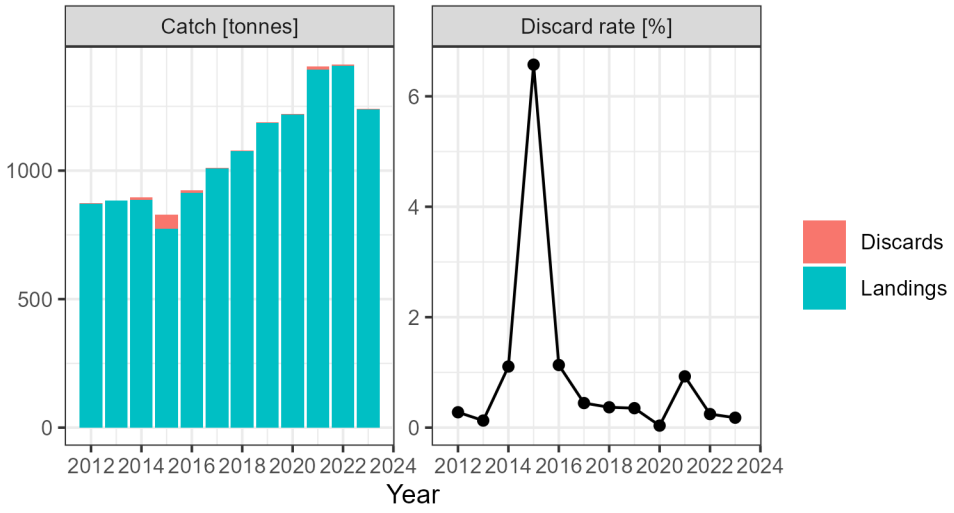

Figure 32.3. Sole in Division 7.e. Discard rates for discards reported in InterCatch.

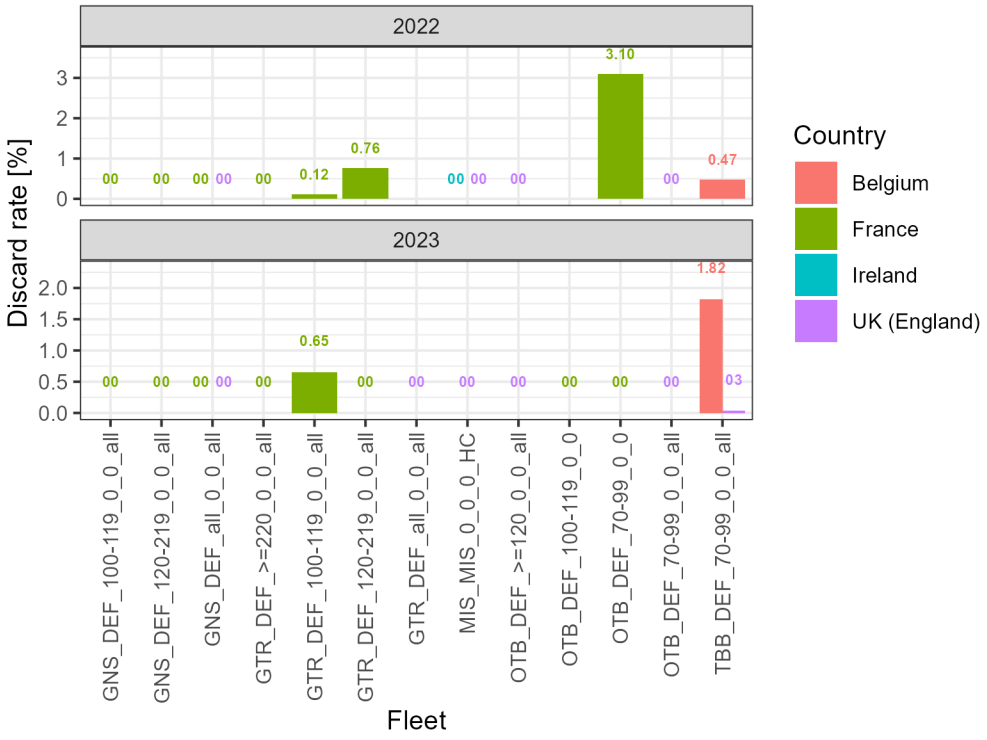

Figure 32.4. Sole in Division 7.e. Annual reported discard rates in InterCatch by fleet and country.

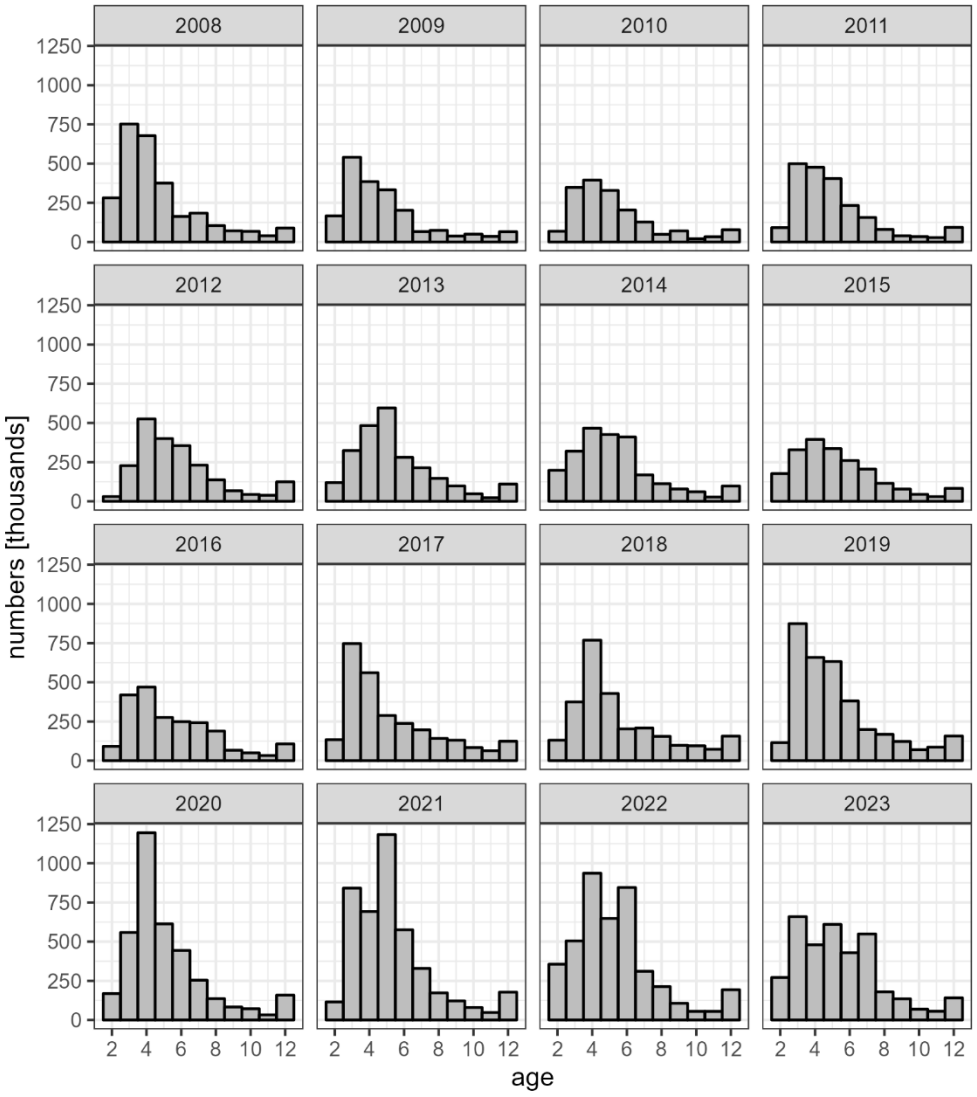

Figure 32.5. Sole in Division 7.e. International landings numbers-at-age (last 16 years).

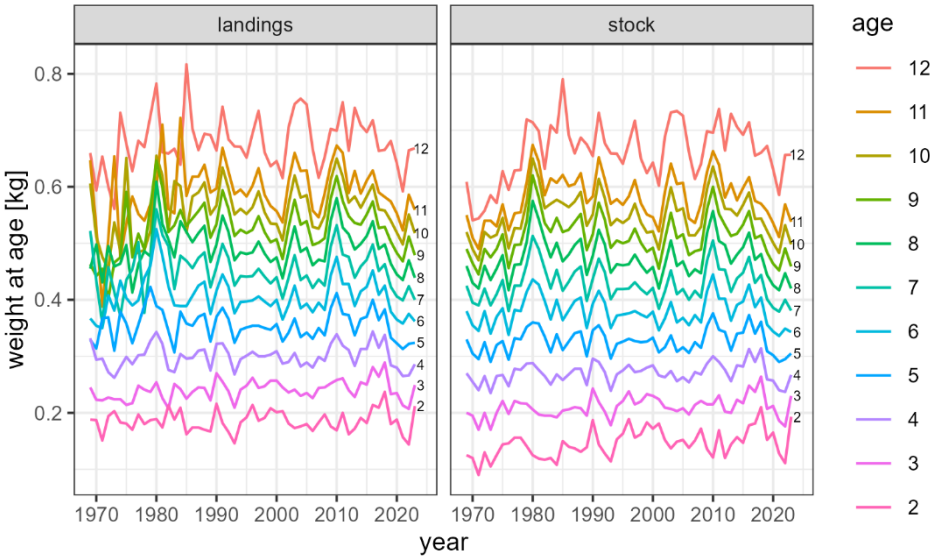

Figure 32.6. Sole in Division 7.e. Catch (landings) and stock weights-at-age.

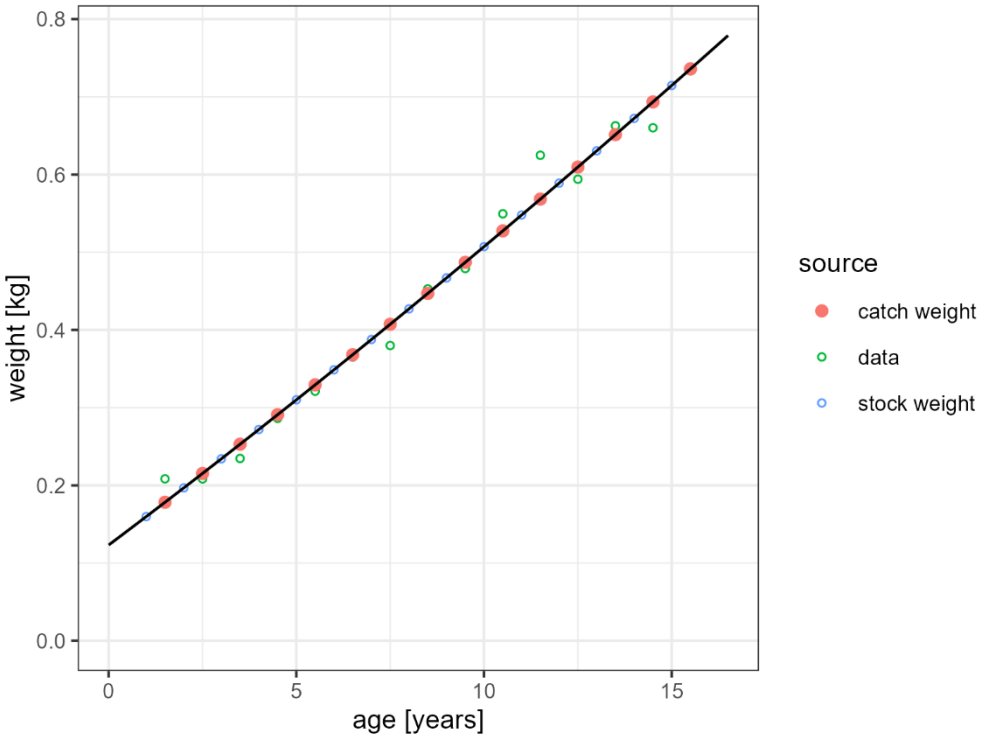

Figure 32.7. Sole in Division 7.e. Generation of stock and catch weights from landings weights-at-age.

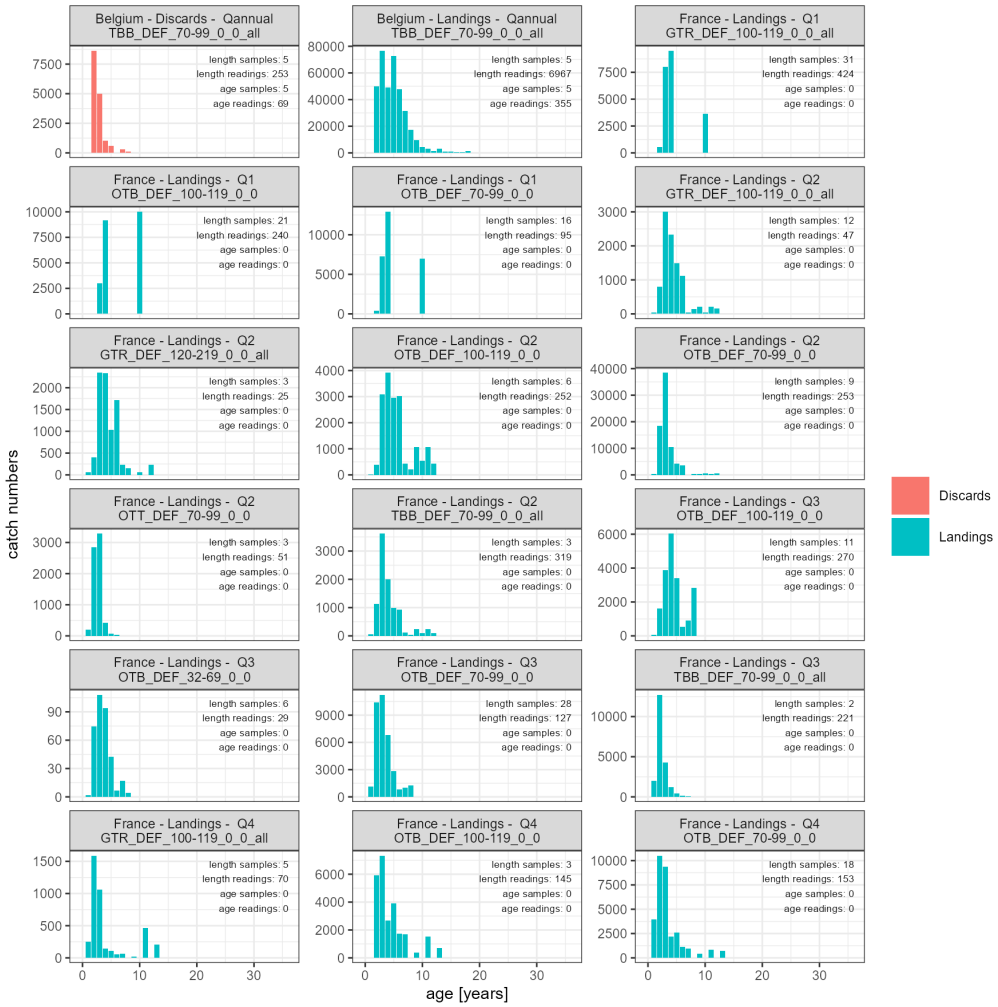

Figure 32.8. Sole in Division 7.e. Landings age distributions submitted to InterCatch. Numbers are raised to fleet level.

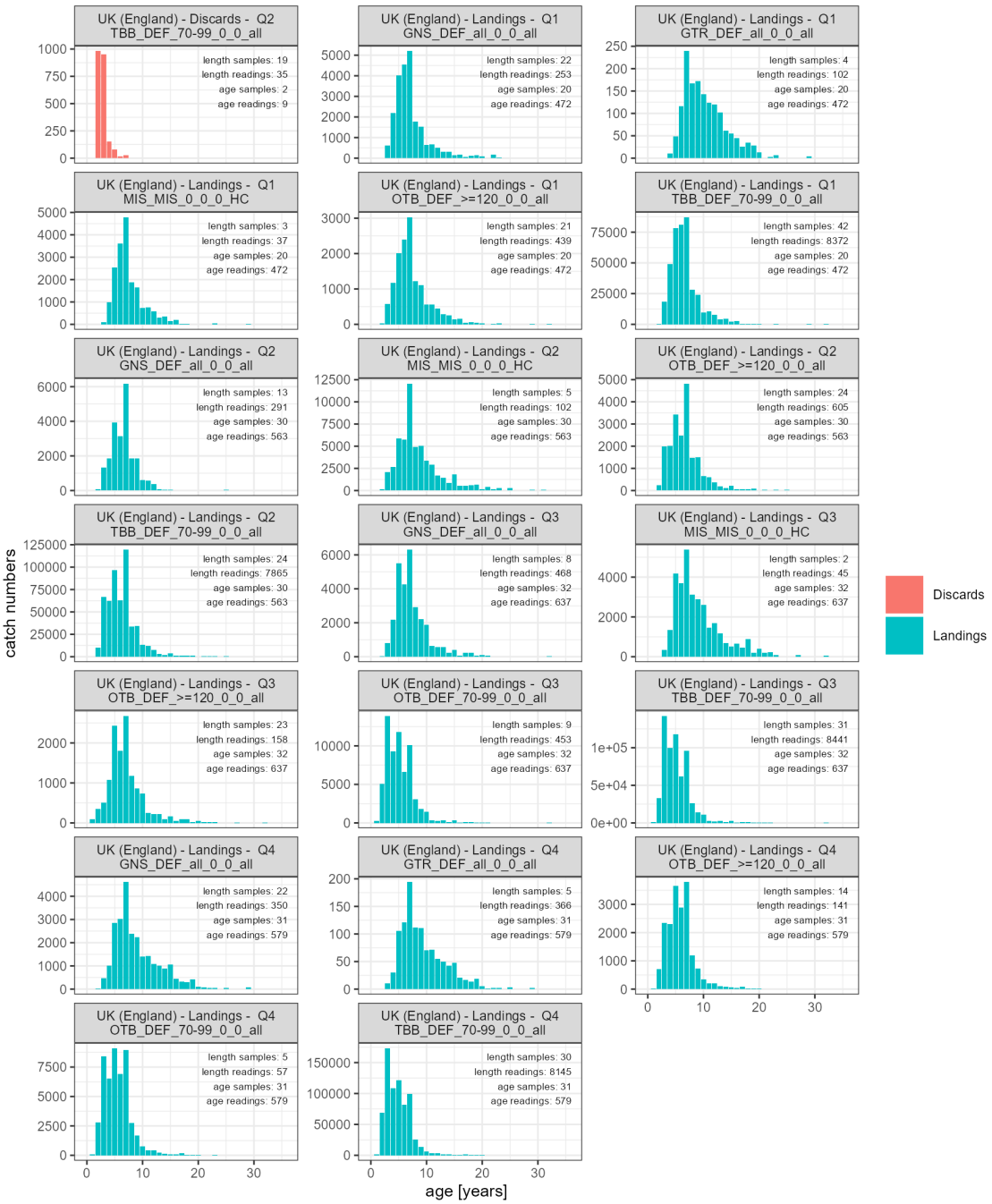

Figure 32.8 (continued). Sole in Division 7.e. Landings age distributions submitted to InterCatch. Numbers are raised to fleet level.

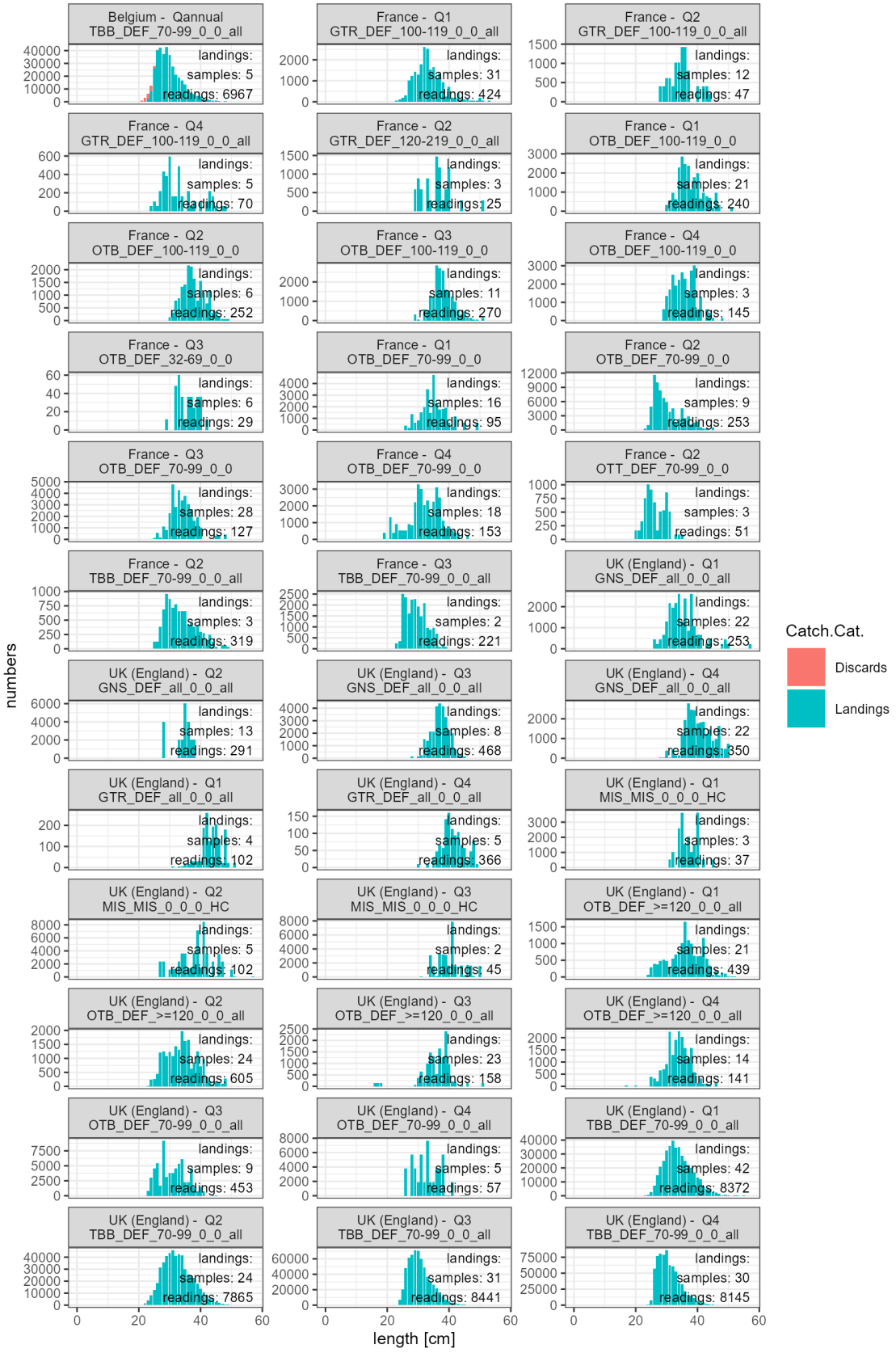

Figure 32.9. Sole in Division 7.e. Length distributions submitted to InterCatch. Numbers are raised to fleet level.

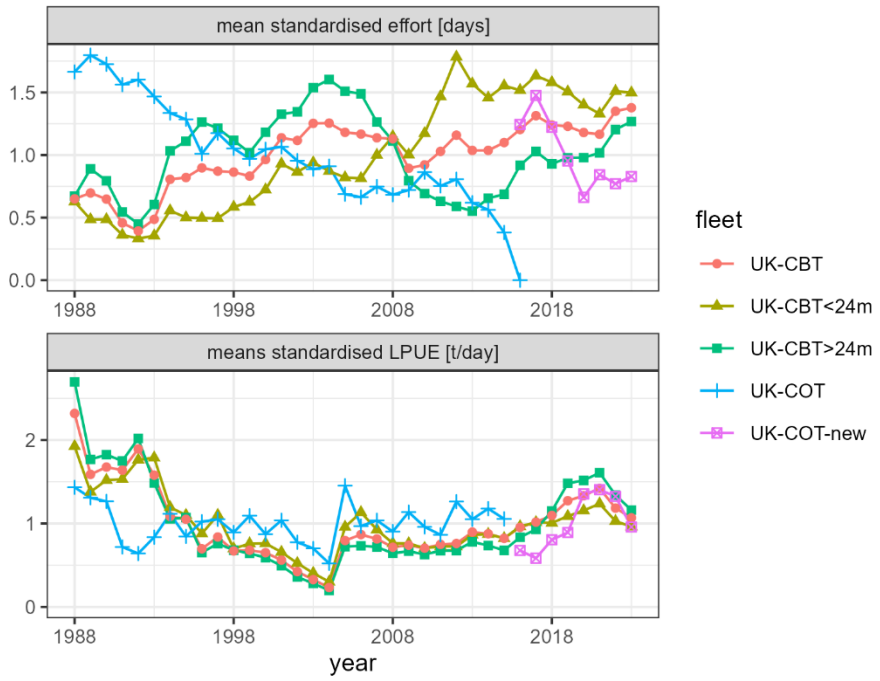

Figure 32.10. Sole in Division 7.e. Means standardised LPUE and effort for the UK commercial fleets.

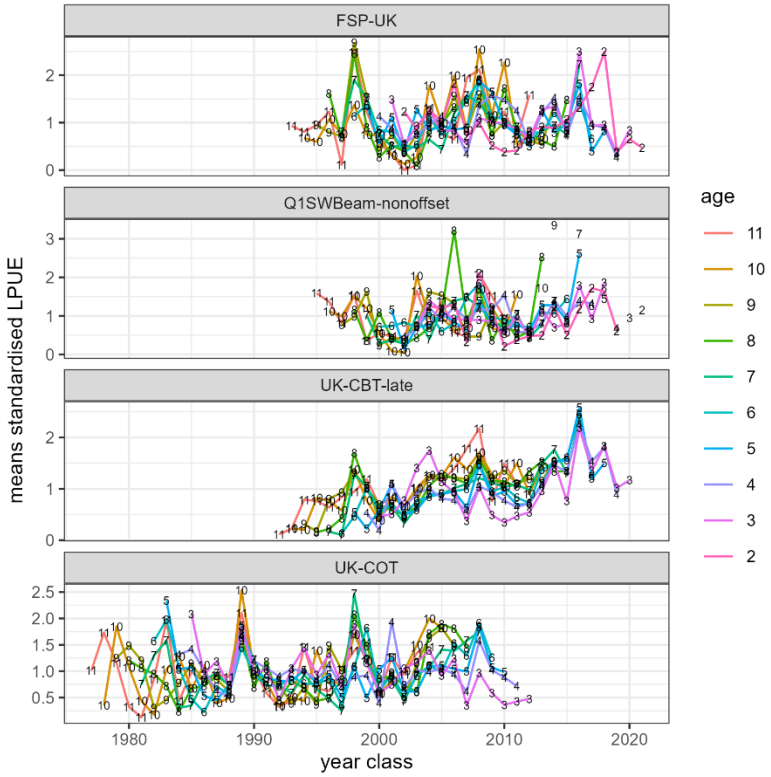

Figure 32.11. Sole in Division 7.e. Means standardised LPUE/CPUE by year class. Note, the cohorts differ on the x-axes due to the differences in the length and age ranges of the tuning series.

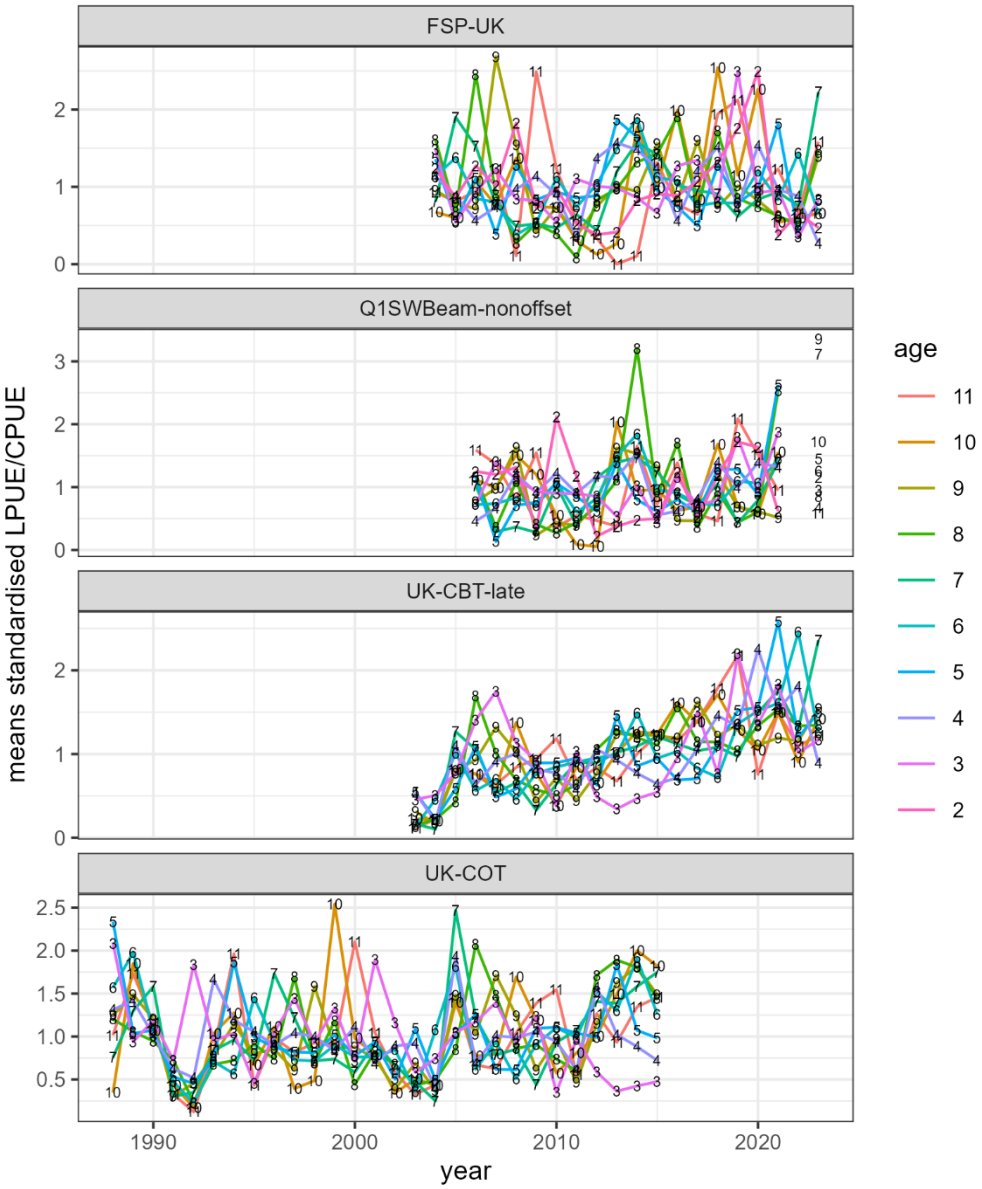

Figure 32.12. Sole in Division 7.e. Means standardised LPUE/CPUE by year. Note, the lines differ on the x-axes due to the differences in the length and age ranges of the tuning series.

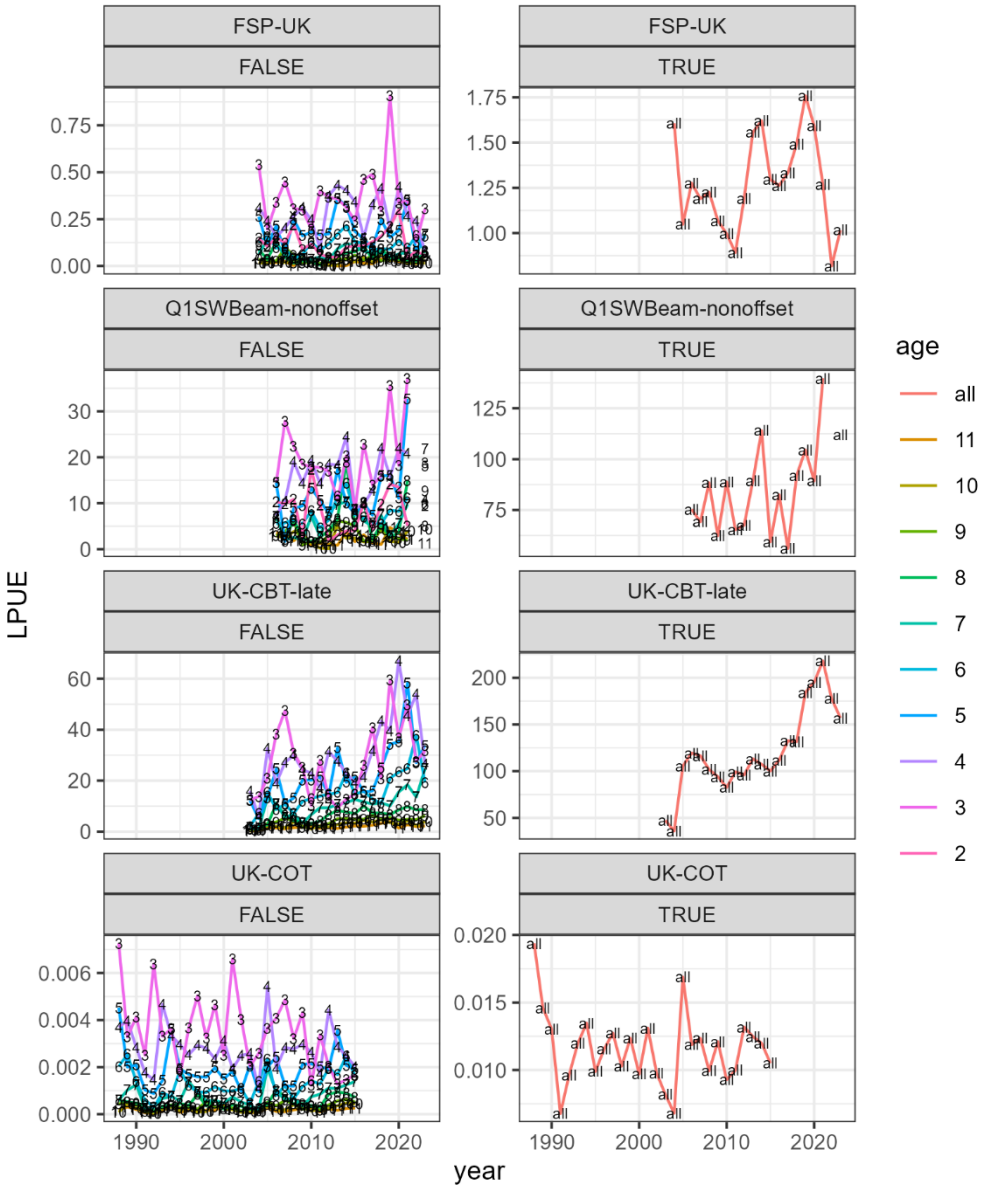

Figure 32.13. Sole in Division 7.e. Survey indices (raw values) for all commercial and scientific surveys. The plots on the left show the index values-at-age, on the right are the values aggregated over all ages.

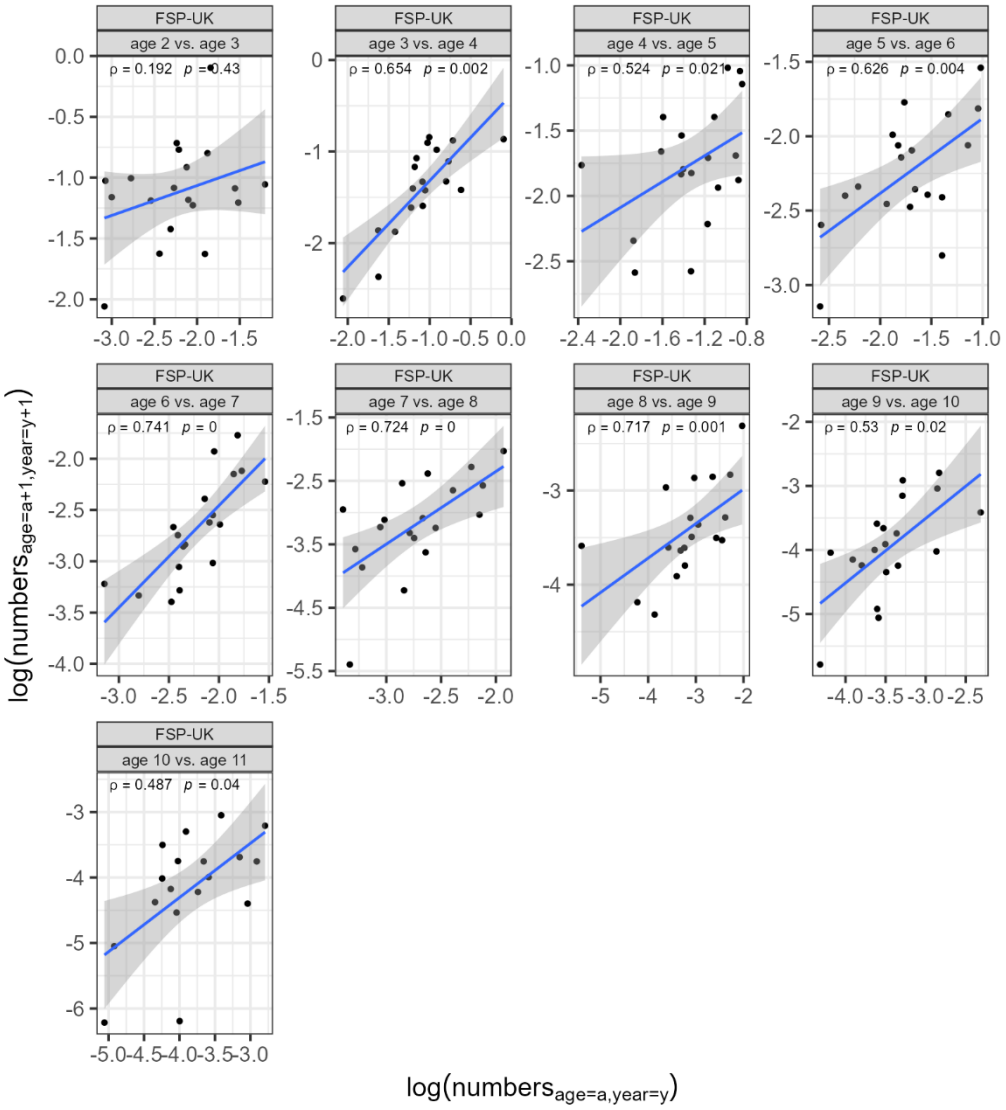

Figure 32.14. Sole in Division 7.e. Internal consistencies in the scientific surveys. Shown is the correlation between numbers-at-age and the numbers of the same cohort one year later, including Pearson correlation coefficient ρ and the p-value.

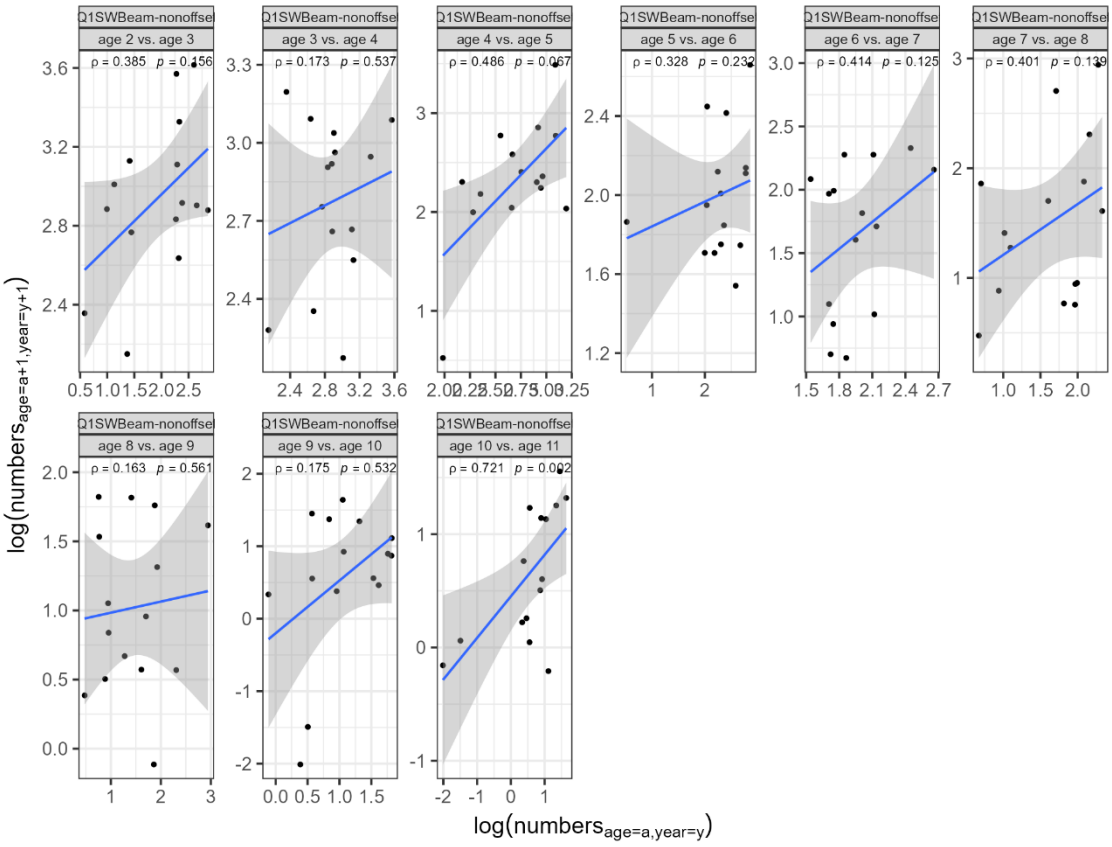

Figure 32.15. Sole in Division 7.e. Internal consistencies in the scientific surveys. Shown is the correlation between numbers-at-age and the numbers of the same cohort one year later, including Pearson correlation coefficient ϱ and the p-value.

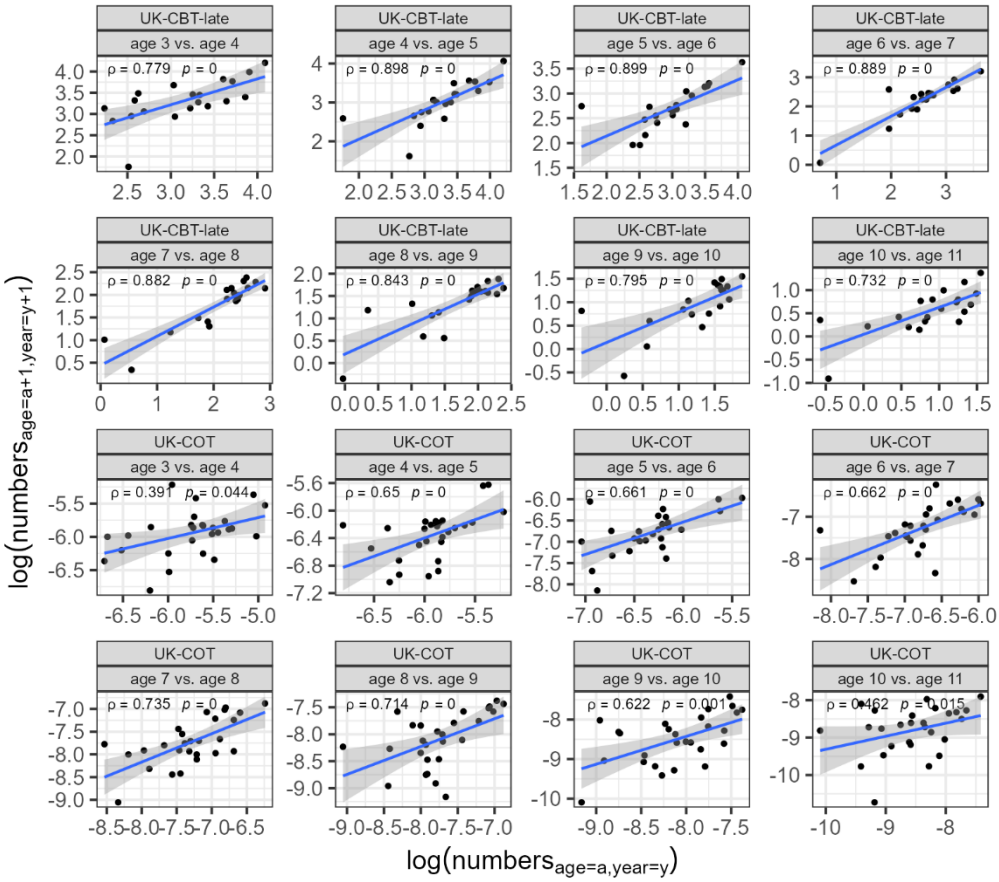

Figure 32.16. Sole in Division 7.e. Internal consistencies in the commercial surveys. Shown is the correlation between numbers-at-age and the numbers of the same cohort one year later, including Pearson correlation coefficient ϱ and the p-value.

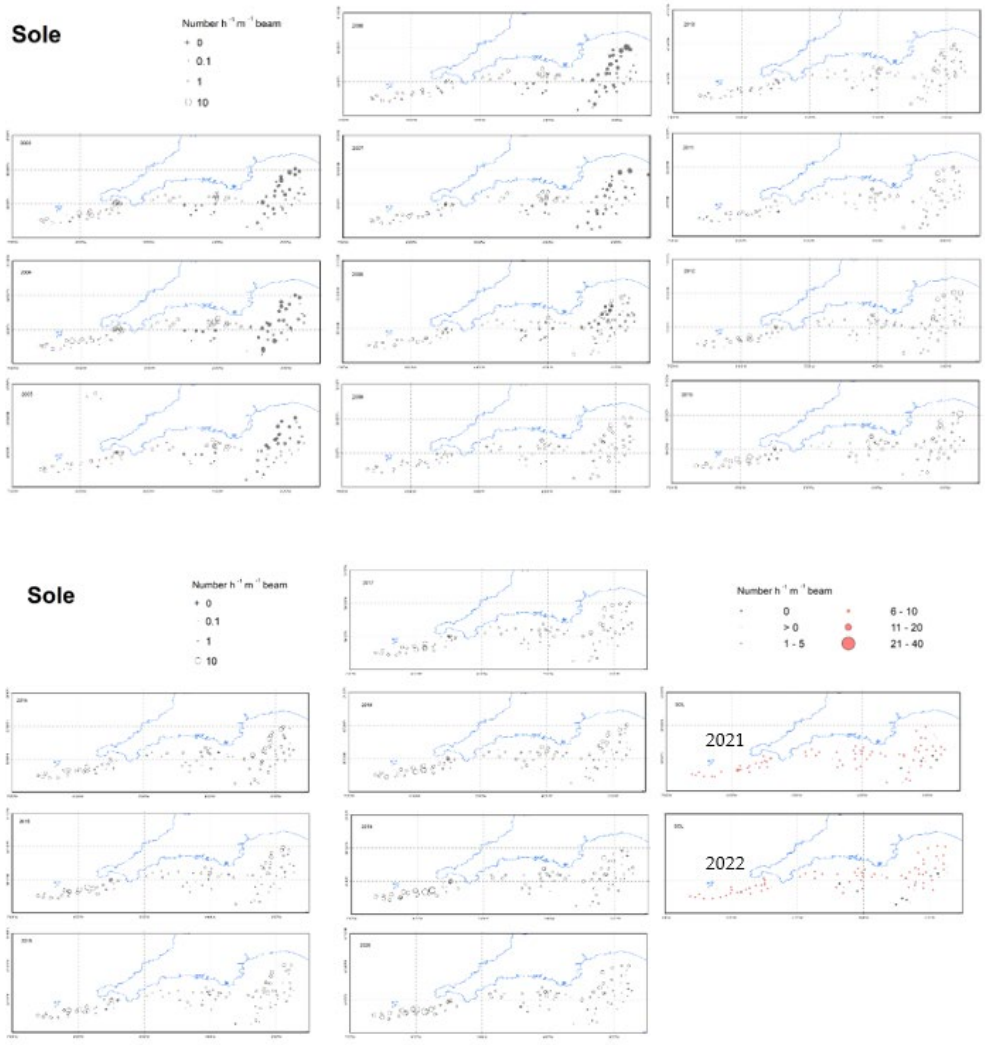

Figure 32.17. Sole in Division 7.e. Sole catch rates during FSP "Western Channel Sole and Plaice" surveys, 2003–2021 (number h^{-1} m $beam^{-1}$). Open circles: FV Nellie and FV Carhelmar tows; filled black circles: FV Lady T Emiel tows. Please note that 2021–2022 numbers are not to scale. Source: Burt *et al*. (2021, 2022, 2023).

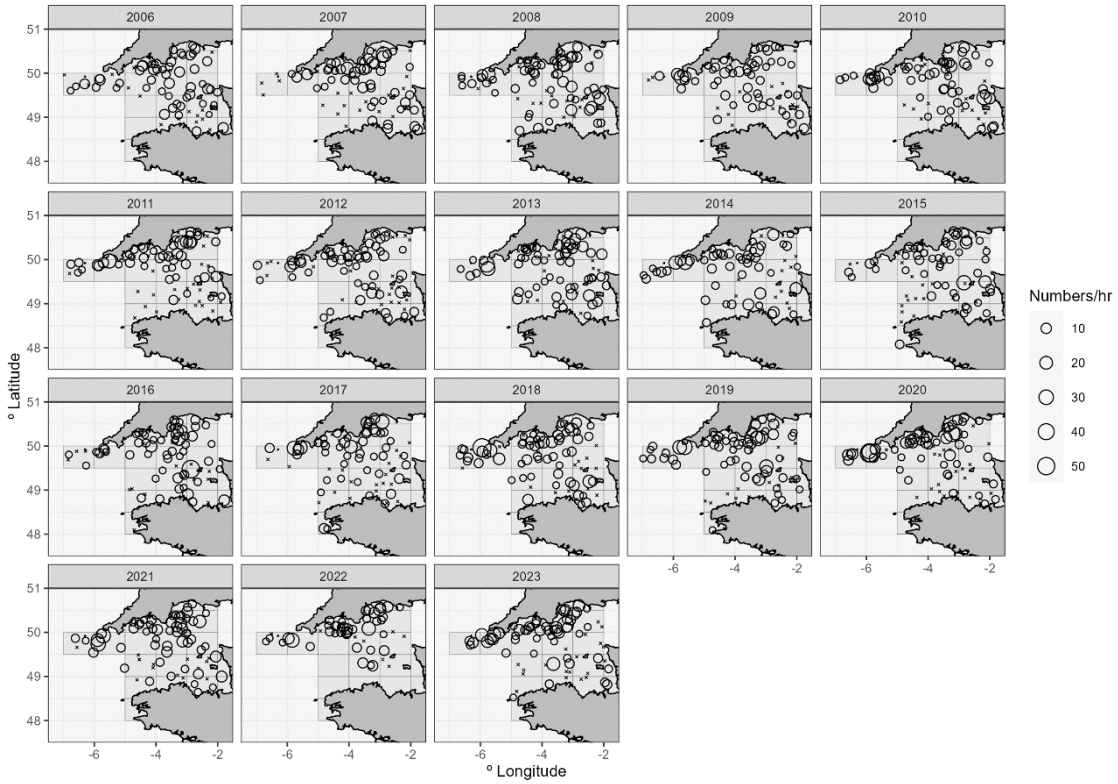

Figure 32.18. Sole in Division 7.e. Catches of sole in the Q1SWBeam survey in numbers per hour. Stations where no sole were caught are indicated by crosses.

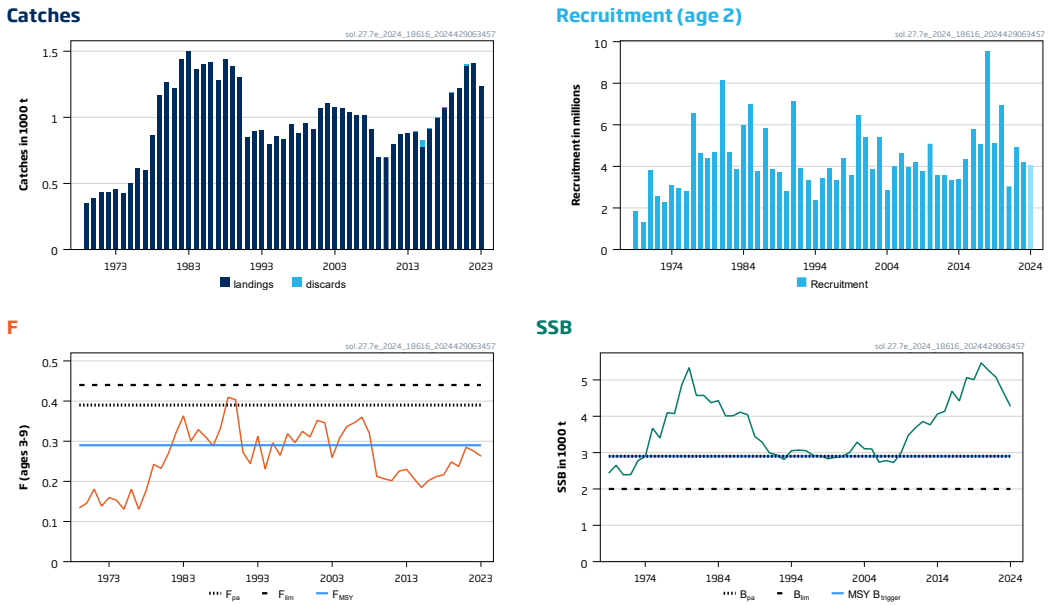

Figure 32.19. Sole in Division 7.e. Results of the final XSA run. Summary of the stock assessment. ICES estimated catches, recruitment (age 2), fishing mortality (F), and spawning–stock biomass (SSB). The assumed recruitment value for 2024 is shaded in a lighter colour. Discard estimates are only available since 2012.

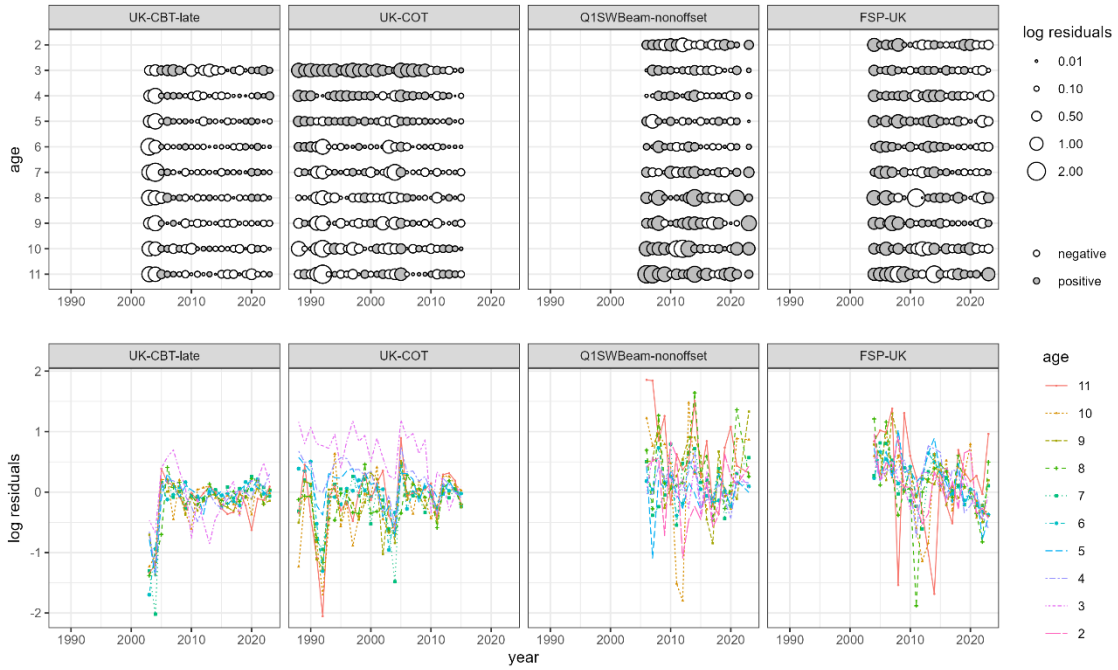

Figure 32.20. Sole in Division 7.e. XSA fleet log catchability residuals. Note that the application of time-series weighting set as a tricubic taper with a range of 15 years excludes log catchability residuals prior to 2005.

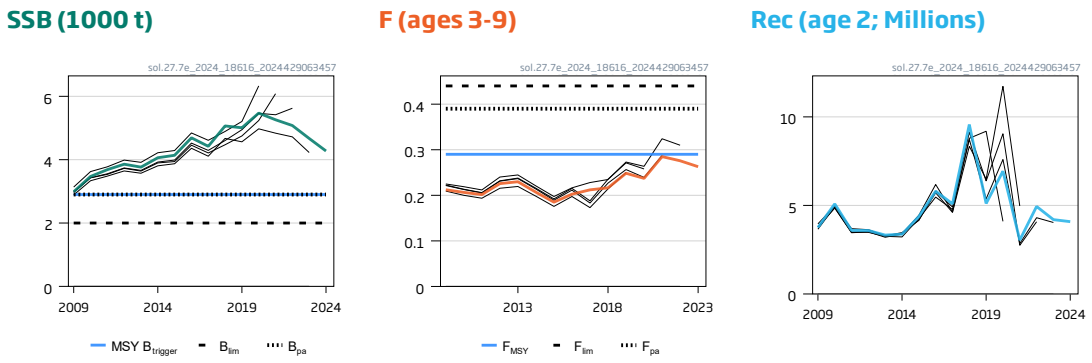

Figure 32.21. Sole in Division 7.e. Comparison of the current XSA assessment with the final assessment runs from the last years.

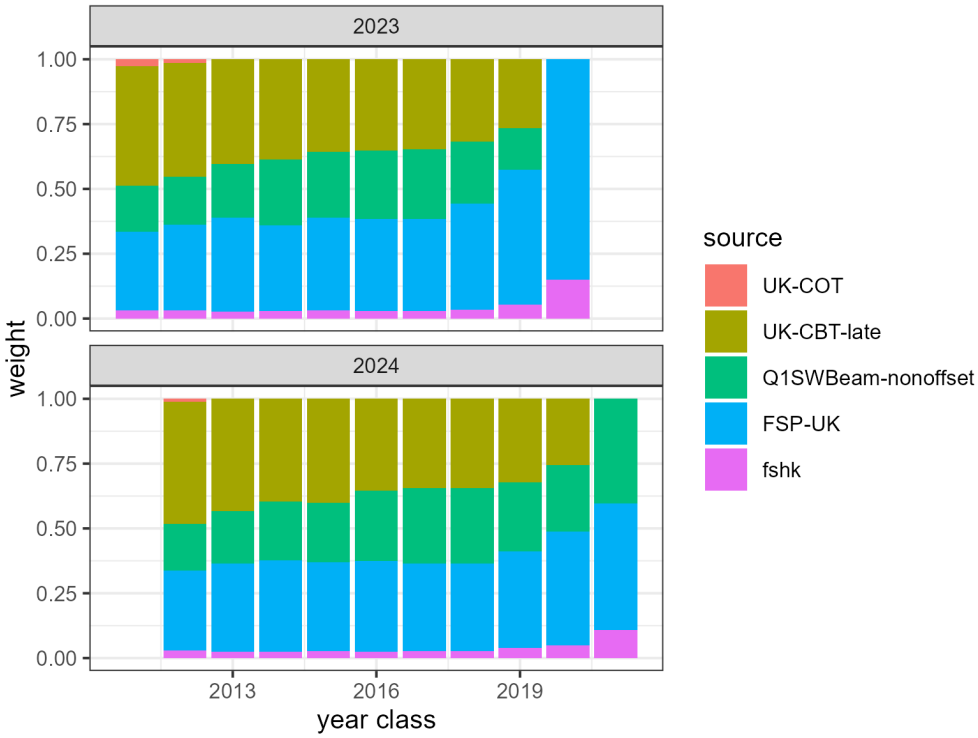

Figure 32.22. Sole in Division 7.e. Scaled weights for the current XSA assessment and the previous XSA assessment conducted at last year's WGCSE.

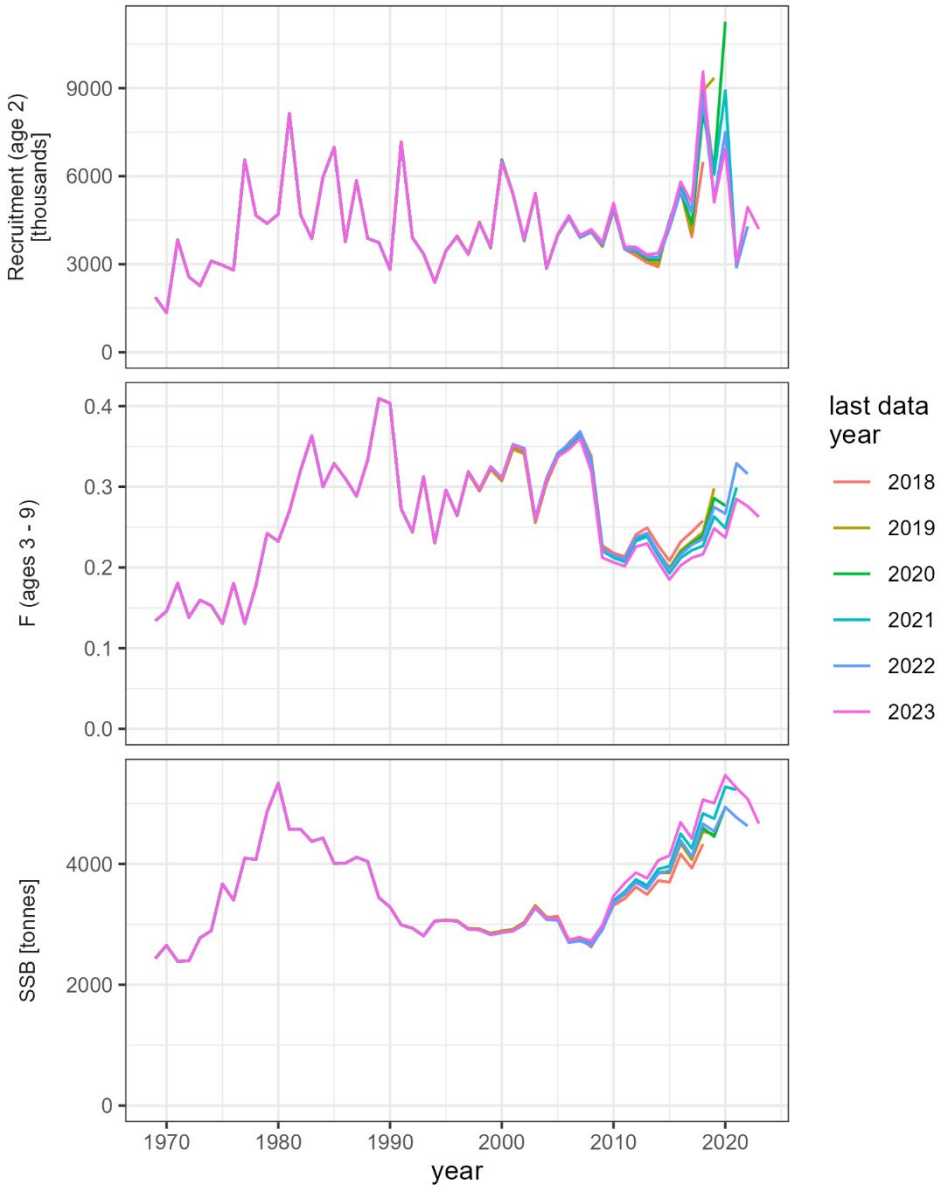

Figure 32.23. Sole in Division 7.e. Five-year retrospective of stock status and fishing mortality estimates.

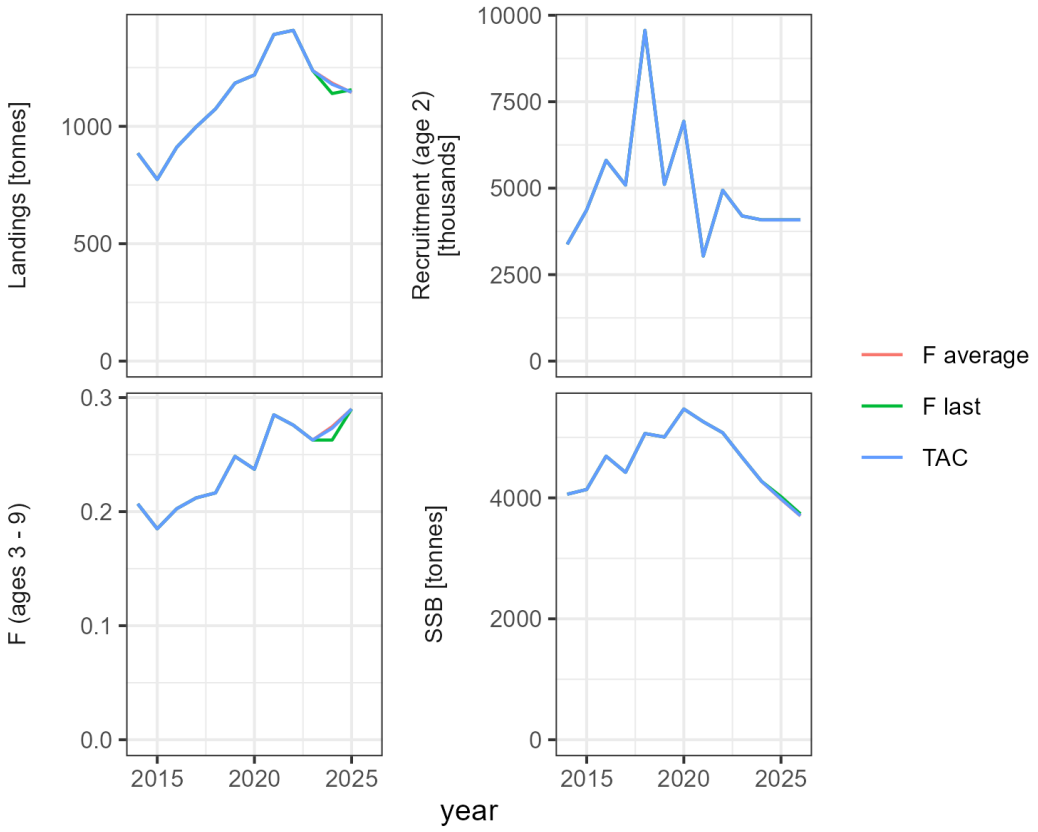

Figure 32.24. Sole in Division 7.e. Options for the intermediate year in the short-term forecast.

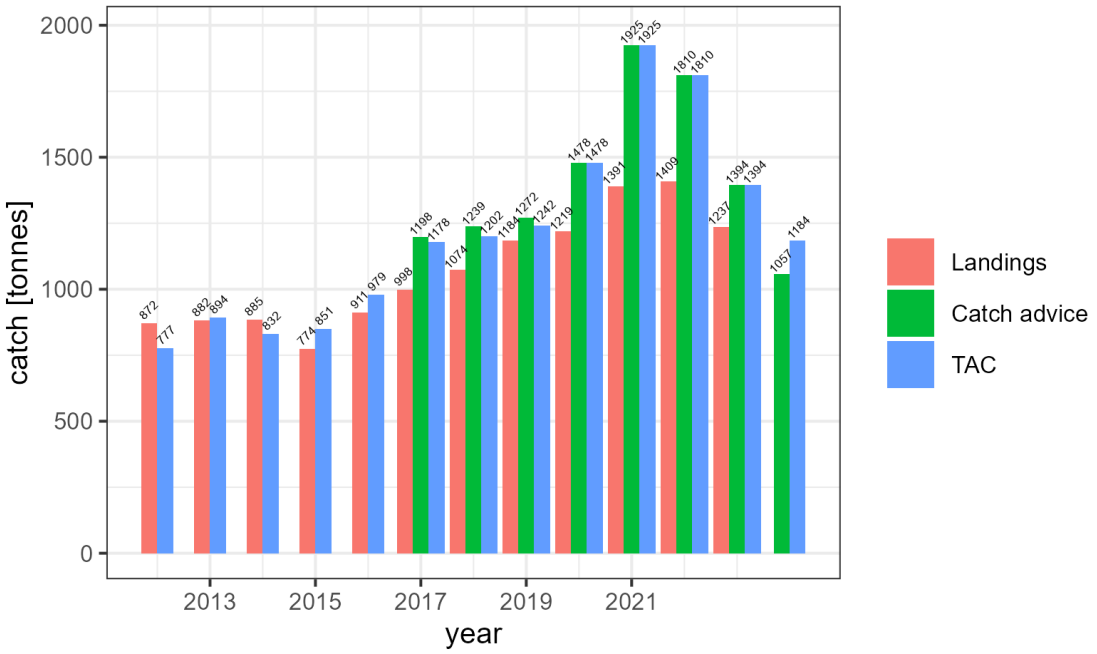

Figure 32.25. Sole in Division 7.e. Comparison of international TAC, catch advice and realised landings.

Figure 32.26. Sole in Division 7.e. Output for the short-term forecast under the MSY approach.

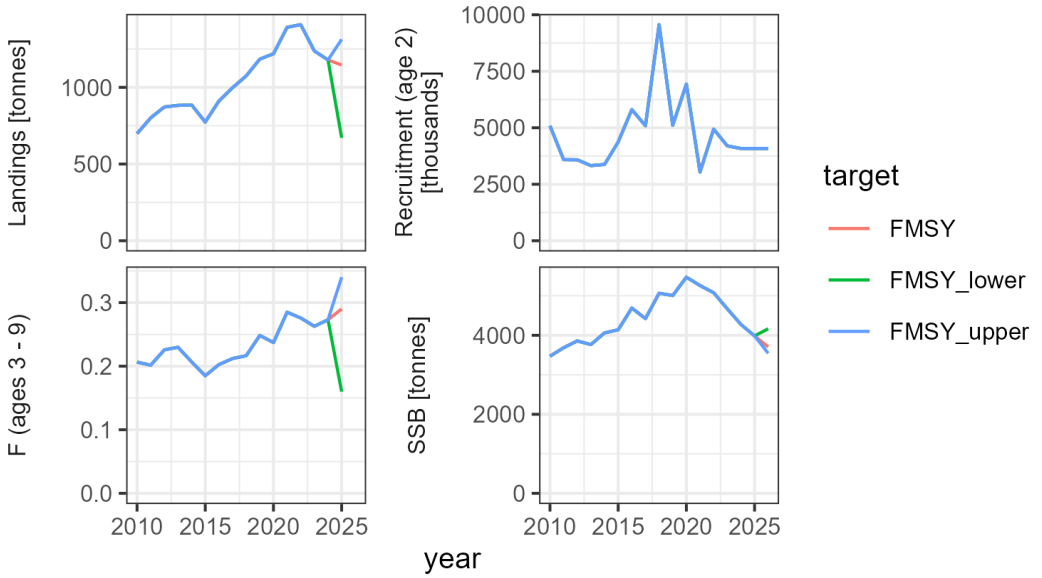

Figure 32.27. Sole in Division 7.e. Output of the short-term forecast of the MSY approach, including F_{MSY} ranges.

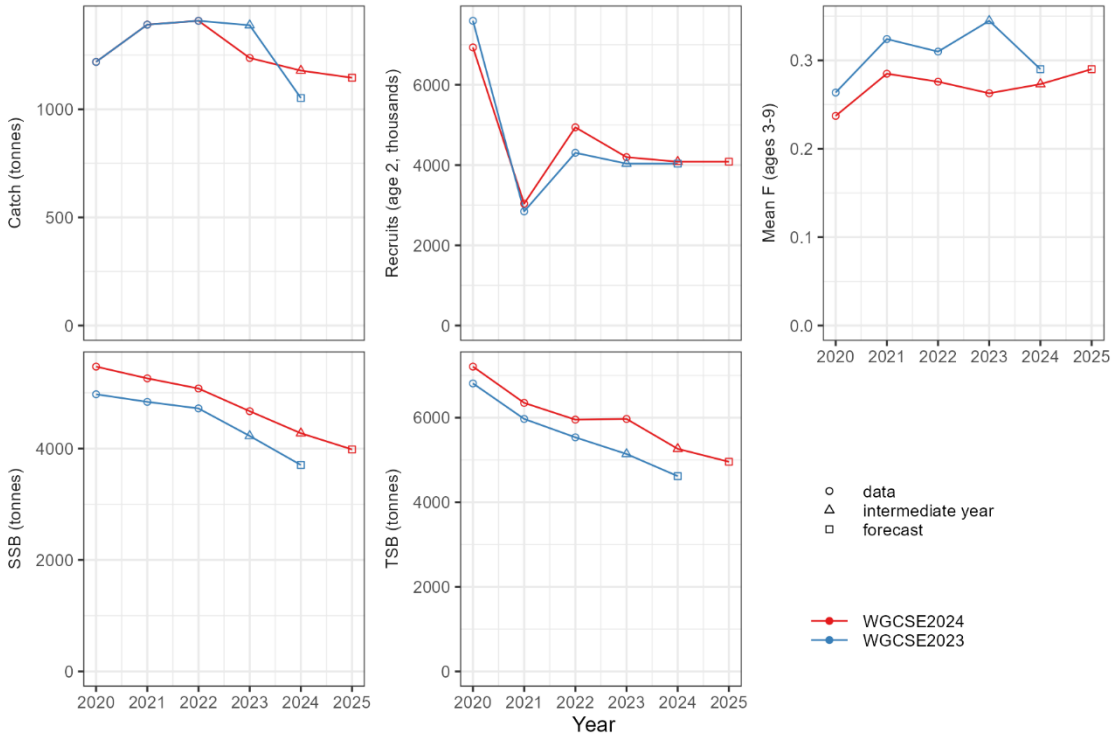

Figure 32.28. Sole in Division 7.e. Comparison of this year's and last year's short-term forecasts.

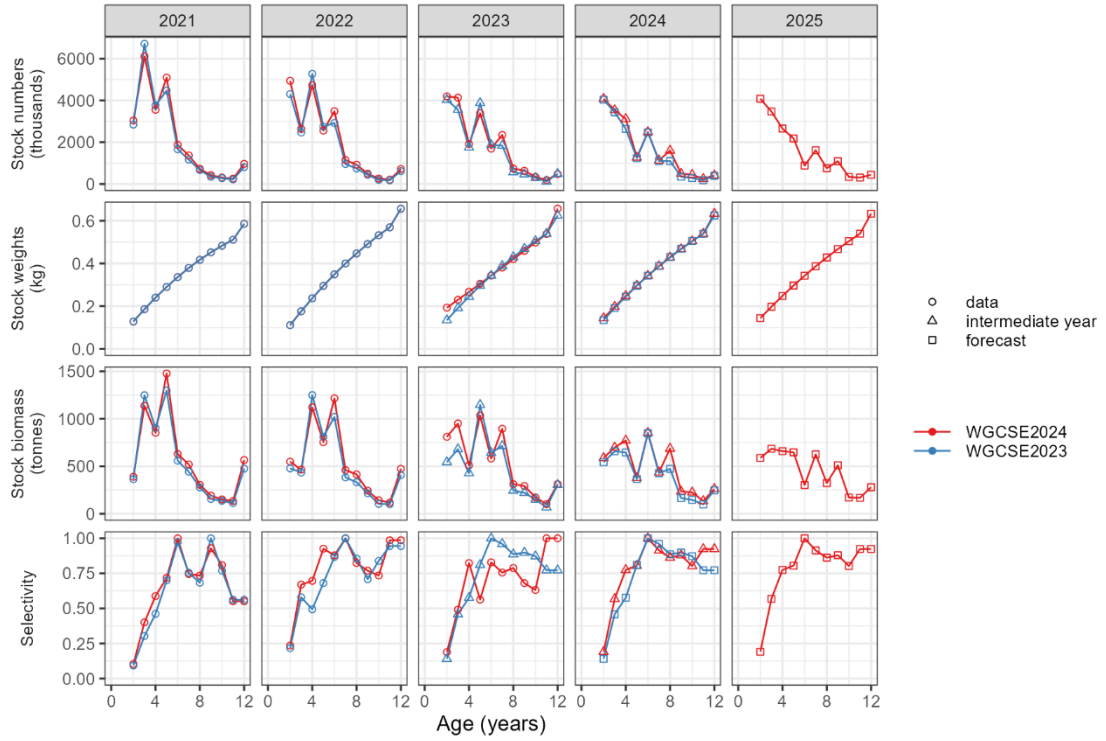

Figure 32.29. Sole in Division 7.e. Comparison of this year's and last year's short-term forecasts by age.

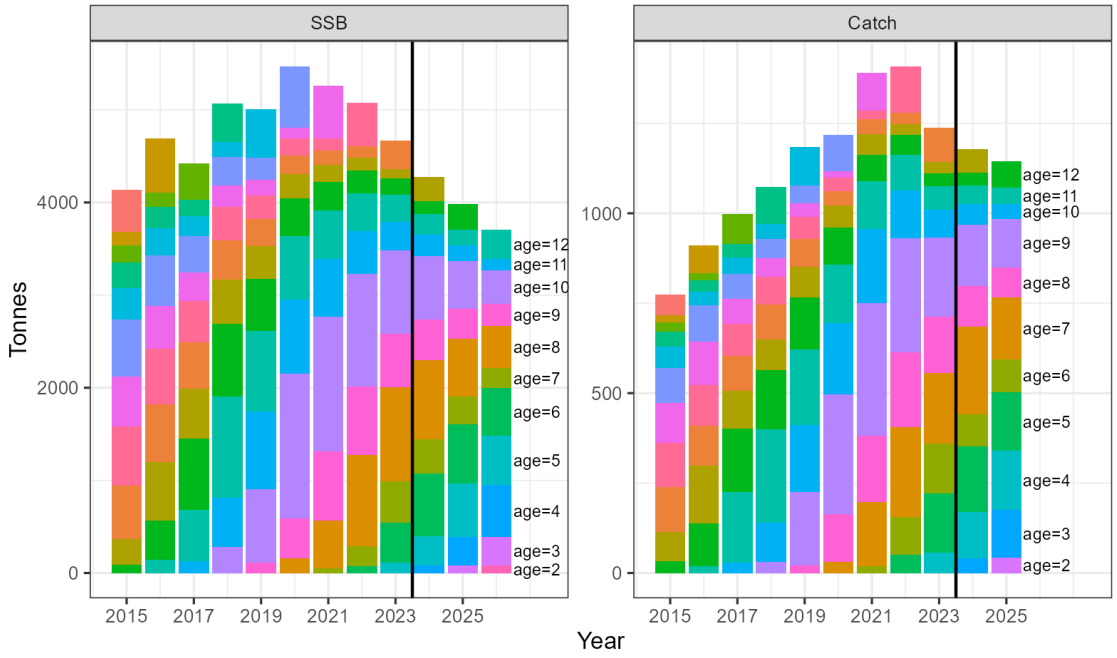

Figure 32.30. Sole in Division 7.e. Age class contributions (biomass) to the SSB and catch. Age 12 is the plus group. The vertical black line indicates where the short-term forecast starts.

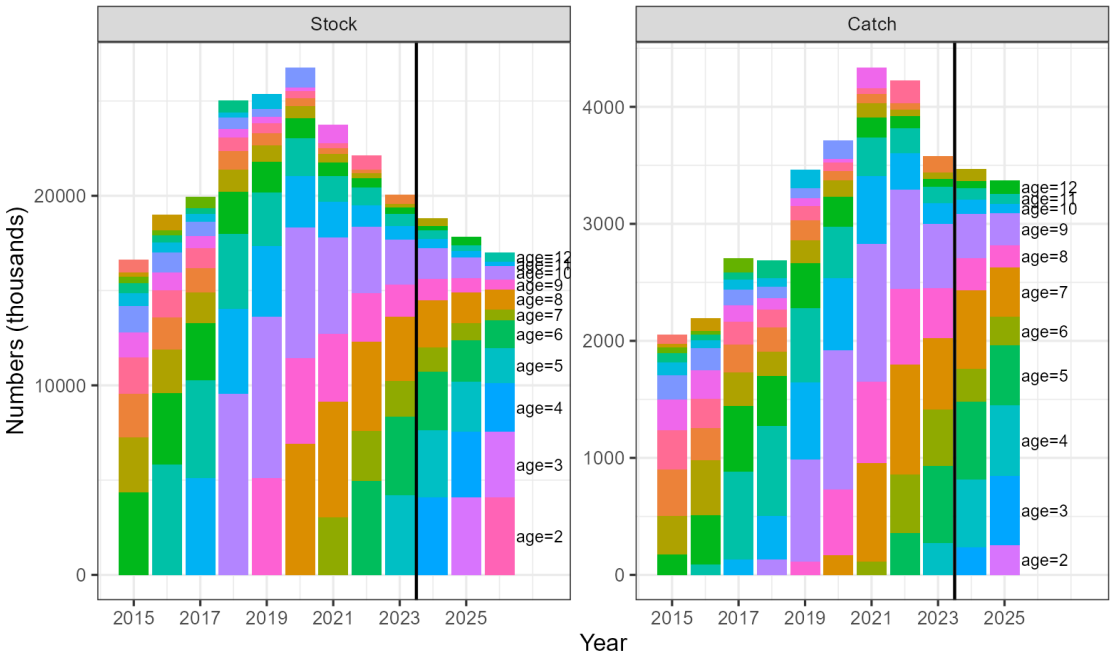

Figure 32.31. Sole in Division 7.e. Age class contributions (numbers) to the stock and catch. Age 12 is the plus group. The vertical black line indicates where the short-term forecast starts.