

13 Plaice in the North Sea and Skagerrak

ple.27.420 – *Pleuronectes platessa* in Subarea 4 and Subdivision 20

The stock was benchmarked in 2022 and the Stock Annex was updated. Therefore, only a comprehensive description of the stock assessment results and deviations from the Stock Annex are presented within this Section of the report.

13.1 General

13.1.1 Stock structure

Plaice in the Skagerrak (Subdivision 20) is considered to have two components: an Eastern and a Western. The latter occurs in a mix with plaice migrating in from the North Sea (Ulrich *et al.*, 2013) and the predominance of catches occurs on summer feeding aggregations in the Western Skagerrak. In a benchmark (WKPLE; ICES, 2015) it was decided that plaice in the Skagerrak would be assessed together with the North Sea stock.

In addition, as in previous years, 50% of the mature animals from 7.d in quarter 1 are included in the North Sea plaice assessment, since North Sea plaice migrates into the area in that season (WKFLAT; ICES, 2010).

13.1.2 Ecosystem considerations

Available information on ecosystem aspects can be found in the Stock Annex. In addition, the ICES Working Group on the Ecosystem Effects of Fishing Activities (WGECO; ICES, 2014) met in April 2014 and addressed a specific question in relation to North Sea plaice, in response to a request from WGNSSK in 2013:

“According to WGNSSK estimates, the North Sea is currently ongoing a plaice outburst without precedent. However, plaice is not included in multispecies models, so the consequences of this outburst on the North Sea ecosystem are unclear and would potentially require additional focus”.

WGECO addressed the trends shown in the stock assessment of plaice, which show how increasing fishing pressure on the stock has progressively moved SSB away from the desired state (in the 1980s and 1990s), and then how management has rectified this situation in recent years, which has brought the North Sea plaice stock in a situation unlike any other over the whole 58-year period for which data is available. The group investigated a possible relationship of these trends with abundance of benthic biomass, which is a predominant food source for plaice. Q1 IBTS data showed a two-fold increase in demersal benthivore biomass over the last 29-year period of the survey, and that species composition of the demersal benthivore guild has changed as well. The data showed that predation loading by plaice on benthic invertebrates increased by a factor of 13.8 in just eleven years (2000–2011).

The increase in the consumption of benthic invertebrate prey by the whole demersal benthivore guild, and particularly by plaice, raises the question as to whether the abundance of benthic invertebrate prey might be becoming limiting. If the biomass of demersal benthivore fish is approaching its carrying capacity, then growth rates in the dominant species in the guild might start to decline (which is in this case plaice growth rates). Computed growth coefficients for the

1956 to 2002 cohorts showed a strong declining linear trend over the whole period (albeit with clear systematic variation in the residuals), and this has been related to increasing water temperature in the North Sea. However, fitting a 4th order polynomial function to the data suggested a marked decline in cohort growth towards the end of the time-series. This is perhaps indicative of plaice becoming food limited, possibly suggesting that B_{MSY} targets for the stock might be marginally too high to be supported by available benthic invertebrate food supplies. However, this evidence is by no means conclusive as polynomial functions are known to show a tendency for marked swings at the extremes of the data range.

More in-depth analysis in WGECO 2018 using the recent years' data showed that the co-occurrence of reduced size at age and increasing stock abundance has led to a negative relationship in period 2006–2016. This correlative indication of density-dependent growth reduction, is further strengthened by a coinciding reduction in physical condition across a range of sizes, hinting that food scarcity may indeed be the mechanism behind the patterns (WGECO; ICES, 2018a).

13.1.3 Fisheries

A basic description of the fisheries is available in the Stock Annex. In recent years, pulse trawling, aiming at reduction of fuel consumption and reduction of bottom disturbance, has been adopted in fisheries. In 2011, approximately 30 derogation licenses for pulse trawls were taken into operation, which increased to 42 in 2012. An additional 42 derogation licenses have been extended in spring 2014. In 2016 and 2018, ICES published advice on ecological and environmental effects of pulse trawling, compared to traditional beam trawls (ICES, 2016; ICES, 2018b). It was concluded that pulse trawling has fewer environmental and ecological effects than beam trawls. Pulse trawls have been increasingly used in the North Sea flatfish fisheries since 2009. Over this period, the fishing mortality has reduced, and stock biomass has increased, mostly due to an overall decrease in effort. The shift in fishing method has resulted in a change in distribution of the fishery. Pulse trawling has increased in areas such as off the Thames estuary and the Belgian coast but decreased in others. This change is related to lighter gear, which can be used on softer grounds than the beam trawls (ICES, 2018b).

Following the EU decision in February 2019 to revise the technical measures regulations, pulse trawling was prohibited since 30 June 2021 which was expected to cause large changes in the Dutch beam trawl fleet in the coming years.

13.1.4 ICES Advice for 2024

The information in this Section is taken from the ICES advice sheet:

ICES advises that when the MSY approach is applied, catches in 2024 should be no more than 155 015 tonnes.

13.1.5 Management

An EU multiannual management plan (MAP) has been agreed by the EU for this stock (EU, 2018). There is no agreement with Norway and UK regarding this plan, and it is not used as the basis of the advice for this shared stock. ICES was requested by the EU and UK to provide advice based on the MSY approach and to include F_{MSY} ranges in the catch scenarios.

13.2 Data available

During the benchmark of the eastern English Channel (7.d) plaice stock (WKFLAT) it was decided that 50% of Q1 mature fish catches taken in the eastern English Channel are actually plaice from the North Sea stock migrating in and out of the area. Before 2015, 50% of the Q1 eastern English Channel (7.d) plaice landings were included in the assessment of the North Sea plaice stock. Since 2015, 50% of the mature fish in both landings and discards in Q1 were added to the North Sea stock and the time series was updated, such that in previous years also 50% of the mature catches from Q1 were added. See the Stock Annex for plaice in Division 7.d for further details.

During the benchmark on plaice (WKPLE; ICES, 2015), it was decided that plaice from the Skagerrak would be added to the North Sea stock. Since then, the assessment has been a combined assessment with Skagerrak plaice.

13.2.1 InterCatch processing

Since 2012, national research institutes submitted landings and discard estimates by métier and quarter in InterCatch. Figures 13.2.1 and 13.2.2 show the landings and discards coverage by country and by métier in Subarea 4 and Subdivision 20. Approximately 61% and 85% of the landings in weight were sampled in Subarea 4 and Subdivision 20 respectively, to obtain information on age-composition. Of the metiers for which discards are monitored in sampling programmes, the largest part of these discards is covered in the TBB_DEF_70–99_mm fleet. In most discards monitoring programmes, age composition information is also collected. To raise the number of discards for landings that had no discards and to raise the landings and discards for which no age distribution was known, the same grouping strategy was used (see table below). The TBB and OTB fleets that covered most of the catches each had their own group (TBB<100, TBB >=100, OTB/OTM<100, and OTB/OTM>=100). Other major groups include seines, shrimper, and gillnets. All discards raising and age allocations were done per quarter. If discards/age structures were present for data for the whole year only, these were added to all quarters. If there were no discards/age structures in a specific quarter and métier, a similar métier type (from the same quarter) or all other quarters (from the same metier) were used. Allocations to calculate the age compositions were done separately for discards and landings.

Summary of the imported/Raised/SampledOrEstimated data by area.

CatchCategory	RaisedOrImported	SampledOrEstimated	Area	CATON	perc
Landings	Imported_Data	Sampled_Distribution	27.4	11889	61
Landings	Imported_Data	Estimated_Distribution	27.4	7629	39
Discards	Imported_Data	Sampled_Distribution	27.4	24496	67
Discards	Raised_Discards	Estimated_Distribution	27.4	12260	33
Discards	Imported_Data	Estimated_Distribution	27.4	43.56	<1
BMS landing	Imported_Data	Estimated_Distribution	27.4	9.547	100
Landings	Imported_Data	Sampled_Distribution	27.3.a.20	2904	85
Landings	Imported_Data	Estimated_Distribution	27.3.a.20	507.1	15

CatchCategory	RaisedOrImported	SampledOrEstimated	Area	CATON	perc
Discards	Imported_Data	Sampled_Distribution	27.3.a.20	1182	74
Discards	Raised_Discards	Estimated_Distribution	27.3.a.20	401.1	25
Discards	Imported_Data	Estimated_Distribution	27.3.a.20	15.19	1
BMS landing	Imported_Data	Estimated_Distribution	27.3.a.20	0	NA

Grouping strategies to raise discards and allocate age structures.

Group for discards raising and age allocation*	quarter + area	description
TBB<100(excluding CRU_16-31)	Each quarter + 4/320	Beam trawl, smaller mesh size
TBB>=100	Each quarter + 4/320	Beam trawl, larger mesh size
TBB/OTB_CRU_16-31	Each quarter + all area	shrimper
OTB/OTM-CRU/DEF/SPF<100(excluding CRU_16-31)	Each quarter + all area	Otter trawl, smaller mesh size
OTB/OTM-CRU/DEF/SPF>=100	Each quarter + all area	Otter trawl, larger mesh size
SSC/SDN<100	Each quarter + all area	Seines, smaller mesh size
SSC/SDN>=100	Each quarter + all area	Seines, larger mesh size
GNS/GTS/GTR<100	Each quarter + all area	Gillnet, smaller mesh size
GNS/GTS/GTR>=100	Each quarter + all area	Gillnet, larger mesh size
Others	All quarter + all area	All other metiers

* all_0_0 are treated as >=100. TBB/OTB_CRU_16-31 is raised from OTB_CRU<100, because several countries have extremely high discard rates, and their fisheries might have different regulations.

For Subarea 4, 67% of the total discards in 2023 were obtained from sampling. For Subdivision 20, 74% of the total discards were obtained from sampling. BMS landings, where reported, were included as discards in the assessment since 2016.

13.2.2 Landings

According to ICES data, in 2023, BMS landings were 9.547 tonnes and majority were reported from UK. Meanwhile the official reported BMS landings were 84.44 tonnes from all countries. For the assessment in this report, BMS was treated as discards.

Total ICES estimated landings (including 7.d and Subdivision 20) of North Sea plaice in 2023 was 23 078 tonnes. Of these 19 518 tonnes came from the Subarea 4, 3411 tonnes came from Subdivision 20, and 149 tonnes came from 7.d. The landings in Subarea 4 decreased 8% (of 2022). The landings in Subdivision 20 decreased 15% (of 2022). Total landings (in tonnes) are presented in Table 13.2.1 and landings in numbers at age in Table 13.2.2 and Figure 13.2.4. Since 2010, the majority of landings were age 3–6.

13.2.3 Discards

The discards time series used in the assessment includes Dutch, Danish, German and UK discards observations for 2000–2023, as described in the Stock Annex. From Belgium, discards data have been available as well but were only used in the assessment since 2012 when it became available in InterCatch. See Section 13.2.1 for more information on the use of InterCatch for raising discards rates across métiers and countries. The Dutch discards data for 2009 and 2010 were derived from a combination of the observer programme that has been running since 2000, and a new self-sampling programme. The estimates from both programmes were combined to come up with an overall estimate of discarding by the Dutch beam trawl fleet. Since 2011, estimates were derived exclusively from the self-sampling data. There is an on-going project within WMR to validate these estimates by examining matched (same vessel and haul) trips where both observer estimates, and self-sampling estimates are derived.

To reconstruct the number of plaice discards at age before 2000, catch numbers at age data was reconstructed in 2005 based on a model-based analysis of growth, selectivity of the 80-mm beam trawl gear, and the availability of undersized plaice on the fishing grounds. Discards numbers at age are presented in Table 13.2.3 and Figure 13.2.4. Figure 13.2.3 presents a time series of landings, catches and discards from these different sources. The total discards weight has been gradually decreasing since our first year of observed discards 2000. The discards ratios are illustrated in Figure 13.2.7. Since 2010, the majority of discards were age 1–3.

13.2.4 Catch

The catches of 2023 in Subarea 4 reached 42% of the 132 922 tonnes catch TAC for 2023. The catches of 2023 in Subdivision 20 reached 28% of the 17 783 tonnes catch TAC for 2023. The total catch-at-age as used in the assessment including all landings and all discards are presented in Table 13.2.4. These include catch of NS plaice in the 1st quarter from 7.d and catch from the Subdivision 20. Table 13.2.5 presents details of ICES catch estimates of NS plaice stock in Subarea 4, Subdivision 20 and in the 1st quarter from Division 7.d. Landings-at-age, discards-at-age and catch-at-age plots are presented in Figures 13.2.4 and 13.2.5. The log-catch curves are illustrated in Figures 13.2.6.

13.2.5 Weight-at-age

Stock weights-at-age are presented in Table 13.2.6. Stock weight-at-age has varied considerably over time, especially for the older ages. Landings, discards and catch weights-at-age are presented in Table 13.2.7, 13.2.8 and 13.2.9 respectively. Catch weights-at-age are derived from the discards and landings weights-at-age according to the relative contributions of each to the overall catch for each age. Figure 13.2.8 presents the stock, discards, landings and catch weights-at-age. Notably, there has been a long-term decline in the observed stock weights-at-age.

13.2.6 Maturity and natural mortality

During the benchmark in 2017, a time-varying maturity ogive was estimated using Dutch commercial landings 1957–2015, but the new ogives had marginal effect on the estimated SSB. Therefore, the previously used, time-invariant maturity ogive (Table 13.2.10) was chosen.

An age-dependent natural mortality was adopted in the 2022 benchmark (WKNSCS; ICES, 2023a). A weight-dependent mortality was first estimated via the Peterson-Wroblewski method based on the stock weight-at-age until 2020. The final natural mortality was then averaged across

years for each age (Table 13.2.10). This age-dependent time-invariant M is expected to be fixed for the following assessment years.

13.2.7 Survey data

The following five survey indices are used in the plaice assessment:

- Beam Trawl Survey and IBTS Q3 combined (BTS-IBTS Q3); (1996–2023); Age 1–10+
- Beam Trawl Survey RV Isis (BTS–Isis) for the older part of the time series; (1985–1995); Age 1–8
- Sole Net Survey 1 (SNS1); (1970–1999); Age 1–6
- Sole Net Survey 2 (SNS2); (2000–2023); Age 1–6
- IBTS Q1 plaice index; 2007–2023; Age 1–8+

The most important surveys for demersal fish species in the greater North Sea area are the BTS (3rd Quarter) and the IBTS (1st and 3rd Quarter). The BTS covers divisions 4.b, 4.c and the English Channel, while the IBTS also covers Division 4.a and the Skagerrak and Kattegat (Division 3.a). The spatial distributions of plaice biomass per haul for these 3 surveys in 2023 are illustrated in Figure 13.2.9. Both BTS-IBTS Q3 and IBTS Q1 indices were estimated using smoother based delta-GAM method (Berg *et al.*, 2014). The retrospective analyses of the two delta-GAM indices are shown in Figure 13.2.10, indicating very robust estimates across the last 5 years.

An annual spatial abundance map could be estimated per age from the delta-GAM model for each of these two indices (Figure 13.2.11). The Q3 survey indicates that younger plaice are nursed in the Belgium-Netherlands-Germany-Denmark coastal area. As they get older, they move north-west towards the centre of North Sea and Scotland coastal area. On the other hand, the IBTS Q1 survey shows slightly different age distributions. This is likely due to the spawning and nursery season in Q1.

Table 13.2.11 and Figure 13.2.12 show the survey index values. Two moderately strong year-class 2013 and 2016 were observed. Very strong 2018 and 2021 year-classes were observed. Additionally, all surveys show an increasing trend for older fishes (age ≥ 5) during 2000 and 2015.

The internal consistency of the survey indices (Figure 13.2.12) appears relatively high for BTS-IBTS Q3, but low for the SNS and IBTS Q1 surveys. The log-catch curves of ages 1–6 for the surveys are illustrated in Figure 13.2.14. In general, SNS has a low selectivity for older ages. Compared to BTS, IBTS has a higher selectivity for older ages. Overall, all surveys show relatively consistent catch selectivity pattern over the time series (which is the assumption for the stock assessment), except for IBTS-Q1 where the time series is too short to validate.

Before WGNSSK 2021, additional survey indices were used for recruitment estimates in the RCT3 analysis for short-term forecast:

- Demersal Fish Survey (DFS); (1990–2019); age-0
- Sole Net Survey (SNS); (2000–2019); age-0

During WKNSROP 2020, it was decided that RCT3 analysis is only applicable during autumn update when new survey indices of the assessment year are available. Thus, RCT3 analysis on recruitment indices from these two surveys are no longer conducted in the WGNSSK May forecast.

13.3 Assessment

13.3.1 Model parameters and diagnostics

SAM assessment model (Nielsen and Berg, 2014; Albertsen *et al.*, 2018) was adopted since the 2022 benchmark. The table below gives an overview of parameters used in the SAM assessment model:

```
$minAge
1
$maxAge
10
$maxAgePlusGroup
# Is last age group considered a plus group for each fleet (1 yes, or 0 no).
1 0 1 1 0 0
$keyLogFsta
# Coupling of the fishing mortality states (normally only first row is used).
0 1 2 3 4 5 6 7 8 8
-1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1
-1 -1 -1 -1 -1 -1 -1 -1 -1
$corFlag
# Correlation of fishing mortality across ages (0 independent, 1 compound symmetry, 2 AR(1), 3 separable AR(1)).
2
$keyLogFpar
# Coupling of the survey catchability parameters (normally first row is not used, as that is covered by fishing mortality).
-1 -1 -1 -1 -1 -1 -1 -1 -1
0 1 2 3 4 5 6 7 -1 -1
8 9 10 11 12 12 12 12 12
13 14 15 15 15 16 17 -1 -1
18 19 20 21 22 23 -1 -1 -1 -1
24 25 26 27 28 29 -1 -1 -1 -1
$keyVarF
# Coupling of process variance parameters for log(F)-process (normally only first row is used)
0 1 2 2 2 2 3 3 3
$keyVarLogN
# Coupling of process variance parameters for log(N)-process
```

```

0 1 1 1 1 1 1 1 2 2 2
3 4 4 4 4 4 5 5 -1 -1
6 7 7 7 7 7 7 8 9 10
11 12 12 12 12 12 13 13 -1 -1
14 15 16 17 17 17 -1 -1 -1 -1
18 19 20 21 22 22 -1 -1 -1 -1

$keyVarObs
# Coupling of the variance parameters for the observations.

0 1 1 1 1 1 1 2 2 2
3 4 4 4 4 4 5 5 -1 -1
6 7 7 7 7 7 7 8 9 10
11 12 12 12 12 12 13 13 -1 -1
14 15 16 17 17 17 -1 -1 -1 -1
18 19 20 21 22 22 -1 -1 -1 -1

$obsCorStruct
# Covariance structure for each fleet ("ID" independent, "AR" AR(1), or "US" for unstructured). | Possible values are:
"ID" "AR" "US"
"ID" "ID" "ID" "AR" "AR" "AR"

$keyCorObs
# Coupling of correlation parameters can only be specified if the AR(1) structure is chosen above.
# NA's indicate where correlation parameters can be specified (-1 where they cannot).

#1-2 2-3 3-4 4-5 5-6 6-7 7-8 8-9 9-10

NA NA NA NA NA NA NA NA NA
NA NA NA NA NA NA NA -1 -1
NA NA NA NA NA NA NA NA NA
0 0 0 0 0 0 -1 -1
1 1 1 1 1 -1 -1 -1 -1
2 2 2 2 2 -1 -1 -1 -1

$fbarRange
# lowest and highest age included in Fbar

```

Model diagnostics including standardized catch and survey residuals and retrospective plots are illustrated in figures 13.3.1–13.3.3. There are age and year patterns in both catch (plus age) and BTS-IBTSQ3 survey (age 5+ in last 10 years) residuals, implying some lack of fitting from the model. Further investigations will be conducted to improve the assessment. The retrospective plot for SSB shows some downwards revision, but the Mohn's rho is within acceptance limits and peels fall within confidence intervals.

13.3.2 Assessment results

Figure 13.2.3 illustrates the trends in observed catch, landing and discards. Reported landings gradually increased up to the late 1980s and then rapidly declined until 1995, in line with the decrease in TAC. The landings show a general decline from 1989 onwards, increasing slowly but steadily since 2007, and decreasing again since 2016. Discards were particularly high in 1997 and 1998 (reconstructed), and in 2001 and 2003 (observed), resulting from strong year-classes.

Figure 13.3.4 and Table 13.3.1 present the model estimated $F(2-6)$, SSB, and recruitment. The estimated SSB in 2024 is 997 743 tonnes and it is well above MSY $B_{trigger}$. SSB has markedly increased since 2008, following a substantial reduction in fishing mortality (F) since 1999. The estimated F in 2023 is 0.065, and it is below F_{MSY} since mid-2000. The estimated recruitment in 2023 is 5 385 463 thousand.

The estimated model parameters are presented in Table 13.3.2. The estimated fishing mortality and stock numbers are shown in Tables 13.3.3–13.3.4 and Figure 13.3.5, respectively.

The stock dynamics are partly affected by the occurrence of strong year-classes. Between 2000 and 2010, recruitment has been increasing. After 2010, recruitment has been fluctuating around its geometric mean. A high 2019 recruitment has been detected in all surveys (BTS-IBTS Q3, SNS and DYFS), but not shown in catches. Recruitment in 2022 turned out to be high again. The increased stock size in 2000–2014 is also partly the direct consequence of reduced fishing mortality. Additionally, the age composition in SSB (Figure 13.3.6) implies that the weight of older aged plaice (age ≥ 8) has been increasing since 2010. Information from surveys (BTS, IBTS-Q3, SNS and DFS) implies that older fishes are likely migrating to the northwestern part of the North Sea (WGBEAM; ICES 2020), where the targeted fishing effort is low (Figure 13.3.7). The leave-one-out analysis (Figure 13.3.8) indicates that BTS-IBTS Q3 is dominating the assessment, which is consistent with the fact that this survey has the highest area and age coverage as well as the lowest uncertainty in survey indices.

13.4 Short-term forecasts

A stochastic short-term forecast was conducted under SAM structure. This includes simulating from the uncertainties of stock number, F , N process error in survival. In forecasting, the process error for F is switched off. The settings of the forecast are listed in the table below.

Variable	Assumption	Arguments in SAM forecast function
Initial stock size	Starting populations are simulated from the estimated distribution at the start of the base year (including covariances).	Year.base=last_data_year; deterministic=FALSE nr_sims=5001
Survival	Forecast according to N processes	deterministic=FALSE
Maturity	Fixed values, time-invariant	-
Natural mortality	Fixed age-dependent Peterson M, determined during WKNSCS2022	-
F and M before spawning	0	-
Weight-at-age in the catch	Average over the last 3 years	ave.years=last 3 years
Weight-at-age in the stock	Average over the last 3 years	ave.years= last 3 years
Exploitation pattern	Simulated according to the estimated last data year exploitation pattern and its estimation uncertainty	overwriteSelYears=FALSE processNoiseF=FALSE
Median F_{bar} value in intermediate year	Last data year (F_{sq})	fval = c(..., F_{last} , ..., ...)

Variable	Assumption	Arguments in SAM forecast function
Proportion of landing	Average over the last 3 years	ave.years=last 3 years; splitLD = TRUE
Recruitment in intermediate year	Sampling from recent 10 years time interval, include the last data year	rec.years=recent 10 years
Recruitment in TAC year	Sampling from recent 10 years time interval, include the last data year	rec.years=recent 10 years

Due to lack of data, the coefficient of variation (CV) of the recruitment estimate for 2023 is 0.187, which is higher than previous years (0.124 for 2022). Despite this, the absolute values of CV for 2023 and all previous years remained low. Therefore, 2023 recruitment is included in recruitment resampling in forecast.

Given the choice of recruitment and F in the intermediate year, the estimated median values for the catches and stock size are listed below.

Assumption	F ₍₂₋₆₎ 2024	SSB 2025	Recruitment 2024-2025	Landings 2024	Discards 2024
F ₂₀₂₄ = F ₂₀₂₃	0.065	1 153 301 t	4 199 508 thousand	31 613 t	43 551 t

A series of F options were assumed for the TAC year. Resulting management options for 2025 are given in Table 13.5.1. The forecasting under F_{MSY} option is illustrated in Figure 13.3.9.

The change in advice (14.2%) is due to a higher recruitment estimated for 2023 than assumed last year and an upward revision of the 2021 year-class. Figures making a comparison with last year's advice are illustrated in Figures 13.3.10-13.3.13.

Mature individuals from plaice stock in Division 7.e and stock in Subarea 4 and Subdivision 20 migrate to Division 7.d in the first quarter. Thus, a proportion of catch of these two stocks occurs in Division 7.d. For the ple.27.7e, ple.27.7d, and ple.27.420 stocks, the catch advice is given at stock level but the catch corresponding to each area is provided in the catch scenario table (ICES, 2023b). Of the plaice caught in Division 7.d, 12.69% is assumed to originate from the North Sea and 3.81% from the western English Channel (average ratio calculated over the years 2003–2023); both of these predicted catches are added to the predicted values for the ple.27.7d stock and applied to total catch, projected landings, and projected discards. Following ICES advice basis, catches in Division 7.d will consist of 2600 tonnes from the ple.27.7d stock, plus 395 tonnes from the ple.27.420 stock and 119 tonnes from the ple.27.7e stock. All catch scenarios for ple.27.7e and ple.27.420 stocks assume that fishing opportunities for ple.27.7d stock in 2025 correspond to the "ICES basis for the advice scenario"; for the ple.27.7d stock, however, this amount depends on the scenario.

13.5 Biological reference points

The latest F_{MSY} reference points were calculated in 2022 benchmark.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B _{trigger}	473 850	B _{pa} ; in tonnes.	ICES (2023a)

Framework	Reference point	Value	Technical basis	Source
	F_{MSY}	0.152	Stochastic simulations (EqSim) based on the recruitment period 1957–2020.	ICES (2023a)
Precautionary approach	B_{lim}	341 003	B_{loss} , lowest estimated SSB from benchmark assessment, which equals the SSB of year 1996; in tonnes.	ICES (2023a)
	B_{pa}	473 850	$B_{lim} \times \exp(1.645 \times \sigma)$, $\sigma = 0.20$; in tonnes.	ICES (2023a)
	F_{lim}	0.270	The F that overall leads to B_{lim} from EqSim.	ICES (2023a)
	F_{pa}	0.182	The F that provides a 95% probability for SSB to be above B_{lim} ($F_{P,05}$ with advice rule [AR]).	ICES (2023a)
EU Management plan (MAP)*	MAP MSY $B_{trigger}$	473 850	MSY $B_{trigger}$; in tonnes.	ICES (2023a)
	MAP B_{lim}	341 003	B_{lim} ; in tonnes.	ICES (2023a)
	MAP F_{MSY}	0.152	F_{MSY}	ICES (2023a)
	MAP range F_{lower}	0.117–0.152	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2023a)
	MAP range F_{upper}	0.152–0.182	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2023a)

* EU multiannual plan (MAP) for the North Sea (EU, 2018).

13.6 Quality of the assessment

The current assessment assumes no discard survival.

The abundance indices of SNS and DYFS surveys targeting age 0–1 plaice have been declining due to the earlier migration of younger fishes to offshore areas. A combined SNS-DYFS-BTS-IBTSQ3 survey index is desired to cover the entire stock area for all ages.

13.7 Status of the stock

SSB in 2024 is estimated around 997 743 tonnes which is well above MSY $B_{trigger}$, B_{pa} , and B_{lim} . Fishing mortality in 2023 is estimated to be at a value of 0.065, which is below F_{MSY} of 0.152 (Figure 13.4.1).

13.8 Management considerations

Plaice is mainly taken by beam trawlers in a mixed fishery with sole in the southern and central part of the North Sea. There are a number of EC regulations that affect the fisheries on plaice and sole in the North Sea, e.g., as a basis for setting the TAC, limiting effort, minimum landing size and minimum mesh size.

13.8.1 Multiannual plan North Sea

An EU multiannual management plan (MAP) has been agreed by the EU for this stock (EU, 2018). There is no agreement with Norway regarding this plan, and it is not used as the basis of the advice for this shared stock. ICES was requested by the EC and UK to provide advice based on the MSY approach and to include F_{MSY} ranges in the catch scenarios.

13.8.2 Effort regulations (North Sea)

Regulated effort restrictions in the EU were introduced in 2003 (annexes to the annual TAC regulations) for the protection of the North Sea cod stock. In addition, a long-term plan for the recovery of cod stocks was adopted in 2008 (EC regulation 1342/2008). In 2009, the effort management programme switched from a days-at-sea to a kW-day system (EC regulation 43/2009), in which different amounts of kW-days are allocated within each area by member state to different groups of vessels depending on gear and mesh size. Effort ceilings are updated annually. A minor part of the fleets exploiting sole, i.e. otter trawls (OTB) with a mesh size equal to or larger than 100 mm included in Figure 13.2.1, have since 2009 been affected by the regulation. The beam trawl fleet (BT2) was affected by this regulation only once in 2009 but not afterwards.

The overall fleet capacity and deployed effort of the North Sea beam trawl fleet has been substantially reduced since 1995, likely due to a number of reasons, including the above-mentioned effort limitations for the recovery of the cod stock. 25 vessels were decommissioned in 2014. In addition, the current sole and plaice long-term management plan specifically reduces effort as a management measure. However, the evaluation of amendments to the plan in 2012 showed that the plan is consistent with the precautionary approach and the principle of maximum sustainable yield (MSY) also without reductions of effort.

Between 2014 and 2018, the majority of the Dutch beam trawlers have switched to pulse trawls, resulting in reallocation of fishing effort to fishing grounds in the southern part of Division 4.c targeting sole. The discards ratio for plaice has been increasing in the same period, from 40% in 2014 to 63% in 2023. Pulse trawling has been prohibited since 30 June 2021, following the EU decision in February 2019 to revise the technical measures regulations. In the meantime, the Dutch fleets targeting plaice are experiencing substantial decommission partly due to the high fuel prices.

13.8.3 Technical measures

Technical measures applicable to the mixed flatfish beam-trawl fishery in the southern North Sea affect both sole and plaice. The minimum mesh size of 80 mm selects sole at the minimum landing size. However, this mesh size generates high discards of plaice with a larger minimum landing size than sole. For the overall fleet the discards ratio has been slightly decreasing since 2003 and increasing up again since 2016. In 2020, discards ratio was approximately 48% by weight. Mesh enlargement would reduce the catch of undersized plaice but would also result in loss of marketable sole. Furthermore, the size selectivity of the fleet may lead to a shift in the age and size at maturation. For example, in recent years plaice and sole have become mature at younger ages and at smaller sizes than in the past (Grift *et al.*, 2003). The introduction of the Omega (mesh size) meter in 2010 has led to a slight increase in the effective mesh size in the fishery.

Technical management measures have caused a shift towards two categories of vessels: 2000 HP (the maximum engine power allowed) and 300 HP. The 300 HP vessels are allowed to fish within

the 12-nautical mile coastal zone and in the Plaice Box. The Plaice Box is a partially closed area along the continental coast that was implemented in phases, starting in 1989. The area has been closed to most categories of vessels >300 HP all year round since 1995. The most recent EU-funded evaluation by Beare *et al.* (2010) reported the Plaice Box as having very little impact on the plaice stock.

13.9 Issues for future benchmarks

13.9.1 Data

- Plaice have heterogeneous age distributions in the North Sea: younger ages are distributed more closely to coastal area while older ages are distributed towards north-west of the North Sea. In recent years, strong younger age signals appeared in IBTS Q3 survey around Scotland coast. The accuracy and uncertainty of these signals need to be investigated, e.g., age readings, gear selectivity (Scottish gear has a different selectivity).
- The abundance indices of SNS and DYFS surveys targeting age 0-1 plaice have been declining due to the earlier migration of younger fishes to offshore areas. A combined SNS-DYFS-BTS-IBTSQ3 survey index is desired to cover the entire stock area for all ages

13.9.2 Assessment

- Residual age and year patterns in BTS-IBTS Q3 survey and catches need to be solved.
- Reduce “error” in discards estimation by including non-zero survival in assessment.

13.9.3 Short-term forecast

- The recruitment signal of age 0 in SNS and DFS surveys are no longer used in short-term forecast. A new method needs to be considered to include SNS and DYFS age 0 indices in assessment model to predict recruitment in the intermediate year, e.g., combined indices of all surveys including age 0.

13.10 References

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13.11 Tables and figures

Table 13.2.1. Plaice in Subarea 4 and Subdivision 20. Official landings, ICES landings and TAC in tonnes. Division 7.d Q1 not included.

North Sea													Skagerrak		
Year	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden	UK	Others	Total	Unallocated	ICES estimate	TAC NS	Total	TAC SK
1982	7103	24 532	1 046	3 628	55715	16	6	20 889	0	112935	41611	154546	140000	8083	
1983	8916	19114	1 185	2 397	53608	17	22	17 407	0	102666	41364	144030	164000	7130	
1984	10220	23361	1145	2 485	61 478	17	14	17183	0	115903	40246	156149	182000	7920	
1985	9965	28 236	1 010	2 197	90 950	23	18	15 912	0	148 311	11527	159838	200000	10 096	
1986	7 232	26 332	751	1 809	74 447	21	16	17 294	0	127 902	37445	165347	180000	11 378	
1987	8 554	21 597	1 580	1 794	76 612	12	7	20 638	0	130 794	22876	153670	150000	12 502	
1988	11 527	20 259	1 773	2 566	77 724	21	2	24 497	43	138 412	16063	154475	175000	10 820	
1989	10 939	23 481	2 037	5 341	84 173	321	12	26 104	0	152 408	17410	169818	185000	5997	
1990	13 940	26 474	1 339	8 747	78 204	1 756	169	25 632	0	156 261	-21	156240	180000	10 048	
1991	14 328	24 355	508	7 926	67 945	560	103	27 839	0	143 564	4439	148003	175000	6679	
1992	12 006	20 890	537	6 818	51 064	836	53	31 277	0	123 481	1709	125190	175000	9554	11200
1993	10 814	16 452	602	6 895	48 552	827	7	31 128	0	115 277	1836	117113	175000	9854	11200

North Sea													Skagerrak		
Year	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden	UK	Others	Total	Unallocated	ICES estimate	TAC NS	Total	TAC SK
1994	7 951	17 056	407	5 697	50 289	524	6	27 749	0	109 679	713	110392	165000	9551	11200
1995	7 093	13 358	442	6 329	44 263	527	3	24 395	0	96 410	1946	98356	115000	9379	11200
1996	5 765	11 776	379	4 780	35 419	917	5	20 992	0	80 033	1640	81673	81000	8003	11200
1997	5 223	13 940	254	4 159	34 143	1 620	10	22 134	0	81 483	1565	83048	91000	7813	11200
1998	5 592	10 087	489	2 773	30 541	965	2	19 915	1	70 365	1169	71534	87000	6449	11200
1999	6 160	13 468	624	3 144	37 513	643	4	17 061	0	78 617	2045	80662	102000	7049	11200
2000	7 260	13 408	547	4 310	35 030	866	3	20 710	0	82134	-984	81150	97000	7001	11200
2001	6 369	13 797	429	4 739	33 290	1805	3	19 147	0	79579	2268	81847	78000	9351	9400
2002	4 859	12 552	552	3 927	29 081	1897	2	16 740	1	69611	606	70217	77000	7080	6400
2003	4 580	13 742	318	3 800	27 372	1699	2	13 892	0	65405	1084	66489	73250	7065	1400
2004	4 344	12 121	241	3 649	23 659	1 737	1	15 312	0	61064	372	61436	61000	8172	9500
2005	3 414	11 385	192	3 380	22 266	1 660	0	10438	0	52735	2965	55700	59000	6146	7600
2006	3 524	11 909	175	3 599	22 764	1430	0	12 431	0	55 832	2111	57943	57441	8444	7600
2007	3 894	8 132	227	2 643	21 464	1224	4	11 558	0	49 146	598	49744	50261	7682	8500
2008	3 396	8 232	188	3 138	20 312	1 051	20	11 409	0	47 746	1129	48875	49000	7912	9300
2009	3 537	8 156	272	2 931	23 152	1 116	1	13 143	0	52 308	2665	54973	55500	6299	9300

Year	North Sea											Skagerrak			
	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden	UK	Others	Total	Unallocated	ICES estimate	TAC NS	Total	TAC SK
2010	3 699	9 369	385	3 787	26 707	1 090	5	14 789	0	59 831	843	60674	63825	8810	9300
2011	4 588	11 636	375	3 812	29 274	1 224	3	15 500	0	66 412	974	67386	73400	8183	7900
2012	5 066	12 243	281	3 873	32 193	1 025	5	16 916	0	71 602	2228	73830	84410	7651	7900
2013	6 508	13 650	250	4 921	33 488	843	3	19 336	0	78999	-94	78905	97070	6815	9142
2014	7 152	11 737	276	4 224	27 720	584	5	17 380	0	69 078	1769	70847	111631	8324	10056
2015	5 750	14 425	226	5 171	30 860	169	7	17 395	0	74 003	960	74963	128376	9804	10056
2016	6 664	16 547	169	4 371	32 228	94	9	18 800	0	78 882	2177	81059	131714	9772	11766
2017	5 316	12 517	151	2 621	31 049	67	5	15 130	0	66 856	-1414	65442	129917	8643	17639
2018	4 887	9 670	112	2 616	24 742	69	3	9 743	0	51 842	-1059	50783	112643	6009	15343
2019	3 912	6 585	62	2 074	21 185	57	3	7 456	0	41 334	-1364	39970	125435	7597	16782
2020	2 560	5 639	25	1 403	18 588	36	5	5 604	0	33 860	-1124	32736	146852	7256	19647
2021	2 318	4 907	9	1 261	15 943	24	4	4 878	0	29 344	-429	28915	143419	6539	19188
2022*	1 321	3 527	13	925	10 476	17	3	4 472	1	20 755	512	21267	125692	3823	16816
2023*	1 664	3 306	9	1 499	7 431	40	7	4 723	0	18 680	838	19518	132922	3395	17783

* Official values are preliminary..

Table 13.2.2. Plaice in Subarea 4 and Subdivision 20. Landings (SOP corrected) in numbers by age (including 1st quarter of 7.d) in thousands as input.

Year	Age										
		1	2	3	4	5	6	7	8	9	10+
1957	0	4792	66428	49659	35282	9867	12248	10026	5522	12059	
1958	0	7581	23612	65979	36274	20836	8696	8507	6497	13981	
1959	0	16914	31085	26040	41988	23432	14173	6547	6739	16530	
1960	0	5998	62285	51359	21462	27510	14280	9073	5121	15253	
1961	0	2299	33913	68965	33209	12958	14909	9900	6089	14889	
1962	0	2075	34677	64548	48387	19939	8757	8733	5081	12373	
1963	0	4424	21886	78412	55414	32413	13096	6965	7183	16912	
1964	0	14818	40789	65219	57837	37368	15937	6644	4010	17012	
1965	0	9913	42438	53486	43919	30320	18464	8602	4237	17686	
1966	0	4220	66196	52428	37336	27870	16801	10981	6585	15201	
1967	0	6101	30905	115157	42204	22490	16496	8163	6861	11397	
1968	0	9750	41883	39251	127220	17638	10642	10396	4039	13754	
1969	3	15892	47819	38185	37657	107955	11016	6440	8669	17029	
1970	74	16850	49861	54712	39642	34174	76862	6149	4078	14459	
1971	20	30568	49876	34580	26919	23659	17471	30711	6626	17468	
1972	2296	37561	63958	54402	23695	17479	14787	11211	19111	16094	
1973	1332	33342	62095	76769	44397	14517	9335	10347	6392	25194	
1974	2305	23972	57595	43677	42588	20391	8300	6554	5773	22790	
1975	1042	29877	65465	33211	27004	22509	12613	6292	4362	20923	
1976	2892	34497	79621	98846	14129	10156	9352	6553	3022	12871	
1977	3225	57061	43359	66120	83841	9157	5922	5030	4068	9206	
1978	1102	58412	60114	52398	48310	34240	5728	3232	2333	7201	
1979	1316	57933	118662	48879	47805	39864	24187	4154	2802	9272	
1980	996	66095	136274	79035	25548	18321	14018	8621	1898	5497	
1981	259	103354	125928	59565	36670	12750	9805	8295	5005	6091	
1982	3373	48354	212188	71167	29191	16975	7704	5551	4539	8775	
1983	1214	119696	115332	100473	29591	12960	8238	4224	3013	8308	

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1984	108	63507	280481	62835	41492	15417	6842	5593	2729	6551
1985	120	72806	146839	201629	37939	17106	7441	3780	2813	5830
1986	1669	66935	165986	106461	101684	27971	9839	4704	2834	7083
1987	1	85153	118416	120782	81304	44590	13539	4669	2346	5610
1988	1	15200	253815	85347	59950	31492	19347	6198	3434	6402
1989	1254	46810	108272	238243	58767	21667	11605	8025	2321	5806
1990	1546	33766	104796	119829	169465	29946	9053	4689	3803	4206
1991	1425	43064	87196	122233	76075	78728	15410	5390	3215	5634
1992	3386	43769	86358	81470	88534	37542	30444	7229	3295	6976
1993	3416	53555	99805	80856	63275	35042	14745	11500	3704	5883
1994	1375	44554	105863	86992	47577	27680	17279	6661	5449	5458
1995	7779	36761	82649	84778	47911	24572	14746	5285	2495	3896
1996	1103	43346	68155	52961	37285	19160	12400	5881	2799	4989
1997	897	43122	88687	49362	31750	18673	9518	5037	3054	4400
1998	197	30594	74441	62339	22793	9151	5703	2870	1983	3360
1999	549	8690	158088	47391	31778	14077	4038	2625	1597	3234
2000	2603	15656	40819	171994	25935	12586	2979	1135	953	2121
2001	4523	37095	58678	57195	101524	11492	4739	1212	650	2364
2002	1229	15868	60204	55511	44243	43066	6527	2256	794	1638
2003	700	44801	50607	54864	34689	20311	18128	1774	689	880
2004	544	12049	119093	39053	23766	13309	5152	4774	460	569
2005	2948	18885	29734	90989	20175	10900	5905	2760	2303	647
2006	363	20214	79934	34221	51057	8057	5589	2301	1318	1408
2007	1436	21357	41941	55949	20379	21837	3095	2011	604	1303
2008	400	13190	52382	45336	34035	7566	8066	978	735	936
2009	1563	12420	61907	42545	24886	18544	3400	4260	587	821
2010	2114	19874	49030	69702	25181	12622	9766	1866	2520	1267
2011	407	12977	45353	62017	51581	14815	6643	6984	1261	2743

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
2012	163	6164	60603	62070	44968	32037	7556	3402	3482	1924
2013	550	10530	63366	77056	42315	29486	15349	3955	2468	3795
2014	7	5384	40649	77966	52266	21932	12955	8387	2472	3440
2015	0	3844	42673	67065	60967	32309	12793	8902	4055	4834
2016	0	4179	39190	85205	60972	39883	19146	7710	5310	5125
2017	27	5289	24694	58141	57766	30891	16860	7600	3068	3213
2018	17	7829	24768	34001	43504	31018	15991	8987	5394	4159
2019	0	6529	43714	32253	18782	18125	11447	6948	3924	4055
2020	80	5638	19007	44781	19082	10223	11645	7614	4813	6395
2021	35	6395	21006	25208	32842	8688	5298	5738	3805	4371
2022	0	3213	14132	26705	12997	10590	5363	2844	2251	3381
2023	3	4488	8776	15780	26815	8244	7665	2782	1312	2302

Table 13.2.3. Plaice in Subarea 4 and Subdivision 20. Discards in numbers by age (including 1st quarter of 7.d) in thousands as input.

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1957	32356	45596	9220	909	961	25	0	0	0	0
1958	66199	73552	23655	2572	2137	65	0	0	0	0
1959	116086	127771	46402	11407	4737	106	0	0	0	0
1960	73939	167893	44948	997	1067	519	0	0	0	0
1961	75578	144609	89014	538	1612	130	0	0	0	0
1962	51265	181321	87599	21716	799	186	0	0	0	0
1963	90913	136183	129778	9964	2112	188	0	0	0	0
1964	66035	153274	64156	33825	3011	323	0	0	0	0
1965	43708	426021	59262	3404	923	267	0	0	0	0
1966	38496	163125	349358	14399	1402	125	0	0	0	0
1967	20199	133545	87532	152496	623	260	0	0	0	0
1968	73971	72192	46339	26530	22436	58	0	0	0	0
1969	85192	67378	16747	19334	773	2024	0	0	0	0

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1970	123569	152480	27747	1287	5061	161	0	0	0	0
1971	69337	96968	42354	2675	426	81	0	0	0	0
1972	70002	55470	33899	5714	567	73	0	0	0	0
1973	132352	49815	4008	673	1289	67	0	0	0	0
1974	211139	308411	3652	285	611	109	0	0	0	0
1975	244969	280130	190536	4807	253	123	0	0	0	0
1976	183879	140921	71054	18013	174	41	0	0	0	0
1977	256628	103696	79317	33552	9317	129	0	0	0	0
1978	226872	154113	27257	10775	1244	570	0	0	0	0
1979	293166	215084	57578	18382	589	310	0	0	0	0
1980	226371	122561	932	687	193	86	0	0	0	0
1981	134142	193241	1850	373	431	55	0	0	0	0
1982	411307	204572	4624	1109	216	98	0	0	0	0
1983	261400	436331	30716	2235	804	72	0	0	0	0
1984	310675	313490	52651	24529	1492	69	0	0	0	0
1985	405385	229208	35566	2221	200	78	0	0	0	0
1986	1117345	490965	48510	26470	1451	146	0	0	0	0
1987	361519	1374202	180969	1427	1348	248	0	0	0	0
1988	348597	608109	459385	61167	882	177	0	0	0	0
1989	213291	485845	193176	85758	7224	115	0	0	0	0
1990	145314	279298	168674	28102	5011	177	0	0	0	0
1991	183126	301575	141567	40739	5528	939	0	0	0	0
1992	138755	219619	94581	34348	4307	880	0	0	0	0
1993	96371	154083	48088	11966	1635	216	0	0	0	0
1994	62122	95703	35703	1038	822	144	0	0	0	0
1995	118863	82676	15753	860	663	120	0	0	0	0
1996	111250	331065	27606	3930	451	116	0	0	0	0
1997	128653	510918	193828	588	271	108	0	0	0	0

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1998	104538	646250	191631	53354	297	33	0	0	0	0
1999	127321	208401	231769	54869	278	58	0	0	0	0
2000	103468	171213	51092	64971	1230	241	263	167	1	0
2001	30346	352452	186900	74744	54276	152	45	1	1	0
2002	310442	178402	78296	13940	2834	718	109	1	1	0
2003	67798	523336	56580	20184	4358	419	5756	1	2	0
2004	233682	183508	127876	10650	1975	450	41	1	2	0
2005	93936	332157	46454	23763	4494	6007	287	6	54	0
2006	220982	226944	117342	9785	2369	251	736	195	1	1080
2007	77687	210407	73043	13942	1594	7028	190	1644	1349	1056
2008	135504	255948	37983	5356	1785	336	8852	885	41	613
2009	148666	193174	68975	9471	2007	1108	138	3220	3	8472
2010	167387	180364	59943	22776	2699	1736	2074	283	531	810
2011	117902	153773	62696	37050	12949	2924	143	2273	0	16534
2012	91961	313013	123821	32986	9439	1547	226	7	620	3084
2013	128227	156837	125878	24797	4679	1033	219	15	7	0
2014	293515	192537	116178	55315	19141	2610	478	67	291	0
2015	83433	288990	130826	38858	12591	2367	521	209	17	406
2016	79202	144049	133284	48501	21078	7479	2068	1857	180	1
2017	129559	144559	77236	59006	16045	3812	1268	268	11	7
2018	64618	266462	101461	39258	21422	4803	1480	243	55	17
2019	134637	115302	119582	29708	11846	8537	3134	1412	133	30
2020	93983	191175	64298	55815	9809	3645	4399	1189	1047	39
2021	74250	108108	154726	30130	17138	3699	549	1088	573	7
2022	132262	100873	84390	82712	14946	10484	3233	2148	676	750
2023	103841	300576	53397	35031	27542	4923	2912	1270	458	158

Table 13.2.4. Plaice in Subarea 4 and Subdivision 20. Catch in numbers by age (including 1st quarter of 7.d) in thousands as input.

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1957	32356	50388	75648	50568	36243	9892	12248	10026	5522	12059
1958	66199	81133	47267	68551	38411	20901	8696	8507	6497	13981
1959	116086	144685	77487	37447	46725	23538	14173	6547	6739	16530
1960	73939	173891	107233	52356	22529	28029	14280	9073	5121	15253
1961	75578	146908	122927	69503	34821	13088	14909	9900	6089	14889
1962	51265	183396	122276	86264	49186	20125	8757	8733	5081	12373
1963	90913	140607	151664	88376	57526	32601	13096	6965	7183	16912
1964	66035	168092	104945	99044	60848	37691	15937	6644	4010	17012
1965	43708	435934	101700	56890	44842	30587	18464	8602	4237	17686
1966	38496	167345	415554	66827	38738	27995	16801	10981	6585	15201
1967	20199	139646	118437	267653	42827	22750	16496	8163	6861	11397
1968	73971	81942	88222	65781	149656	17696	10642	10396	4039	13754
1969	85195	83270	64566	57519	38430	109979	11016	6440	8669	17029
1970	123643	169330	77608	55999	44703	34335	76862	6149	4078	14459
1971	69357	127536	92230	37255	27345	23740	17471	30711	6626	17468
1972	72298	93031	97857	60116	24262	17552	14787	11211	19111	16094
1973	133684	83157	66103	77442	45686	14584	9335	10347	6392	25194
1974	213444	332383	61247	43962	43199	20500	8300	6554	5773	22790
1975	246011	310007	256001	38018	27257	22632	12613	6292	4362	20923
1976	186771	175418	150675	116859	14303	10197	9352	6553	3022	12871
1977	259853	160757	122676	99672	93158	9286	5922	5030	4068	9206
1978	227974	212525	87371	63173	49554	34810	5728	3232	2333	7201
1979	294482	273017	176240	67261	48394	40174	24187	4154	2802	9272
1980	227367	188656	137206	79722	25741	18407	14018	8621	1898	5497
1981	134401	296595	127778	59938	37101	12805	9805	8295	5005	6091
1982	414680	252926	216812	72276	29407	17073	7704	5551	4539	8775
1983	262614	556027	146048	102708	30395	13032	8238	4224	3013	8308

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1984	310783	376997	333132	87364	42984	15486	6842	5593	2729	6551
1985	405505	302014	182405	203850	38139	17184	7441	3780	2813	5830
1986	1119014	557900	214496	132931	103135	28117	9839	4704	2834	7083
1987	361520	1459355	299385	122209	82652	44838	13539	4669	2346	5610
1988	348598	623309	713200	146514	60832	31669	19347	6198	3434	6402
1989	214545	532655	301448	324001	65991	21782	11605	8025	2321	5806
1990	146860	313064	273470	147931	174476	30123	9053	4689	3803	4206
1991	184551	344639	228763	162972	81603	79667	15410	5390	3215	5634
1992	142141	263388	180939	115818	92841	38422	30444	7229	3295	6976
1993	99787	207638	147893	92822	64910	35258	14745	11500	3704	5883
1994	63497	140257	141566	88030	48399	27824	17279	6661	5449	5458
1995	126642	119437	98402	85638	48574	24692	14746	5285	2495	3896
1996	112353	374411	95761	56891	37736	19276	12400	5881	2799	4989
1997	129550	554040	282515	49950	32021	18781	9518	5037	3054	4400
1998	104735	676844	266072	115693	23090	9184	5703	2870	1983	3360
1999	127870	217091	389857	102260	32056	14135	4038	2625	1597	3234
2000	106071	186869	91911	236965	27165	12827	3242	1302	954	2121
2001	34869	389547	245578	131939	155800	11644	4784	1213	651	2364
2002	311671	194270	138500	69451	47077	43784	6636	2257	795	1638
2003	68498	568137	107187	75048	39047	20730	23884	1775	691	880
2004	234226	195557	246969	49703	25741	13759	5193	4775	462	569
2005	96884	351042	76188	114752	24669	16907	6192	2766	2357	647
2006	221345	247158	197276	44006	53426	8308	6325	2496	1319	2488
2007	79123	231764	114984	69891	21973	28865	3285	3655	1953	2359
2008	135904	269138	90365	50692	35820	7902	16918	1863	776	1549
2009	150229	205594	130882	52016	26893	19652	3538	7480	590	9293
2010	169501	200238	108973	92478	27880	14358	11840	2149	3051	2077
2011	118309	166750	108049	99067	64530	17739	6786	9257	1261	19277

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
2012	92124	319177	184424	95056	54407	33584	7782	3409	4102	5008
2013	128777	167367	189244	101853	46994	30519	15568	3970	2475	3795
2014	293522	197921	156827	133281	71407	24542	13433	8454	2763	3440
2015	83433	292834	173499	105923	73558	34676	13314	9111	4071	5240
2016	79202	148228	172474	133706	82050	47362	21214	9567	5490	5126
2017	129586	149848	101930	117147	73811	34703	18128	7868	3079	3220
2018	64635	274291	126229	73259	64926	35821	17471	9230	5449	4176
2019	134636	121830	163295	61961	30628	26662	14581	8360	4057	4085
2020	94063	196813	83305	100596	28891	13868	16044	8803	5860	6434
2021	74285	114503	175732	55338	49980	12387	5847	6826	4378	4378
2022	132262	104086	98522	109417	27943	21074	8596	4992	2927	4131
2023	103844	305064	62173	50811	54357	13167	10577	4052	1770	2460

Table 13.2.5. Plaice in Subarea 4 and Subdivision 20. ICES catches estimates including catches in 7d during spawning migration in the 1st quarter. ICES discards since 2016 includes BMS landings.

North Sea and Skagerrak			Eastern English Channel (Q1)	
Year	ICES Landings	ICES Discards	ICES Landings	ICES Discards
1980	150461	31080	328	
1981	148198	33031	585	
1982	162619	49127	635	
1983	151160	74483	731	
1984	164070	70816	702	
1985	169933	60549	786	
1986	176725	129953	893	
1987	166173	190524	1046	
1988	165295	156423	1258	
1989	175815	107793	1281	
1990	166288	71225	1306	
1991	154682	80935	1116	

North Sea and Skagerrak		Eastern English Channel (Q1)		
Year	ICES Landings	ICES Discards	ICES Landings	ICES Discards
1992	134744	57049	860	
1993	126967	35016	655	
1994	119943	23785	826	
1995	107736	21828	718	
1996	89676	52049	741	
1997	90862	100145	867	
1998	77983	103751	716	
1999	87711	70976	814	
2000	88139	44311	1149	
2001	91078	100309	682	
2002	77319	55099	716	
2003	73632	79275	366	
2004	69469	57478	418	
2005	61799	56250	389	
2006	66288	64160	324	16
2007	57365	42373	477	25
2008	57231	46993	451	37
2009	61487	45902	335	43
2010	69374	46570	385	76
2011	75604	41593	275	76
2012	81510	59914	418	225
2013	85717	40025	402	200
2014	80060	52937	496	432
2015	84767	50108	593	348
2016	91959	43971	785	395
2017	74217	38966	711	762
2018	57012	47792	788	446
2019	48063	36713	681	657

North Sea and Skagerrak		Eastern English Channel (Q1)		
Year	ICES Landings	ICES Discards	ICES Landings	ICES Discards
2020	40562	38110	326	223
2021	35690	37213	241	316
2022	25260	38831	283	593
2023	22929	38407	149	464

Table 13.2.6. Plaice in Subarea 4 and Subdivision 20. Stock weight-at-age (kg).

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1957	0.038	0.102	0.157	0.242	0.325	0.485	0.719	0.682	0.844	0.918
1958	0.041	0.093	0.180	0.272	0.303	0.442	0.577	0.778	0.793	0.945
1959	0.045	0.106	0.173	0.264	0.329	0.470	0.650	0.686	0.908	0.897
1960	0.038	0.111	0.181	0.272	0.364	0.469	0.633	0.726	0.845	0.918
1961	0.037	0.098	0.185	0.306	0.337	0.483	0.579	0.691	0.779	0.911
1962	0.036	0.096	0.173	0.301	0.424	0.573	0.684	0.806	0.873	1.335
1963	0.041	0.103	0.176	0.273	0.378	0.540	0.663	0.788	0.882	0.961
1964	0.024	0.113	0.184	0.296	0.373	0.477	0.645	0.673	0.845	0.973
1965	0.031	0.068	0.198	0.294	0.333	0.43	0.516	0.601	0.722	0.578
1966	0.031	0.099	0.127	0.305	0.403	0.455	0.503	0.565	0.581	0.848
1967	0.029	0.104	0.179	0.205	0.442	0.528	0.585	0.650	0.703	0.833
1968	0.055	0.094	0.175	0.287	0.344	0.532	0.592	0.362	0.667	0.746
1969	0.047	0.158	0.188	0.266	0.344	0.390	0.565	0.621	0.679	0.635
1970	0.043	0.113	0.236	0.274	0.369	0.410	0.468	0.636	0.732	0.747
1971	0.051	0.109	0.251	0.344	0.413	0.489	0.512	0.583	0.696	0.707
1972	0.056	0.158	0.218	0.407	0.473	0.534	0.579	0.606	0.655	0.759
1973	0.037	0.134	0.237	0.308	0.468	0.521	0.566	0.583	0.617	0.690
1974	0.049	0.105	0.217	0.416	0.437	0.524	0.570	0.629	0.652	0.690
1975	0.063	0.141	0.187	0.388	0.483	0.544	0.610	0.668	0.704	0.762
1976	0.082	0.169	0.226	0.308	0.484	0.550	0.593	0.658	0.694	0.743
1977	0.064	0.184	0.265	0.311	0.405	0.551	0.627	0.690	0.667	0.759

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1978	0.064	0.151	0.319	0.373	0.411	0.467	0.547	0.630	0.704	0.773
1979	0.062	0.179	0.258	0.365	0.414	0.459	0.543	0.667	0.764	0.826
1980	0.049	0.163	0.289	0.428	0.444	0.524	0.582	0.651	0.778	1.025
1981	0.041	0.140	0.239	0.421	0.473	0.536	0.570	0.624	0.707	0.849
1982	0.048	0.128	0.250	0.351	0.490	0.589	0.631	0.679	0.726	0.828
1983	0.045	0.128	0.242	0.381	0.494	0.559	0.624	0.712	0.754	0.791
1984	0.048	0.129	0.216	0.413	0.464	0.571	0.649	0.692	0.787	0.898
1985	0.048	0.146	0.232	0.320	0.452	0.536	0.635	0.656	0.764	0.869
1986	0.043	0.126	0.245	0.311	0.440	0.533	0.692	0.779	0.888	0.971
1987	0.036	0.105	0.200	0.383	0.401	0.503	0.573	0.711	0.747	0.817
1988	0.036	0.097	0.172	0.264	0.426	0.467	0.547	0.644	0.706	0.897
1989	0.039	0.101	0.192	0.247	0.362	0.484	0.553	0.616	0.759	0.837
1990	0.043	0.108	0.176	0.261	0.343	0.422	0.555	0.647	0.701	0.760
1991	0.048	0.131	0.184	0.260	0.342	0.401	0.463	0.633	0.652	0.744
1992	0.043	0.121	0.199	0.270	0.318	0.403	0.500	0.573	0.683	0.730
1993	0.050	0.119	0.208	0.315	0.330	0.391	0.490	0.587	0.633	0.723
1994	0.053	0.141	0.214	0.290	0.360	0.404	0.462	0.533	0.653	0.702
1995	0.050	0.142	0.254	0.336	0.399	0.448	0.509	0.584	0.678	0.789
1996	0.044	0.117	0.229	0.368	0.390	0.462	0.488	0.554	0.660	0.791
1997	0.035	0.115	0.233	0.359	0.439	0.492	0.521	0.543	0.627	0.734
1998	0.038	0.081	0.207	0.333	0.474	0.577	0.581	0.648	0.656	0.642
1999	0.044	0.091	0.150	0.319	0.437	0.524	0.586	0.644	0.664	0.620
2000	0.051	0.106	0.165	0.219	0.408	0.467	0.649	0.695	0.656	0.744
2001	0.061	0.122	0.202	0.233	0.331	0.452	0.560	0.641	0.798	0.816
2002	0.048	0.118	0.213	0.301	0.319	0.403	0.446	0.612	0.685	0.781
2003	0.057	0.111	0.227	0.269	0.344	0.391	0.464	0.600	0.714	0.960
2004	0.047	0.116	0.201	0.306	0.384	0.430	0.489	0.495	0.780	0.921
2005	0.053	0.106	0.216	0.237	0.378	0.422	0.434	0.527	0.621	0.815

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
2006	0.052	0.130	0.190	0.316	0.354	0.424	0.439	0.506	0.583	0.688
2007	0.047	0.093	0.235	0.238	0.337	0.394	0.458	0.412	0.526	0.512
2008	0.048	0.114	0.196	0.274	0.355	0.429	0.484	0.627	0.598	0.449
2009	0.052	0.114	0.194	0.344	0.373	0.412	0.472	0.540	0.565	0.576
2010	0.053	0.116	0.179	0.340	0.361	0.401	0.448	0.572	0.568	0.655
2011	0.039	0.100	0.187	0.209	0.355	0.483	0.438	0.422	0.530	0.580
2012	0.052	0.093	0.142	0.188	0.331	0.393	0.484	0.479	0.480	0.518
2013	0.043	0.107	0.153	0.208	0.320	0.354	0.434	0.493	0.662	0.468
2014	0.048	0.104	0.158	0.202	0.312	0.380	0.439	0.484	0.458	0.615
2015	0.024	0.065	0.120	0.207	0.279	0.323	0.379	0.435	0.465	0.457
2016	0.030	0.066	0.117	0.198	0.260	0.329	0.380	0.434	0.479	0.514
2017	0.032	0.069	0.132	0.181	0.270	0.333	0.359	0.458	0.476	0.557
2018	0.036	0.064	0.116	0.165	0.215	0.276	0.327	0.366	0.412	0.595
2019	0.022	0.063	0.117	0.173	0.240	0.261	0.352	0.391	0.415	0.443
2020	0.026	0.058	0.114	0.163	0.208	0.248	0.323	0.351	0.424	0.458
2021	0.033	0.069	0.104	0.165	0.219	0.263	0.330	0.356	0.464	0.494
2022	0.022	0.068	0.113	0.147	0.186	0.209	0.259	0.208	0.445	0.474
2023	0.03	0.052	0.112	0.145	0.182	0.254	0.263	0.276	0.499	0.492

Table 13.2.7. Plaice in Subarea 4 and Subdivision 20. Landings weight-at-age (kg).

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1957	0.000	0.165	0.201	0.258	0.353	0.456	0.533	0.589	0.396	0.998
1958	0.000	0.198	0.221	0.259	0.337	0.453	0.513	0.615	0.665	0.992
1959	0.000	0.218	0.246	0.293	0.362	0.473	0.592	0.623	0.750	1.000
1960	0.000	0.200	0.236	0.289	0.386	0.485	0.601	0.683	0.724	1.094
1961	0.000	0.191	0.233	0.302	0.412	0.509	0.604	0.671	0.812	1.071
1962	0.000	0.211	0.248	0.300	0.400	0.541	0.570	0.692	0.777	1.127
1963	0.000	0.253	0.286	0.319	0.399	0.533	0.624	0.667	0.715	1.028

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1964	0.000	0.250	0.273	0.312	0.388	0.487	0.628	0.700	0.737	1.005
1965	0.000	0.242	0.282	0.321	0.385	0.471	0.539	0.663	0.726	0.887
1966	0.000	0.232	0.270	0.348	0.436	0.484	0.559	0.624	0.690	0.933
1967	0.000	0.232	0.279	0.322	0.425	0.547	0.597	0.662	0.738	0.978
1968	0.000	0.267	0.298	0.331	0.366	0.517	0.590	0.596	0.686	0.911
1969	0.217	0.294	0.310	0.333	0.359	0.412	0.573	0.655	0.658	0.893
1970	0.315	0.286	0.318	0.356	0.419	0.443	0.499	0.672	0.744	0.892
1971	0.256	0.318	0.356	0.403	0.448	0.514	0.542	0.607	0.699	0.891
1972	0.246	0.296	0.352	0.428	0.493	0.541	0.608	0.646	0.674	0.939
1973	0.272	0.316	0.344	0.405	0.486	0.539	0.605	0.627	0.677	0.842
1974	0.285	0.311	0.354	0.405	0.476	0.554	0.609	0.693	0.707	0.926
1975	0.249	0.300	0.330	0.420	0.495	0.587	0.636	0.703	0.783	1.019
1976	0.265	0.295	0.338	0.375	0.513	0.594	0.641	0.705	0.741	0.980
1977	0.254	0.323	0.353	0.380	0.418	0.556	0.647	0.721	0.715	0.978
1978	0.244	0.315	0.369	0.397	0.438	0.491	0.609	0.687	0.776	0.950
1979	0.235	0.311	0.349	0.388	0.429	0.474	0.550	0.675	0.796	0.960
1980	0.238	0.286	0.344	0.401	0.473	0.545	0.588	0.662	0.772	1.013
1981	0.237	0.274	0.329	0.416	0.505	0.558	0.604	0.642	0.725	1.007
1982	0.279	0.262	0.311	0.424	0.514	0.608	0.664	0.712	0.738	0.984
1983	0.200	0.250	0.300	0.383	0.515	0.604	0.677	0.771	0.815	0.984
1984	0.231	0.263	0.283	0.364	0.480	0.591	0.677	0.726	0.839	1.036
1985	0.245	0.264	0.290	0.335	0.445	0.563	0.667	0.730	0.807	1.021
1986	0.221	0.269	0.303	0.339	0.405	0.473	0.668	0.750	0.856	1.014
1987	0.000	0.249	0.299	0.345	0.378	0.472	0.574	0.728	0.835	0.993
1988	0.000	0.254	0.278	0.341	0.418	0.478	0.590	0.680	0.808	1.017
1989	0.236	0.280	0.308	0.331	0.385	0.515	0.591	0.668	0.785	0.940
1990	0.271	0.284	0.297	0.315	0.364	0.441	0.586	0.690	0.761	1.010
1991	0.227	0.286	0.292	0.302	0.360	0.452	0.526	0.666	0.743	0.924

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1992	0.251	0.263	0.290	0.312	0.330	0.415	0.530	0.607	0.719	0.891
1993	0.249	0.273	0.288	0.319	0.343	0.408	0.512	0.630	0.720	0.856
1994	0.229	0.263	0.284	0.333	0.375	0.417	0.491	0.610	0.731	0.906
1995	0.272	0.277	0.301	0.335	0.375	0.420	0.474	0.593	0.734	0.906
1996	0.240	0.279	0.304	0.346	0.415	0.465	0.490	0.553	0.712	0.858
1997	0.208	0.271	0.313	0.355	0.410	0.474	0.541	0.574	0.616	0.912
1998	0.151	0.260	0.306	0.384	0.452	0.546	0.613	0.673	0.687	0.899
1999	0.245	0.253	0.280	0.347	0.415	0.416	0.538	0.637	0.748	0.804
2000	0.228	0.267	0.283	0.312	0.378	0.461	0.597	0.689	0.752	0.888
2001	0.238	0.267	0.291	0.307	0.360	0.412	0.582	0.701	0.796	0.799
2002	0.237	0.264	0.289	0.311	0.336	0.430	0.477	0.644	0.760	0.904
2003	0.232	0.252	0.285	0.320	0.353	0.389	0.482	0.635	0.763	0.857
2004	0.214	0.246	0.281	0.328	0.391	0.429	0.508	0.560	0.797	0.872
2005	0.272	0.265	0.280	0.330	0.382	0.426	0.465	0.555	0.617	0.910
2006	0.253	0.267	0.282	0.322	0.383	0.389	0.457	0.477	0.531	0.748
2007	0.263	0.268	0.303	0.343	0.364	0.432	0.507	0.486	0.587	0.632
2008	0.249	0.269	0.309	0.341	0.400	0.446	0.531	0.720	0.640	0.638
2009	0.176	0.260	0.308	0.355	0.415	0.481	0.531	0.608	0.668	0.792
2010	0.206	0.265	0.308	0.348	0.418	0.476	0.516	0.625	0.682	0.649
2011	0.235	0.242	0.281	0.341	0.414	0.504	0.604	0.521	0.556	0.804
2012	0.236	0.258	0.305	0.351	0.380	0.436	0.518	0.558	0.558	0.680
2013	0.031	0.242	0.281	0.313	0.364	0.417	0.494	0.600	0.607	0.680
2014	0.207	0.252	0.285	0.318	0.368	0.418	0.479	0.543	0.628	0.650
2015	NA	0.251	0.284	0.321	0.359	0.409	0.473	0.487	0.582	0.600
2016	NA	0.249	0.271	0.296	0.350	0.385	0.450	0.531	0.556	0.684
2017	0.212	0.247	0.276	0.299	0.357	0.410	0.455	0.543	0.642	0.735
2018	0.167	0.243	0.259	0.287	0.306	0.356	0.400	0.447	0.439	0.589
2019	NA	0.249	0.258	0.295	0.349	0.388	0.431	0.488	0.504	0.601

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
2020	0.211	0.236	0.264	0.269	0.302	0.333	0.372	0.422	0.451	0.562
2021	0.182	0.245	0.249	0.272	0.296	0.366	0.398	0.431	0.530	0.628
2022	NA	0.226	0.243	0.253	0.31	0.347	0.405	0.462	0.534	0.661
2023	0.193	0.237	0.247	0.258	0.257	0.327	0.371	0.408	0.587	0.625

Table 13.2.8. Plaice in Subarea 4 and Subdivision 20. Discards weight-at-age (kg).

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1957	0.044	0.104	0.146	0.181	0.206	0.244	0.244	0.231	0	0
1958	0.047	0.096	0.158	0.188	0.2	0.244	0	0	0	0
1959	0.051	0.107	0.155	0.186	0.197	0.231	0	0	0	0
1960	0.045	0.112	0.159	0.188	0.204	0.212	0.244	0	0	0
1961	0.044	0.1	0.16	0.194	0.204	0.22	0.22	0	0	0
1962	0.042	0.098	0.155	0.193	0.213	0.221	0.221	0.231	0	0
1963	0.048	0.105	0.156	0.188	0.205	0.231	0.221	0.231	0	0
1964	0.032	0.114	0.16	0.192	0.204	0.221	0.244	0.231	0	0
1965	0.038	0.072	0.166	0.192	0.212	0.221	0.231	0	0	0
1966	0.038	0.101	0.125	0.194	0.205	0.231	0.231	0.244	0	0
1967	0.036	0.105	0.158	0.169	0.22	0.22	0.244	0.244	0	0
1968	0.06	0.096	0.156	0.191	0.192	0.244	0.22	0	0	0
1969	0.052	0.146	0.162	0.186	0.211	0.212	0	0.231	0	0
1970	0.049	0.114	0.179	0.189	0.196	0	0.22	0.231	0	0
1971	0.057	0.11	0.183	0.2	0.212	0	0	0.231	0	0
1972	0.061	0.147	0.173	0.211	0.211	0.244	0	0	0	0
1973	0.043	0.131	0.179	0.195	0.211	0.244	0	0	0	0
1974	0.054	0.106	0.173	0.212	0.22	0.231	0.244	0	0	0
1975	0.068	0.136	0.162	0.206	0.221	0.244	0.244	0	0	0
1976	0.085	0.153	0.176	0.195	0.22	0	0.244	0	0	0
1977	0.069	0.16	0.186	0.196	0.198	0.22	0	0	0	0

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1978	0.069	0.143	0.197	0.205	0.211	0.213	0.231	0	0	0
1979	0.066	0.158	0.185	0.204	0.22	0.231	0.221	0.244	0	0
1980	0.055	0.149	0.191	0.212	0.231	0	0	0	0	0
1981	0.048	0.135	0.179	0.212	0.22	0	0	0	0	0
1982	0.054	0.126	0.182	0.203	0.231	0.244	0.244	0	0	0
1983	0.051	0.126	0.18	0.205	0.211	0.244	0	0	0	0
1984	0.053	0.127	0.172	0.211	0.205	0	0.244	0	0	0
1985	0.054	0.139	0.177	0.197	0.231	0.244	0	0	0	0
1986	0.049	0.124	0.181	0.196	0.22	0.244	0.244	0	0	0
1987	0.043	0.105	0.166	0.205	0.22	0.231	0	0	0	0
1988	0.043	0.098	0.153	0.185	0.22	0.244	0	0	0	0
1989	0.046	0.102	0.163	0.181	0.196	0	0	0	0	0
1990	0.051	0.111	0.157	0.186	0.212	0.231	0	0	0	0
1991	0.055	0.13	0.161	0.185	0.203	0.221	0.231	0.231	0	0
1992	0.05	0.122	0.167	0.188	0.204	0.212	0.231	0.244	0	0
1993	0.056	0.121	0.171	0.197	0.211	0.231	0.244	0	0	0
1994	0.06	0.14	0.175	0.194	0.213	0.244	0.244	0.221	0	0
1995	0.058	0.141	0.186	0.201	0.22	0.232	0.232	0.244	0	0
1996	0.052	0.122	0.179	0.205	0.221	0.232	0	0	0	0
1997	0.044	0.117	0.178	0.203	0.221	0.244	0	0	0	0
1998	0.047	0.086	0.17	0.199	0.22	0	0.244	0	0	0
1999	0.053	0.097	0.143	0.197	0.22	0	0	0	0	0
2000	0.059	0.11	0.151	0.174	0.244	0	0.203	0	0	0
2001	0.068	0.122	0.167	0.178	0.197	0.244	0	0.244	0	0
2002	0.056	0.119	0.17	0.182	0.172	0.208	0.003	0	0	0
2003	0.064	0.113	0.174	0.185	0.198	0.204	0.221	0	0	0
2004	0.054	0.117	0.164	0.183	0.189	0.192	0.196	0	0	0
2005	0.061	0.109	0.17	0.175	0.215	0.205	0.21	0.176	0	0

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
2006	0.06	0.128	0.164	0.193	0.198	0.204	0.212	0.22	0	0
2007	0.055	0.098	0.177	0.178	0.188	0.199	0.225	0.2	0	0
2008	0.056	0.116	0.163	0.186	0.187	0.23	0.22	0.191	0	0
2009	0.06	0.116	0.164	0.199	0.202	0.212	0.21	0.22	0	0
2010	0.06	0.117	0.159	0.199	0.19	0.198	0.211	0.234	0.001	0
2011	0.047	0.104	0.162	0.171	0.192	0.196	0.199	0.211	0	0
2012	0.052	0.093	0.142	0.188	0.198	0.206	0.215	0.215	0	0
2013	0.051	0.081	0.127	0.151	0.17	0.194	0.228	0.346	0	0
2014	0.025	0.089	0.132	0.162	0.18	0.212	0.3	0.37	0.255	0
2015	0.026	0.078	0.122	0.149	0.164	0.185	0.173	0.218	0.404	0.291
2016	0.048	0.079	0.124	0.15	0.151	0.179	0.166	0.192	0.251	0.5
2017	0.051	0.08	0.121	0.139	0.161	0.194	0.208	0.206	0.513	0.758
2018	0.058	0.084	0.121	0.137	0.149	0.152	0.159	0.179	0.196	0.163
2019	0.044	0.083	0.118	0.135	0.146	0.148	0.158	0.172	0.182	0.194
2020	0.054	0.079	0.119	0.133	0.146	0.148	0.154	0.164	0.159	0.166
2021	0.052	0.085	0.111	0.131	0.137	0.149	0.168	0.168	0.173	0.311
2022	0.043	0.081	0.112	0.131	0.15	0.158	0.203	0.146	0.185	0.287
2023	0.034	0.066	0.113	0.127	0.13	0.149	0.147	0.149	0.163	0.117

Table 13.2.9. Plaice in Subarea 4 and Subdivision 20. Catch weight-at-age (kg).

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1957	0.044	0.11	0.194	0.257	0.349	0.455	0.533	0.589	0.396	0.998
1958	0.047	0.106	0.189	0.256	0.329	0.452	0.513	0.615	0.665	0.992
1959	0.051	0.12	0.192	0.26	0.345	0.472	0.592	0.623	0.75	1
1960	0.045	0.115	0.204	0.287	0.377	0.48	0.601	0.683	0.724	1.094
1961	0.044	0.101	0.18	0.301	0.402	0.506	0.604	0.671	0.812	1.071
1962	0.042	0.099	0.181	0.273	0.397	0.538	0.57	0.692	0.777	1.127
1963	0.048	0.11	0.175	0.304	0.392	0.531	0.624	0.667	0.715	1.028

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1964	0.032	0.126	0.204	0.271	0.379	0.485	0.628	0.7	0.737	1.005
1965	0.038	0.076	0.214	0.313	0.381	0.469	0.539	0.663	0.726	0.887
1966	0.038	0.104	0.148	0.315	0.428	0.483	0.559	0.624	0.69	0.933
1967	0.036	0.111	0.19	0.235	0.422	0.543	0.597	0.662	0.738	0.978
1968	0.06	0.116	0.223	0.275	0.34	0.516	0.59	0.596	0.686	0.911
1969	0.052	0.174	0.272	0.284	0.356	0.408	0.573	0.655	0.658	0.893
1970	0.049	0.131	0.268	0.352	0.394	0.441	0.499	0.672	0.744	0.892
1971	0.057	0.16	0.277	0.388	0.444	0.512	0.542	0.607	0.699	0.891
1972	0.067	0.207	0.29	0.407	0.486	0.54	0.608	0.646	0.674	0.939
1973	0.045	0.205	0.334	0.403	0.478	0.538	0.605	0.627	0.677	0.842
1974	0.056	0.121	0.343	0.404	0.472	0.552	0.609	0.693	0.707	0.926
1975	0.069	0.152	0.205	0.393	0.492	0.585	0.636	0.703	0.783	1.019
1976	0.088	0.181	0.262	0.347	0.509	0.592	0.641	0.705	0.741	0.98
1977	0.071	0.218	0.245	0.318	0.396	0.551	0.647	0.721	0.715	0.978
1978	0.07	0.19	0.315	0.364	0.432	0.486	0.609	0.687	0.776	0.95
1979	0.067	0.19	0.295	0.338	0.426	0.472	0.55	0.675	0.796	0.96
1980	0.056	0.197	0.343	0.399	0.471	0.542	0.588	0.662	0.772	1.013
1981	0.048	0.183	0.327	0.415	0.502	0.556	0.604	0.642	0.725	1.007
1982	0.056	0.152	0.308	0.421	0.512	0.606	0.664	0.712	0.738	0.984
1983	0.052	0.153	0.275	0.379	0.507	0.602	0.677	0.771	0.815	0.984
1984	0.053	0.15	0.265	0.321	0.47	0.588	0.677	0.726	0.839	1.036
1985	0.054	0.169	0.268	0.333	0.444	0.562	0.667	0.73	0.807	1.021
1986	0.049	0.141	0.275	0.311	0.402	0.472	0.668	0.75	0.856	1.014
1987	0.043	0.113	0.219	0.343	0.375	0.471	0.574	0.728	0.835	0.993
1988	0.043	0.102	0.197	0.276	0.415	0.477	0.59	0.68	0.808	1.017
1989	0.047	0.118	0.215	0.291	0.364	0.512	0.591	0.668	0.785	0.94
1990	0.053	0.13	0.211	0.29	0.36	0.44	0.586	0.69	0.761	1.01
1991	0.056	0.149	0.211	0.273	0.349	0.449	0.526	0.666	0.743	0.924

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1992	0.055	0.145	0.226	0.275	0.324	0.41	0.53	0.607	0.719	0.891
1993	0.063	0.16	0.25	0.303	0.34	0.407	0.512	0.63	0.72	0.856
1994	0.064	0.179	0.257	0.331	0.372	0.416	0.491	0.61	0.731	0.906
1995	0.071	0.183	0.283	0.334	0.373	0.419	0.474	0.593	0.734	0.906
1996	0.054	0.14	0.268	0.336	0.413	0.464	0.49	0.553	0.712	0.858
1997	0.045	0.129	0.22	0.353	0.408	0.473	0.541	0.574	0.616	0.912
1998	0.047	0.094	0.208	0.299	0.449	0.544	0.613	0.673	0.687	0.899
1999	0.054	0.103	0.199	0.267	0.413	0.414	0.538	0.637	0.748	0.804
2000	0.063	0.123	0.21	0.274	0.372	0.452	0.565	0.601	0.751	0.888
2001	0.09	0.136	0.197	0.234	0.303	0.41	0.577	0.701	0.795	0.799
2002	0.057	0.131	0.222	0.285	0.326	0.426	0.469	0.644	0.759	0.904
2003	0.066	0.124	0.226	0.284	0.336	0.385	0.419	0.635	0.761	0.857
2004	0.054	0.125	0.22	0.297	0.376	0.421	0.506	0.56	0.794	0.872
2005	0.067	0.117	0.213	0.298	0.352	0.347	0.453	0.554	0.603	0.91
2006	0.06	0.139	0.212	0.293	0.375	0.383	0.428	0.457	0.531	0.423
2007	0.059	0.114	0.223	0.31	0.351	0.375	0.491	0.357	0.181	0.349
2008	0.057	0.123	0.248	0.325	0.389	0.437	0.368	0.469	0.606	0.385
2009	0.061	0.125	0.232	0.327	0.399	0.466	0.518	0.441	0.665	0.07
2010	0.062	0.132	0.226	0.311	0.396	0.442	0.463	0.574	0.563	0.396
2011	0.048	0.115	0.212	0.277	0.369	0.453	0.595	0.445	0.556	0.114
2012	0.052	0.096	0.196	0.294	0.348	0.425	0.509	0.557	0.474	0.261
2013	0.051	0.091	0.179	0.274	0.345	0.409	0.49	0.599	0.605	0.68
2014	0.025	0.093	0.172	0.253	0.318	0.396	0.473	0.542	0.589	0.65
2015	0.026	0.08	0.162	0.258	0.326	0.394	0.461	0.481	0.581	0.576
2016	0.048	0.084	0.157	0.243	0.299	0.352	0.422	0.465	0.546	0.684
2017	0.051	0.086	0.159	0.218	0.314	0.386	0.438	0.532	0.642	0.735
2018	0.058	0.089	0.148	0.207	0.254	0.329	0.38	0.44	0.437	0.62
2019	0.044	0.092	0.155	0.218	0.27	0.311	0.372	0.435	0.493	0.598

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
2020	0.054	0.083	0.152	0.194	0.249	0.284	0.312	0.387	0.399	0.56
2021	0.052	0.094	0.127	0.195	0.241	0.301	0.376	0.389	0.483	0.627
2022	0.043	0.085	0.131	0.161	0.224	0.253	0.329	0.326	0.453	0.593
2023	0.034	0.069	0.132	0.168	0.193	0.26	0.309	0.327	0.477	0.592

Table 13.2.10. Plaice in Subarea 4 and Subdivision 20. Natural mortality-at-age and maturity-at-age.

Age	1	2	3	4	5	6	7	8	9	10+
Natural mortality	0.495	0.394	0.343	0.311	0.292	0.278	0.268	0.260	0.252	0.246
Maturity	0	0.5	0.5	1	1	1	1	1	1	1

Table 13.2.11. Plaice in Subarea 4 and Subdivision 20. Survey tuning indices.

BTS-Isis		Age							
Year	1	2	3	4	5	6	7	8	
1985	137	173.9	36.1	11	1.27	0.973	0.336	0.155	
1986	667	131.7	50.2	9.21	3.78	0.4	0.418	0.147	
1987	226	764.2	33.8	4.88	1.84	0.607	0.252	0.134	
1988	680	147	182.3	9.99	2.81	0.814	0.458	0.036	
1989	468	319.3	314.7	47.3	5.85	0.833	0.311	0.661	
1990	185	146.1	79.3	26.35	5.47	0.758	0.189	0.383	
1991	291	159.4	34	13.57	4.31	5.659	0.239	0.204	
1992	361	174.5	29.3	5.96	3.75	2.871	1.186	0.346	
1993	189	283.4	62.8	14.27	1.13	1.13	0.584	0.464	
1994	193	77.1	34.5	10.59	2.67	0.6	0.8	0.895	
1995	266	40.6	13.2	7.53	1.11	0.806	0.33	1.051	

BTS-IBTS Q3	1	2	3	4	5	6	7	8	9	10+
1996	23098.4	23044.25	6954.972	3232.411	3382.38	2110.328	911.7256	584.8592	306.4766	470.9221
1997	81405.29	38596.92	10767.99	3718.086	2888.021	1923.239	1047.459	881.3553	331.5632	390.2061
1998	45221.04	77820.84	14286.35	5964.067	2258.186	1553.643	1003.044	762.9209	415.7637	415.8612
1999	32697.25	26409.1	42117.48	6374.13	2940.161	1260.622	624.9442	562.3576	416.607	314.4588

BTS-IBTS Q3	1	2	3	4	5	6	7	8	9	10+
2000	39453.81	18993.88	15378.24	17442.57	2381.601	1120.274	604.7751	512.0409	194.4659	339.481
2001	27722.99	24211.16	11897.14	7474.352	8640.657	1617.013	707.0655	562.0824	419.1019	823.4599
2002	147973.3	26210.44	14756.18	7953.726	4408.133	3187.239	823.9476	712.1286	361.2596	679.3769
2003	31974.79	49465.81	12276.7	7114.35	3449.879	2206.843	2163.838	550.7279	485.312	943.8412
2004	46026.34	19430.71	31629.71	6376.903	3864.734	2382.809	1578.716	1761.574	404.7752	1127.671
2005	40152.31	41432.4	10455.12	16157.12	2797.436	3074.714	1757.67	805.6649	1468.105	1425.682
2006	38606.35	26215.69	23178.21	6506.218	8181.743	2513.175	2430.588	1010.514	595.8757	2003.842
2007	81103.36	37793.37	24420.61	19615.72	5510.38	7602.036	1953.022	2345.585	749.3222	3397.406
2008	85083.14	78814.47	30724.69	19505.74	12709.7	4100.589	4791.17	1657.99	1589.136	3174.257
2009	55883.58	40885.85	47291.45	16638.59	10058.81	6827.629	2759.099	4293.578	1072.558	4081.467
2010	75433.15	39178.19	32582.82	28135.23	9102.644	5657.44	5719.642	2444.159	2630.828	5161.894
2011	113352	64286.24	41020.26	24801.31	16622.42	6016.38	3988.65	4682.79	1243.556	6590.126
2012	44343.1	87132.64	67849.01	33091.36	18073.53	11890.84	5203.218	4033.774	4031.843	6566.874
2013	56783.36	59878.96	71024.61	40504.18	17754.19	10212.94	7512.68	3267.116	2139.051	7678.072
2014	97397.25	73770.17	49258.72	40461.49	18171.71	8115.389	5272.009	3679.797	2275.757	6653.116
2015	30922.74	69836.65	59108.35	36886.88	26953.36	12777.2	6102.778	3926.629	3302.333	8749.802
2016	43496.23	40897.19	57492.36	37833.36	18889.76	13039.07	7810.532	4300.928	3151.577	8714.247
2017	81880.46	52046.15	27844.71	31514.75	17835.38	9767.492	6309.762	4242.606	2182.104	6698.686
2018	43701.29	66009.13	33853.97	19453.64	18048.87	9878.859	6492.431	3988.165	3230.868	7341.647
2019	165482.9	53769.64	40223.96	15991.62	9603.484	7574.92	5195.416	3932.825	2331.643	5218.085
2020	80825.74	92703.44	36967.49	26329.1	10161.14	6213.324	4994.4	4044.072	2415.401	5267.191
2021	76906.7	64522.44	67053.88	27569.32	16267.99	6952.69	4120.374	4045.048	2660.552	6085.035
2022	148965.6	45520.65	34462.1	29135.17	11103.67	8768.557	4852.154	3139.449	2712.164	7231.524
2023	76056.89	127328.9	46539.31	30074.05	27883	14117.89	8129.042	5130.475	2729.82	8612.745

SNS1						SNS2							
Age						Age							
Year	1	2	3	4	5	6	Year	1	2	3	4	5	6
1970	9311	9732	3273	770	170	37.5	2000	22855	2493	891	983	17	2.0
1971	13538	28164	1415	101	50	23.6	2001	11511	2898	370	176	691	105.8

SNS1							SNS2						
Age							Age						
Year	1	2	3	4	5	6	Year	1	2	3	4	5	6
1972	13207	10780	4478	89	84	0.0	2002	30809	1103	265	65	69	30.7
1973	65643	5133	1578	461	15	5.7	2003	NA	NA	NA	NA	NA	NA
1974	15366	16509	1129	160	82	7.0	2004	18202	1350	1081	51	27	29.7
1975	11628	8168	9556	65	15	0.0	2005	10118	1819	142	366	8	19.0
1976	8537	2403	868	236	0	2.3	2006	12164	1571	385	52	54	0.0
1977	18537	3424	1737	590	213	0.0	2007	14175	2134	140	52	0	7.4
1978	14012	12678	345	135	45	13.6	2008	14706	2700	464	179	34	6.7
1979	21495	9829	1575	161	17	42.2	2009	14860	2019	492	38	20	0.0
1980	59174	12882	491	180	24	7.8	2010	11947	1812	529	55	10	0.0
1981	24756	18785	834	38	32	4.7	2011	18349	1143	308	75	60	28.0
1982	69993	8642	1261	88	8	8.7	2012	5893	2929	682	82	30	15.0
1983	33974	13909	249	71	6	1.3	2013	15395	3021	1638	428	89	31.1
1984	44965	10413	2467	42	0	0.0	2014	17313	2258	514	458	58	16.4
1985	28101	13848	1598	328	17	1.5	2015	16727	5040	1882	478	200	97.5
1986	93552	7580	1152	145	30	6.6	2016	10385	2434	1086	522	223	131.7
1987	33402	32991	1227	200	30	16.7	2017	15936	1716	1212	534	144	70.6
1988	36609	14421	13153	1350	88	12.1	2018	9465	5250	993	533	489	88
1989	34276	17810	4373	7126	289	113.6	2019	28309	1886	1533	338	196	62
1990	25037	7496	3160	816	422	48.8	2020	11393	3931	283	607	118	5
1991	57221	11247	1518	1077	128	74.4	2021	6014	1290	1135	249	230	143
1992	46798	13842	2268	613	176	52.0	2022	23731.8	1279.1	769.5	586	12.5	119.5
1993	22098	9686	1006	98	60	58.8	2023	10664.9	2171.1	721.2	224.3	330.6	85.5
1994	19188	4977	856	76	23	2.7							
1995	24767	2796	381	97	38	0.0							
1996	23015	10268	1185	45	47	0.0							
1997	95901	4473	497	32	0	13.3							
1998	33666	30242	5014	50	10	0.0							

SNS1							SNS2						
Age							Age						
Year	1	2	3	4	5	6	Year	1	2	3	4	5	6
1999	32951	10272	13783	1058	17	0.0							
<hr/>													
IBTS Q1	1	2	3	4	5	6	7	8+					
2007	2192.862	5311.144	6107.365	7154.383	2541.533	1296.985	758.3323	612.4984					
2008	2094.399	11708.13	9015.122	4302.552	3196.169	863.7036	842.9592	574.4972					
2009	2916.234	8568.191	15743.46	5260.945	2719.967	1099.462	584.8883	824.0054					
2010	1077.292	5647.443	8950.614	8661.455	4116.908	1416.75	980.8666	900.0791					
2011	1159.511	6638.432	7933.3	8265.487	6426.368	2214.304	1181.534	1290.874					
2012	1850.997	14828.13	19543.02	9082.445	6450.033	4130.026	1706.358	2405.065					
2013	1459.316	5889.37	12006.62	8117.932	3881.242	2214.602	1192.681	1065.156					
2014	2483.209	8512.23	11124.06	10924.63	6051.14	2157.114	1339.069	1474.416					
2015	618.0882	8856.034	11864.94	9940.532	7154.812	3348.78	1471.297	1619.033					
2016	1352.006	4302.22	9580.072	8355.513	5868.47	2871.037	1656.179	2213.629					
2017	2107.75	7748.842	5458.227	9257.077	6306.377	3828.959	1952.139	2707.693					
2018	766.7498	6395.57	7580.058	3136.953	4016.63	2335.032	1711.107	2998.1					
2019	4224.449	4354.44	7645.667	4000.439	2335.657	1694.633	1525.111	2776.025					
2020	1893.076	9165.638	4836.392	4147.062	2167.711	1531.944	1246.619	1941.566					
2021	1205.859	7614.906	12181.59	5217.488	3255.823	1621.381	932.1569	2296.81					
2022	9734.706	8303.597	7923.457	11496.95	3474.026	2133.458	1316.244	2561.33					
2023	2727.839	19566.35	12449.77	7863.844	8067.612	2975.674	1956.799	3238.635					

Table 13.3.1. Plaice in Subarea 4 and Subdivision 20. Stock summary table. Recruits are in thousands, weights in tonnes. Landings and discards since 2015 include part of the catches in Division 7.d in the first quarter. From 2016, discards include BMS landings from EU and UK fleets.

Year	Recruits	SSB	Catch	Landings	Discards	Fbar2-6	Fbar hc2-6	Fbar dis2-3	Y/SSB
	(age 1)								
1957	1774291	810123	78442	70563	7881	0.11	0.09	0.047	0.09
1958	2577550	807714	88162	73354	14837	0.128	0.093	0.079	0.09
1959	3052907	800971	109180	79301	29863	0.145	0.093	0.096	0.1

Year	Recruits	SSB	Catch	Landings	Discards	Fbar2-6	Fbar hc2-6	Fbar dis2-3	Y/SSB
(age 1)									
1960	2705710	826171	117346	87541	29793	0.149	0.11	0.09	0.11
1961	2914398	830764	118369	85987	32489	0.148	0.101	0.114	0.1
1962	2095648	993516	125273	87474	37902	0.16	0.101	0.124	0.09
1963	2455086	896648	148439	107120	41257	0.182	0.115	0.151	0.12
1964	6336716	882883	147597	110542	37030	0.188	0.12	0.127	0.13
1965	2419782	780923	140210	97140	43081	0.169	0.119	0.117	0.12
1966	1904274	834795	166490	101833	64719	0.181	0.111	0.151	0.12
1967	1280132	958401	163517	108815	54548	0.184	0.103	0.142	0.11
1968	1305876	900504	139497	111534	27987	0.166	0.103	0.107	0.12
1969	1879519	799489	142811	121650	21169	0.178	0.13	0.085	0.15
1970	1737971	736122	159923	130342	29639	0.226	0.168	0.128	0.18
1971	1136454	675520	136964	113946	22994	0.207	0.157	0.114	0.17
1972	1001413	658982	142442	122843	19632	0.223	0.179	0.094	0.19
1973	3363947	541046	143711	130432	13353	0.251	0.221	0.071	0.24
1974	2591392	533768	157427	112539	44945	0.271	0.223	0.117	0.21
1975	1830388	540206	195349	108535	86699	0.308	0.202	0.241	0.2
1976	1497510	557869	166997	113673	53245	0.257	0.185	0.158	0.2
1977	2150809	558421	176623	119189	57500	0.291	0.189	0.185	0.21
1978	1920067	532644	159539	113977	45658	0.281	0.213	0.139	0.21
1979	1854707	508104	213145	145349	67935	0.384	0.278	0.203	0.29
1980	2691575	494559	171852	140762	31081	0.332	0.292	0.097	0.28
1981	2120759	464248	174140	141235	33030	0.333	0.292	0.098	0.3
1982	4595665	446897	205329	156155	49125	0.361	0.306	0.132	0.35
1983	3072030	541016	220537	145781	74482	0.35	0.283	0.158	0.27
1984	2911694	557217	236422	165776	70813	0.362	0.272	0.159	0.3
1985	3678348	593665	232241	171841	60547	0.345	0.286	0.145	0.29
1986	9441400	619565	308262	178881	129952	0.423	0.322	0.204	0.29
1987	4240880	742159	358749	168738	190533	0.459	0.331	0.312	0.23
1988	4206434	642179	324772	168557	156421	0.444	0.277	0.314	0.26

Year	Recruits	SSB	Catch	Landings	Discards	Fbar2-6	Fbar hc2-6	Fbar dis2-3	Y/SSB
(age 1)									
1989	2859623	694174	286704	178891	107793	0.388	0.251	0.264	0.26
1990	2527041	622108	240832	169455	71224	0.366	0.254	0.237	0.27
1991	2388027	572582	237986	157283	80932	0.405	0.273	0.257	0.27
1992	2081048	486823	193692	136728	57048	0.398	0.278	0.222	0.28
1993	1332470	436776	163524	128502	35018	0.368	0.293	0.157	0.29
1994	1154860	380880	145745	121925	23785	0.37	0.311	0.139	0.32
1995	2448971	361659	131248	109349	21827	0.385	0.329	0.133	0.3
1996	2750806	339561	143394	91387	52048	0.408	0.316	0.21	0.27
1997	5151885	367013	192969	92949	100149	0.464	0.319	0.355	0.25
1998	2069082	412278	183655	79810	103751	0.409	0.233	0.324	0.19
1999	1984387	382631	160881	89723	70978	0.381	0.226	0.262	0.23
2000	2442844	403133	135015	90752	44312	0.303	0.2	0.198	0.23
2001	1700349	449742	193367	92905	100313	0.4	0.187	0.324	0.21
2002	4739471	391850	134404	79177	55099	0.334	0.219	0.237	0.2
2003	1762429	461570	154023	74728	79273	0.318	0.199	0.229	0.16
2004	3376027	447455	127824	70508	57479	0.238	0.148	0.187	0.16
2005	2590326	506849	118885	62795	56250	0.219	0.115	0.184	0.12
2006	3017808	565350	131169	67143	64159	0.19	0.114	0.161	0.12
2007	4373576	584850	101029	58573	42373	0.152	0.086	0.129	0.1
2008	3860278	747044	105289	58335	46993	0.12	0.08	0.089	0.08
2009	3783203	873116	108299	62359	45903	0.109	0.068	0.084	0.07
2010	4198985	1014676	116972	70342	46569	0.107	0.065	0.079	0.07
2011	5834561	998515	118106	76502	41595	0.11	0.061	0.08	0.08
2012	3581806	1040159	141842	82017	59914	0.117	0.065	0.094	0.08
2013	4244538	1082785	126360	86218	40027	0.11	0.067	0.085	0.08
2014	5133750	1155311	133664	80684	53012	0.117	0.058	0.097	0.07
2015	2605165	1024689	134577	85358	49226	0.124	0.066	0.105	0.08
2016	2924958	985208	136931	92745	44251	0.141	0.071	0.116	0.09
2017	4456885	925322	114281	74929	39372	0.132	0.065	0.108	0.08

Year	Recruits	SSB	Catch	Landings	Discards	Fbar2-6	Fbar hc2-6	Fbar dis2-3	Y/SSB
(age 1)									
2018	2722841	775538	105954	57799	48001	0.139	0.061	0.118	0.07
2019	6085600	698791	86015	48744	37376	0.115	0.05	0.091	0.07
2020	3767466	724061	79079	40889	38269	0.1	0.043	0.081	0.06
2021	3335676	771049	73222	35905	37447	0.084	0.033	0.074	0.05
2022	8875151	749236	64879	25543	39353	0.079	0.021	0.071	0.03
2023	5385463	872609	62131	23078	38876	0.065	0.02	0.06	0.03
2024	4199508*								

* Recruitment in 2024 is the geometric mean of resampled recruitment estimates from 2014 to 2023.

Table 13.3.2. Plaice in Subarea 4 and Subdivision 20. Estimated parameters from SAM model.

	par	sd(par)	exp(par)	Low	High
logFpar_0	-8.761	0.158	0.000	0.000	0.000
logFpar_1	-8.637	0.132	0.000	0.000	0.000
logFpar_2	-9.359	0.132	0.000	0.000	0.000
logFpar_3	-10.109	0.133	0.000	0.000	0.000
logFpar_4	-10.831	0.135	0.000	0.000	0.000
logFpar_5	-11.091	0.139	0.000	0.000	0.000
logFpar_6	-11.333	0.198	0.000	0.000	0.000
logFpar_7	-11.058	0.207	0.000	0.000	0.000
logFpar_8	-3.740	0.074	0.024	0.021	0.028
logFpar_9	-3.392	0.063	0.034	0.030	0.038
logFpar_10	-3.227	0.068	0.040	0.035	0.045
logFpar_11	-3.220	0.076	0.040	0.034	0.046
logFpar_12	-3.308	0.092	0.037	0.030	0.044
logFpar_13	-7.660	0.121	0.000	0.000	0.001
logFpar_14	-5.661	0.085	0.003	0.003	0.004
logFpar_15	-4.845	0.083	0.008	0.007	0.009
logFpar_16	-4.902	0.111	0.007	0.006	0.009
logFpar_17	-5.405	0.126	0.004	0.003	0.006
logFpar_18	-4.054	0.087	0.017	0.015	0.021

	par	sd(par)	exp(par)	Low	High
logFpar_19	-4.419	0.100	0.012	0.010	0.015
logFpar_20	-5.553	0.146	0.004	0.003	0.005
logFpar_21	-6.941	0.171	0.001	0.001	0.001
logFpar_22	-7.909	0.178	0.000	0.000	0.001
logFpar_23	-8.543	0.197	0.000	0.000	0.000
logFpar_24	-5.221	0.102	0.005	0.004	0.007
logFpar_25	-6.470	0.113	0.002	0.001	0.002
logFpar_26	-7.175	0.139	0.001	0.001	0.001
logFpar_27	-7.769	0.193	0.000	0.000	0.001
logFpar_28	-8.393	0.251	0.000	0.000	0.000
logFpar_29	-8.644	0.261	0.000	0.000	0.000
logSdLogFsta_0	-1.936	0.201	0.144	0.097	0.216
logSdLogFsta_1	-1.893	0.132	0.151	0.116	0.196
logSdLogFsta_2	-1.915	0.099	0.147	0.121	0.179
logSdLogFsta_3	-1.885	0.129	0.152	0.117	0.196
logSdLogN_0	-0.682	0.098	0.506	0.416	0.615
logSdLogN_1	-2.434	0.100	0.088	0.072	0.107
logSdLogObs_0	-0.851	0.115	0.427	0.340	0.537
logSdLogObs_1	-2.248	0.089	0.106	0.088	0.126
logSdLogObs_2	-1.321	0.071	0.267	0.231	0.308
logSdLogObs_3	-0.675	0.223	0.509	0.326	0.796
logSdLogObs_4	-0.865	0.100	0.421	0.345	0.514
logSdLogObs_5	-0.491	0.160	0.612	0.445	0.842
logSdLogObs_6	-1.277	0.153	0.279	0.205	0.379
logSdLogObs_7	-1.715	0.074	0.180	0.155	0.209
logSdLogObs_8	-1.390	0.165	0.249	0.179	0.347
logSdLogObs_9	-1.309	0.172	0.270	0.191	0.381
logSdLogObs_10	-0.900	0.183	0.407	0.282	0.586
logSdLogObs_11	-0.845	0.174	0.430	0.303	0.609

	par	sd(par)	exp(par)	Low	High
logSdLogObs_12	-1.358	0.090	0.257	0.215	0.308
logSdLogObs_13	-1.227	0.138	0.293	0.222	0.387
logSdLogObs_14	-0.785	0.138	0.456	0.346	0.602
logSdLogObs_15	-0.634	0.137	0.530	0.404	0.697
logSdLogObs_16	-0.237	0.128	0.789	0.610	1.019
logSdLogObs_17	-0.083	0.083	0.920	0.780	1.086
logSdLogObs_18	-0.893	0.146	0.409	0.306	0.548
logSdLogObs_19	-0.756	0.141	0.469	0.354	0.622
logSdLogObs_20	-0.520	0.143	0.594	0.446	0.792
logSdLogObs_21	-0.153	0.140	0.859	0.649	1.136
logSdLogObs_22	0.117	0.119	1.124	0.885	1.426
transfIRARdist_0	0.399	0.259	1.491	0.888	2.503
transfIRARdist_1	0.143	0.215	1.154	0.751	1.773
transfIRARdist_2	-0.368	0.244	0.692	0.425	1.127
itrans_rho_0	1.718	0.192	5.571	3.798	8.172

Table 13.3.3. Plaice in Subarea 4 and Subdivision 20. Estimated Harvest (F) at age.

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1957	0.027	0.088	0.111	0.124	0.124	0.103	0.095	0.088	0.085	0.085
1958	0.031	0.102	0.129	0.143	0.143	0.12	0.109	0.1	0.095	0.095
1959	0.035	0.118	0.148	0.162	0.161	0.137	0.122	0.111	0.106	0.106
1960	0.036	0.121	0.152	0.164	0.164	0.142	0.126	0.114	0.108	0.108
1961	0.036	0.121	0.151	0.163	0.163	0.143	0.125	0.112	0.106	0.106
1962	0.038	0.131	0.164	0.176	0.175	0.155	0.133	0.118	0.11	0.11
1963	0.043	0.148	0.186	0.199	0.199	0.179	0.153	0.134	0.125	0.125
1964	0.044	0.151	0.191	0.206	0.205	0.185	0.157	0.137	0.129	0.129
1965	0.04	0.136	0.173	0.184	0.184	0.17	0.145	0.127	0.121	0.121
1966	0.045	0.149	0.186	0.197	0.196	0.179	0.154	0.134	0.127	0.127
1967	0.047	0.152	0.189	0.199	0.198	0.181	0.154	0.133	0.125	0.125

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1968	0.046	0.141	0.171	0.179	0.176	0.163	0.141	0.122	0.116	0.116
1969	0.051	0.151	0.182	0.191	0.189	0.178	0.155	0.136	0.129	0.129
1970	0.065	0.193	0.231	0.244	0.24	0.224	0.195	0.168	0.157	0.157
1971	0.061	0.173	0.208	0.222	0.223	0.208	0.185	0.163	0.154	0.154
1972	0.067	0.187	0.223	0.24	0.242	0.223	0.197	0.176	0.165	0.165
1973	0.076	0.211	0.252	0.274	0.275	0.245	0.215	0.193	0.18	0.18
1974	0.086	0.234	0.275	0.295	0.293	0.258	0.227	0.206	0.191	0.191
1975	0.101	0.274	0.315	0.333	0.329	0.288	0.255	0.231	0.213	0.213
1976	0.09	0.236	0.267	0.276	0.269	0.237	0.213	0.193	0.179	0.179
1977	0.102	0.267	0.305	0.315	0.305	0.263	0.232	0.207	0.19	0.19
1978	0.098	0.257	0.297	0.306	0.292	0.255	0.225	0.198	0.18	0.18
1979	0.127	0.345	0.407	0.424	0.399	0.345	0.299	0.26	0.233	0.233
1980	0.109	0.296	0.357	0.372	0.343	0.293	0.254	0.221	0.199	0.199
1981	0.106	0.292	0.355	0.376	0.347	0.295	0.257	0.224	0.203	0.203
1982	0.112	0.316	0.382	0.41	0.377	0.319	0.277	0.242	0.219	0.219
1983	0.108	0.305	0.363	0.398	0.369	0.315	0.271	0.238	0.217	0.217
1984	0.108	0.312	0.366	0.407	0.388	0.335	0.288	0.252	0.229	0.229
1985	0.101	0.294	0.341	0.384	0.376	0.331	0.286	0.249	0.226	0.226
1986	0.117	0.357	0.41	0.46	0.47	0.419	0.357	0.308	0.277	0.277
1987	0.121	0.381	0.44	0.493	0.518	0.466	0.398	0.339	0.302	0.302
1988	0.113	0.365	0.423	0.471	0.504	0.459	0.396	0.34	0.306	0.306
1989	0.097	0.317	0.372	0.41	0.44	0.403	0.349	0.299	0.271	0.271
1990	0.088	0.291	0.348	0.387	0.42	0.386	0.334	0.284	0.257	0.257
1991	0.093	0.316	0.383	0.427	0.464	0.432	0.377	0.319	0.286	0.286
1992	0.086	0.299	0.372	0.422	0.464	0.435	0.387	0.329	0.294	0.294
1993	0.077	0.272	0.344	0.394	0.429	0.404	0.365	0.309	0.275	0.275
1994	0.076	0.276	0.353	0.4	0.421	0.397	0.362	0.3	0.262	0.262
1995	0.078	0.295	0.38	0.425	0.429	0.394	0.352	0.284	0.24	0.24

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1996	0.085	0.336	0.424	0.458	0.435	0.387	0.336	0.268	0.224	0.224
1997	0.097	0.397	0.503	0.532	0.48	0.407	0.331	0.258	0.211	0.211
1998	0.085	0.344	0.444	0.489	0.423	0.345	0.266	0.2	0.16	0.16
1999	0.076	0.305	0.389	0.458	0.412	0.341	0.252	0.183	0.141	0.141
2000	0.063	0.248	0.305	0.36	0.331	0.27	0.195	0.136	0.101	0.101
2001	0.087	0.358	0.424	0.471	0.421	0.325	0.229	0.152	0.106	0.106
2002	0.076	0.304	0.346	0.379	0.354	0.289	0.211	0.137	0.091	0.091
2003	0.078	0.306	0.334	0.353	0.327	0.27	0.195	0.124	0.078	0.078
2004	0.067	0.253	0.261	0.261	0.231	0.185	0.131	0.084	0.052	0.052
2005	0.063	0.236	0.239	0.237	0.212	0.17	0.12	0.08	0.05	0.05
2006	0.059	0.213	0.213	0.204	0.179	0.142	0.102	0.071	0.046	0.046
2007	0.048	0.168	0.167	0.162	0.145	0.118	0.086	0.062	0.041	0.041
2008	0.039	0.13	0.13	0.129	0.117	0.096	0.073	0.053	0.035	0.035
2009	0.036	0.115	0.116	0.118	0.107	0.088	0.066	0.051	0.034	0.034
2010	0.034	0.108	0.112	0.118	0.107	0.089	0.066	0.051	0.034	0.034
2011	0.033	0.102	0.113	0.124	0.116	0.096	0.07	0.056	0.038	0.038
2012	0.035	0.109	0.122	0.132	0.121	0.099	0.071	0.056	0.037	0.037
2013	0.033	0.1	0.114	0.125	0.116	0.096	0.069	0.054	0.034	0.034
2014	0.035	0.106	0.122	0.133	0.123	0.1	0.073	0.056	0.035	0.035
2015	0.037	0.113	0.131	0.141	0.131	0.105	0.079	0.06	0.036	0.036
2016	0.039	0.123	0.146	0.162	0.152	0.122	0.092	0.07	0.04	0.04
2017	0.037	0.114	0.139	0.154	0.141	0.111	0.084	0.063	0.035	0.035
2018	0.039	0.12	0.149	0.163	0.147	0.115	0.088	0.067	0.037	0.037
2019	0.032	0.097	0.123	0.136	0.121	0.096	0.077	0.059	0.033	0.033
2020	0.028	0.083	0.106	0.12	0.108	0.085	0.072	0.057	0.033	0.033
2021	0.025	0.072	0.091	0.1	0.089	0.068	0.058	0.046	0.026	0.026
2022	0.024	0.07	0.086	0.093	0.082	0.063	0.054	0.043	0.024	0.024
2023	0.021	0.06	0.071	0.076	0.067	0.051	0.044	0.035	0.019	0.019

Table 13.3.4. Plaice in Subarea 4 and Subdivision 20. Estimated stock numbers (thousands).

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1957	1774291	731900	879664	505236	339457	125830	152398	124147	76313	165004
1958	2577550	1047460	456486	573096	327546	216506	91438	105679	86892	172715
1959	3052907	1528802	652357	286262	363414	210857	143210	64786	73851	183600
1960	2705710	1787608	905035	403771	177501	231823	138713	96951	45757	179776
1961	2914398	1583449	1044747	548402	255244	114903	148522	93802	66802	158462
1962	2095648	1740370	953860	629209	344702	160412	78292	99786	63964	157445
1963	2455086	1221674	1022654	580337	385370	215564	103285	53761	68894	157778
1964	6336716	1393815	702132	587575	357541	243635	131468	66609	36557	159837
1965	2419782	4116176	766611	404066	330480	215564	153796	85893	44584	139050
1966	1904274	1418856	2697037	438909	247050	204340	133103	101548	58578	127993
1967	1280132	1140995	810507	1692899	255712	151155	133099	83955	68526	127302
1968	1305876	761607	659766	468163	1072700	144882	92767	90669	55202	136689
1969	1879519	737892	460493	393873	283128	713266	90708	60166	63420	135267
1970	1737971	1096970	424279	282991	242586	185067	454994	59462	39723	135629
1971	1136454	1026554	586834	228038	161134	145467	114226	272856	39968	119408
1972	1001413	652489	597527	332812	133119	96877	91859	72641	173318	107277
1973	3363947	544511	358436	351238	196080	78077	57700	58433	46583	182606
1974	2591392	1976666	293324	197275	191718	107699	47018	36278	37093	147945
1975	1830388	1486166	1111712	153258	107053	102578	63767	29436	22966	117826
1976	1497510	1001488	770568	590326	78264	56000	55832	38359	18198	87068
1977	2150809	808990	544349	429725	348658	47198	33295	33305	24484	66960
1978	1920067	1181826	409567	287904	236350	182663	29686	20491	20338	57948
1979	1854707	1066210	615588	220618	160862	140650	105109	18529	13163	50966
1980	2691575	965412	490843	290890	106209	82388	73779	58142	11135	39677
1981	2120759	1467093	489229	226637	144484	58315	47710	44018	35690	33194
1982	4595665	1148662	741080	243251	109753	74354	34764	28382	27079	44597
1983	3072030	2552905	569136	343261	116686	55823	40952	20774	17213	45272
1984	2911694	1653550	1294069	292156	155667	61341	31347	24597	12889	39396

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
1985	3678348	1534909	800654	653424	147350	73654	33640	18420	14943	33030
1986	9441400	2058708	770002	423982	312646	82555	39189	19389	11343	30712
1987	4240880	5353687	976459	365637	209861	140388	42543	21200	11053	25617
1988	4206434	2318552	2478532	458357	169690	94571	67410	21361	12082	22248
1989	2859623	2309340	1095272	1150954	216464	76190	45135	35330	11734	20617
1990	2527041	1544623	1124043	538886	549590	105400	37943	24570	20341	19645
1991	2388027	1429914	799701	562177	262926	255748	54605	21375	14486	24799
1992	2081048	1275906	687227	391894	272129	123267	113574	28878	12284	23976
1993	1332470	1127754	626230	334827	195138	123962	57356	55111	16098	21530
1994	1154860	720873	568906	313093	168538	95723	61230	29787	29661	22093
1995	2448971	616711	364226	281379	153689	85522	50496	30474	16329	28981
1996	2750806	1410956	322817	178485	132395	74377	45023	26247	16546	26481
1997	5151885	1677718	686133	158561	91365	64315	38800	25083	15131	25356
1998	2069082	3012337	735384	286543	79507	41646	30803	21459	14693	24284
1999	1984387	1097933	1538011	296839	116575	44435	22163	17518	13459	24515
2000	2442844	1094809	547597	808933	117233	54758	22655	13545	10686	24524
2001	1700349	1382221	631296	341068	430873	58832	29594	14411	9192	24315
2002	4739471	944761	601961	288918	170541	198968	33566	18638	9662	22349
2003	1762429	2565003	462586	300781	155442	91350	119418	19801	12405	21314
2004	3376027	954282	1249126	236984	161559	90220	51581	73905	13085	23026
2005	2590326	1963542	460788	662108	132886	111384	59896	34812	53403	26206
2006	3017808	1478742	1062476	273278	385931	79922	76400	41552	25227	61282
2007	4373576	1724776	819710	607246	180625	262712	54860	56501	31295	67506
2008	3860278	2657368	929654	502379	384829	112451	200483	39642	41687	78268
2009	3783203	2172896	1531239	548004	314538	255218	76118	144532	28536	103554
2010	4198985	2146039	1293632	959340	341618	196390	192264	55545	107816	102332
2011	5834561	2473502	1278659	877676	630238	222165	130286	144034	40200	175271
2012	3581806	3553544	1744082	843920	562797	398901	147401	94590	106572	157479

Year	Age									
	1	2	3	4	5	6	7	8	9	10+
2013	4244538	2245671	2076890	1078855	509779	352997	253414	103235	68797	181298
2014	5133750	2585602	1502113	1259931	675729	307522	221124	167234	75576	174588
2015	2605165	2957262	1661555	992049	746999	415715	204239	154008	117221	179286
2016	2924958	1548514	1632070	1045126	638352	441485	268459	140521	110788	203129
2017	4456885	1750029	907147	968706	621499	380648	258798	177141	95991	207267
2018	2722841	2680615	1036628	548465	565652	365589	240721	169840	126002	207419
2019	6085600	1625617	1546850	581973	324334	328481	227822	163946	116966	225737
2020	3767466	3438529	1005290	947881	354485	203427	224556	160125	118013	239261
2021	3335676	2158911	2174303	680891	595387	237534	137165	156314	116917	249256
2022	8875151	1929900	1315507	1393268	439476	381208	178017	106110	113471	262440
2023	5385463	5414080	1233392	851340	950822	324495	271146	134362	81699	273768

Table 13.5.1. Plaice in Subarea 4 and Subdivision 20. Annual catch scenarios. All weights are in tonnes.

Basis	plaice 27.420 plaice stock							Plaice in Subarea 4 and Subdivision 20						
	Total catch (2025)	Projected landings (2025)	Projected discards* (2025)	F _{total} (ages 2–6)** (2025)	F _{projected} landings (ages 2–6) (2025)	F _{projected} discards (ages 2–3) (2025)	SSB (2026)	% SSB change***	% advice change^	Total catch^^ (2025)	Projected landing (2025)	Projected discards* (2025)	% change in projected catches ^^^	% TAC change#
ICES advice basis														
MSY approach: F _{MSY}	176988	84100	92888	0.152	0.049	0.103	1113260	-3.5	14.2	176593	83956	92637	14.2	14.2
Other scenarios														
F _{MSY upper}	209089	99441	109648	0.182	0.058	0.124	1085388	-5.9	35	208694	99297	109397	35	35
F _{MSY lower}	138332	65697	72635	0.117	0.037	0.080	1147061	-0.54	-10.8	137937	65553	72384	-10.8	-10.8
F = 0##	0	0	0	0	0	0	1266886	9.8	-100	0	0	0	-100	-100
F _{pa}	209089	99441	109648	0.182	0.058	0.124	1085388	-5.9	35	208694	99297	109397	35	35
SSB (2026) = B _{lim}	1126008	549702	576306	1.74	0.56	1.19	341003	-70	630	1125613	549558	576055	630	630
SSB (2026) = B _{pa} = MSY B _{trig-} ger	950686	461121	489565	1.26	0.40	0.86	473849	-59	510	950291	460977	489314	510	510
F = F ₂₀₂₄	78553	37264	41289	0.065	0.021	0.044	1198555	3.9	-49	78158	37120	41038	-49	-49

* Including BMS landings recent discard rates.

** Projected landings and F_{projected} discards do not add up to the F_{total} as they are calculated using different ages.

*** SSB 2026 relative to SSB 2025.

^ Projected catch of plaice stock in 2025 relative to the advised value for 2024 adding the proportion caught in Division 7.d (154663 + 352 = 155 015 tonnes).

^^ Projected catches for plaice in Subarea 4 and Subdivision 20 are calculated as the total catch for the stock (2025) (176 988 tonnes) reduced by the catch of the plaice 27.420 stock to be taken in Division 7.d in 2025 when fishing at catch advice level (144 tonnes landing + 251 tonnes discards).

^^^ Projected catch of plaice in Subarea 4 and Subdivision 20 in 2025 relative to the value in 2024 (154 663 tonnes).

^ Projected catch of plaice in Subarea 4 and Subdivision 20 in 2025 relative to the 2024 TAC (154 663 tonnes) for Subarea 4 and Subdivision 20.

This scenario implies zero fishing in Division 7.d in Quarter 1.

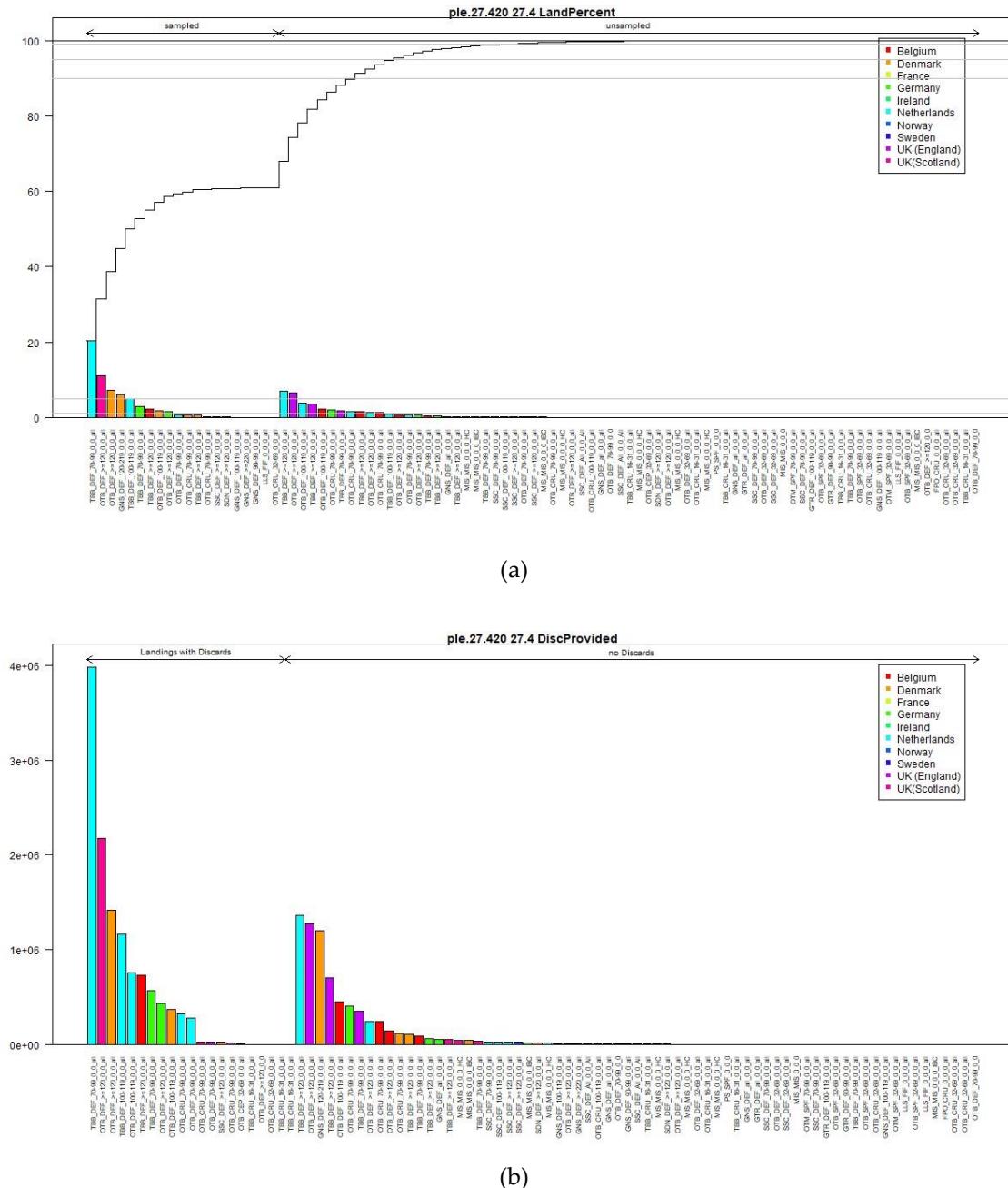


Figure 13.2.1. Plaice in Subarea 4 and Subdivision 20. Summary of data upload in InterCatch for Subarea 4: (a) Percentage of landings. Sampled and unsampled refers to availability of age-composition information. (b) Percentage of landings provided with discards, by métier.

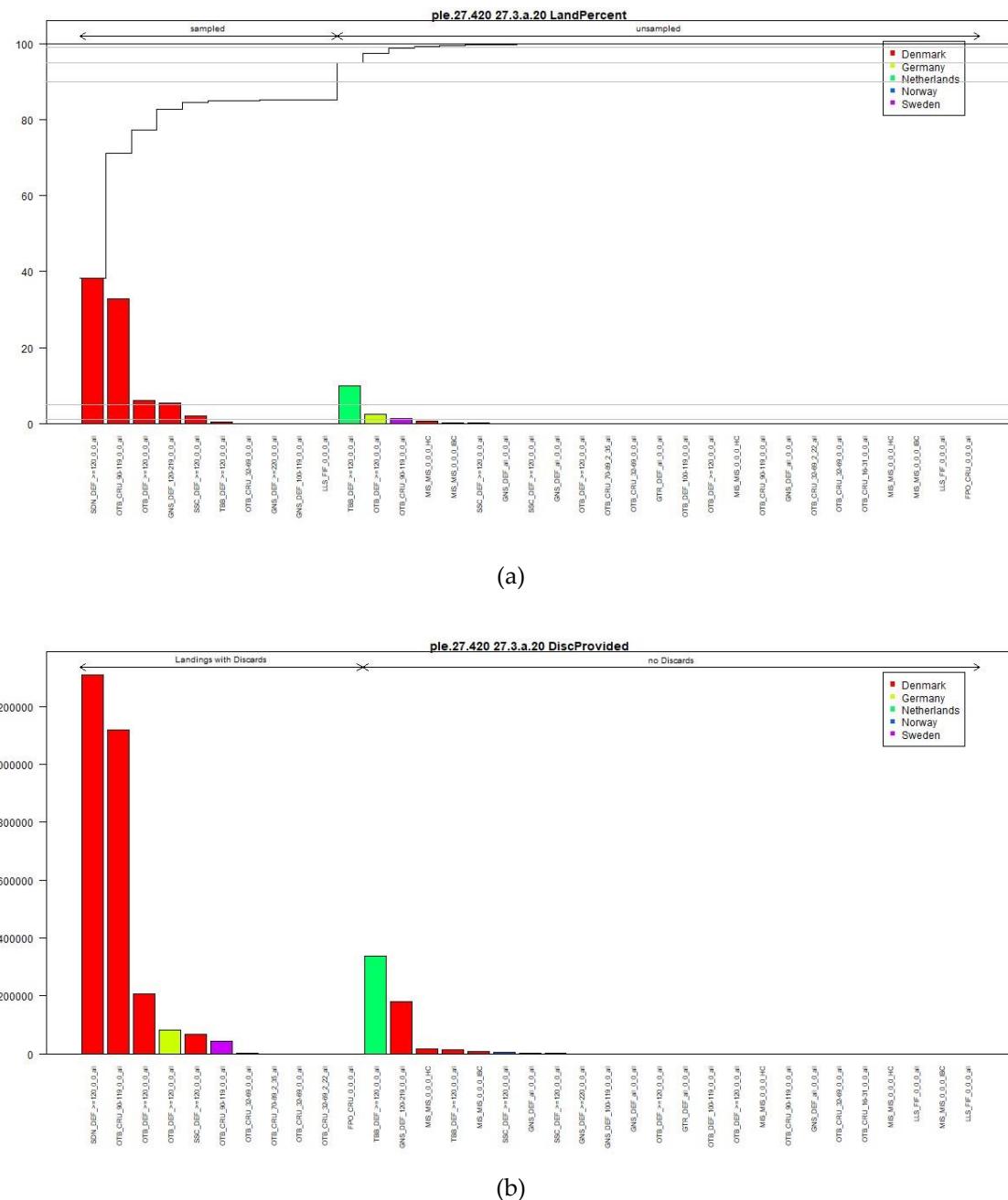


Figure 13.2.2. Plaice in Subarea 4 and Subdivision 20. Summary of data upload in InterCatch for Subdivision 20: (a) Percentage of landings. Sampled and unsampled refers to availability of age-composition information. (b) Percentage of landings provided with discards, by country by métier.

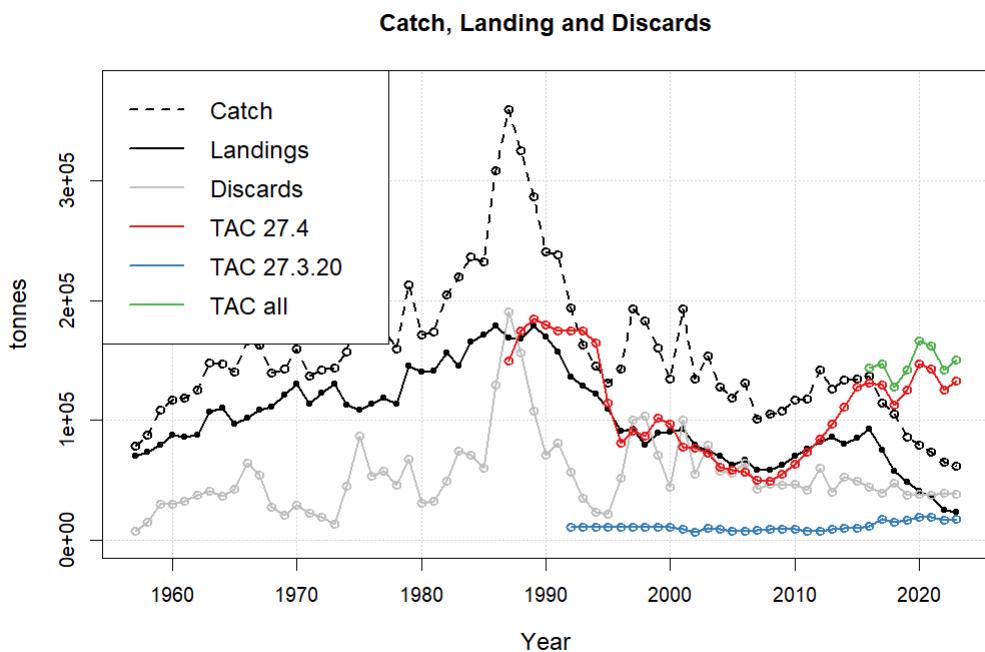


Figure 13.2.3. Plaice in Subarea 4 and Subdivision 20. Time series of catch (dashed line), landings (solid black line) and discards (grey line) estimates. TAC for Subarea 4 (red), Subdivision 20 (blue) and combined area (green) are also plotted. Discards before 2000 were reconstructed using a model-based method. Landing TAC was given before 2019 and catch TAC was given since 2019.

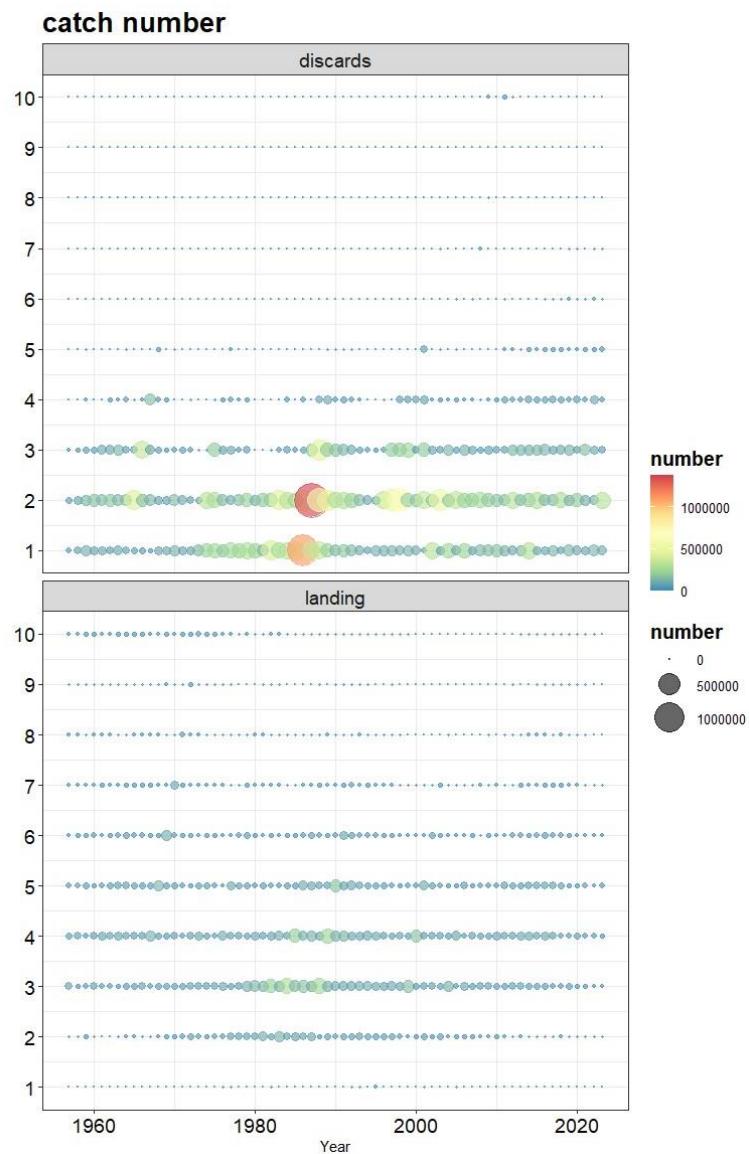


Figure 13.2.4. Plaice in Subarea 4 and Subdivision 20. Discards numbers-at-age (top) and landings numbers-at-age (bottom). Discards before 2000 were reconstructed using a model-based method.

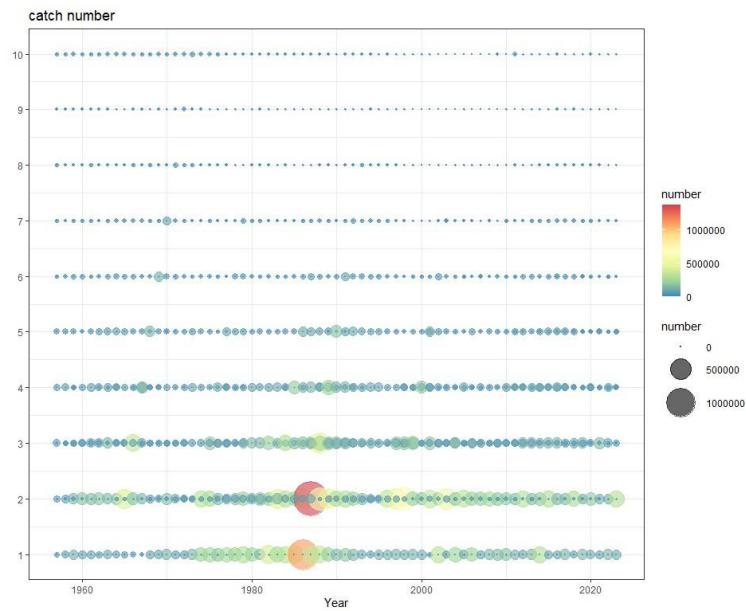


Figure 13.2.5. Plaice in Subarea 4 and Subdivision 20. Catch numbers-at-age: Discards before 2000 were reconstructed using a model-based method.

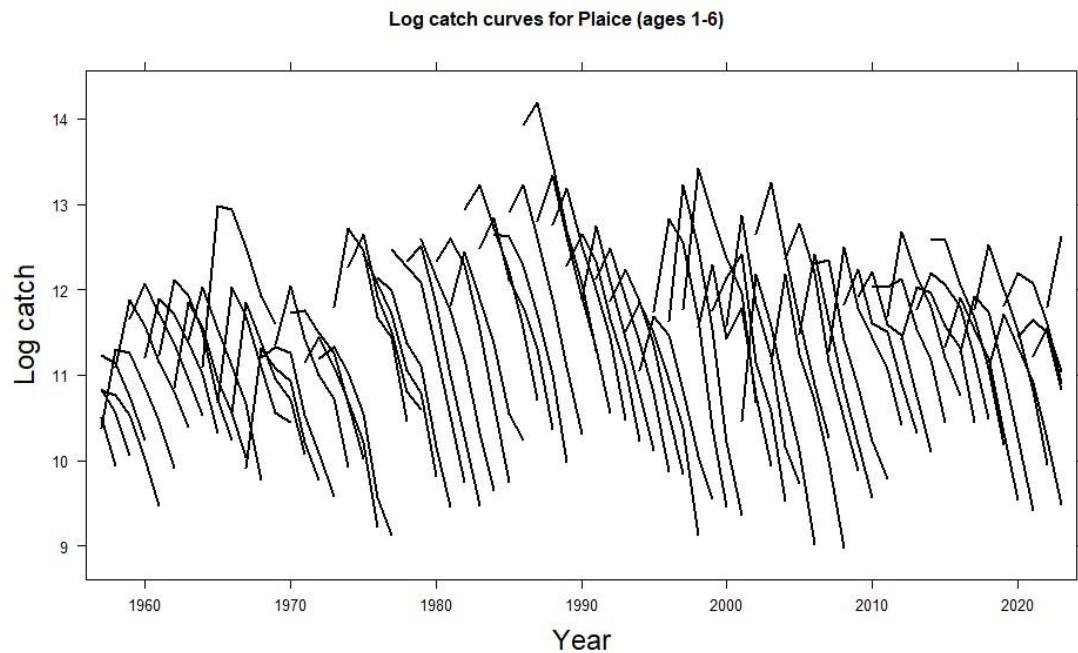


Figure 13.2.6. Plaice in Subarea 4 and Subdivision 20. Catch curves for catches in age 1–6.

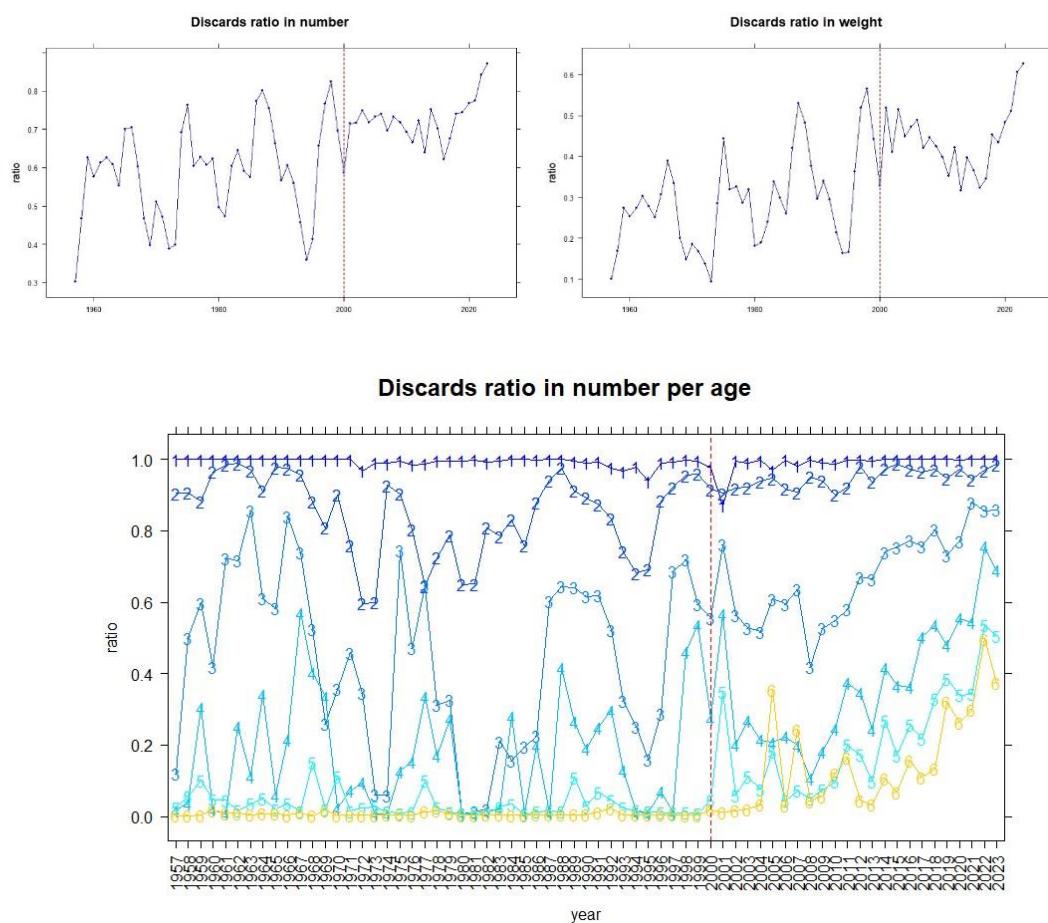


Figure 13.2.7. Plaice in Subarea 4 and Subdivision 20. Discards ratio. Discards before 2000 were reconstructed using a model-based method.

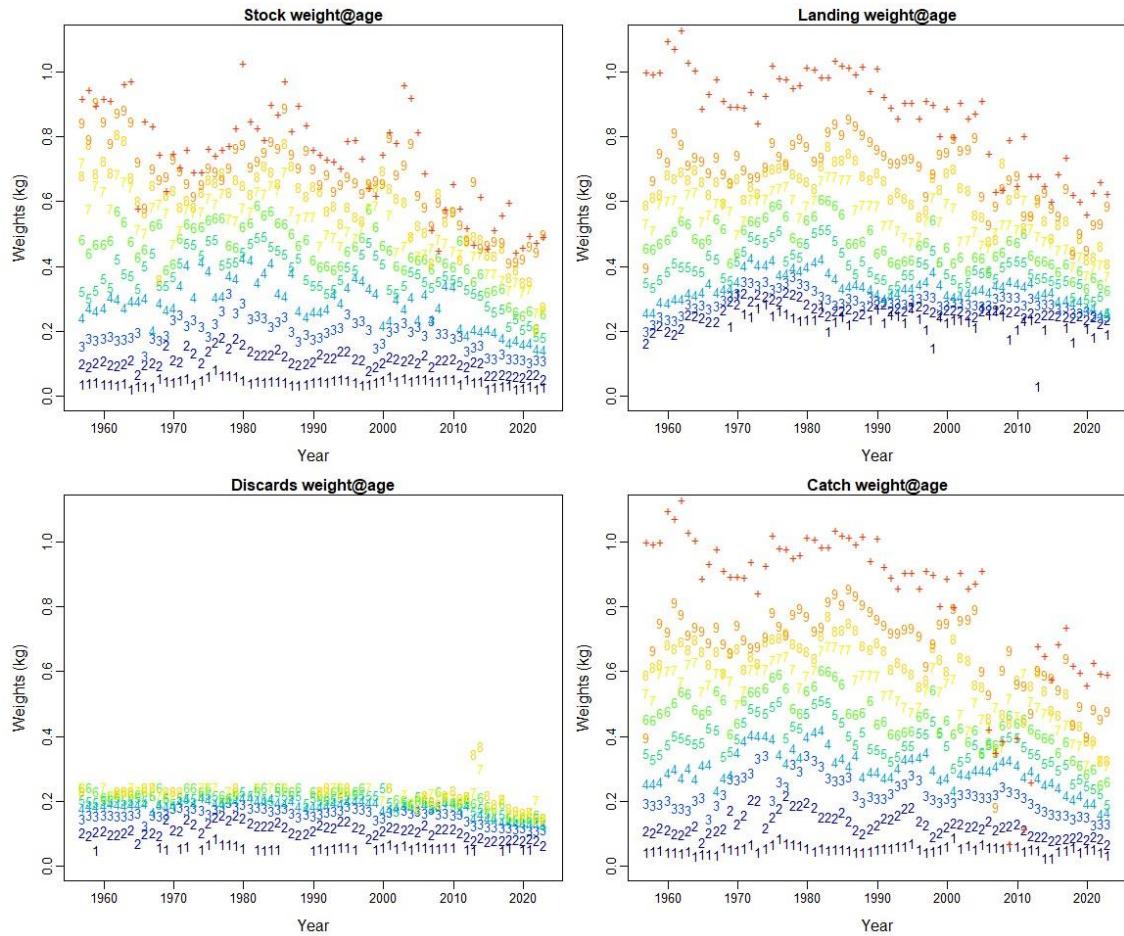


Figure 13.2.8. Plaice in Subarea 4 and Subdivision 20. Stock weight-at-age (top left), landings weight-at-age (top right), discards weight-at-age (bottom left) and catch weight-at-age (bottom right).

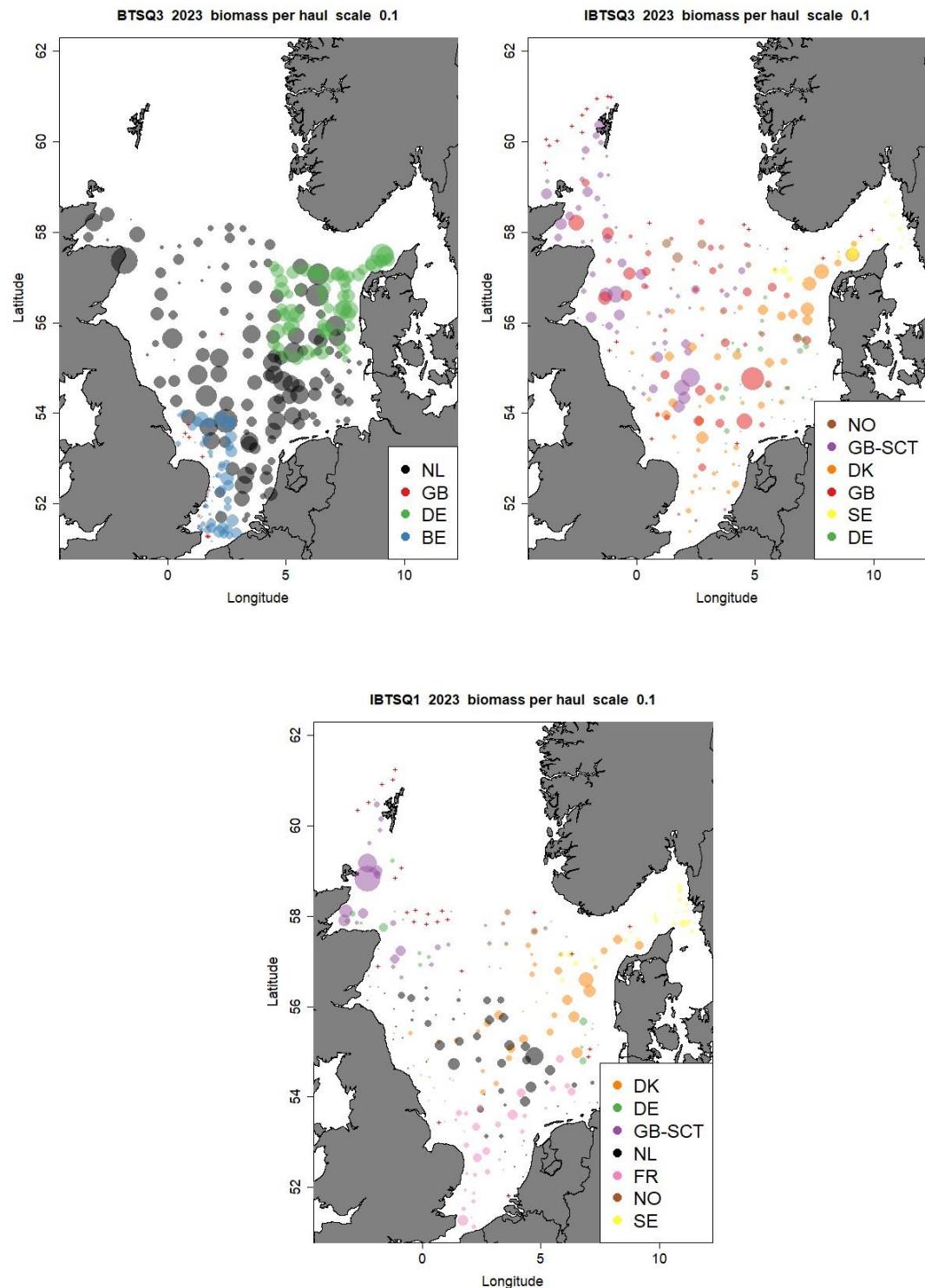


Figure 13.2.9. Plaice in Subarea 4 and Subdivision 20. Spatial distribution of biomass per haul for BTS-Q3, IBTS-Q3 and IBTS-Q1 surveys in 2023. The age length key was estimated annually using GAM including spatial effects. Samples in grey area were excluded due to low coverage.

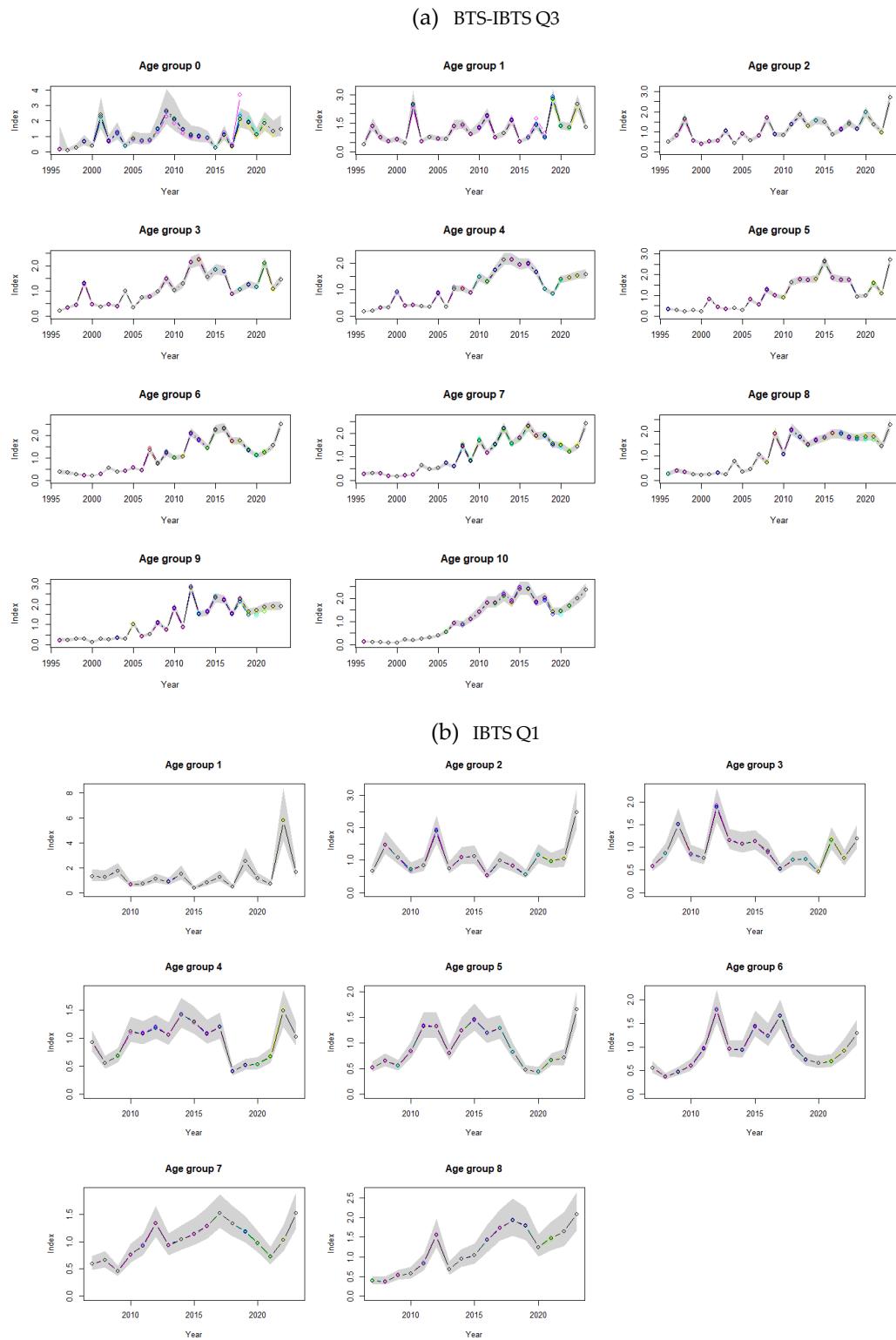


Figure 13.2.10. Plaice in Subarea 4 and Subdivision 20. Retrospective analysis of (a) BTS-IBTS Q3 and (b) IBTS Q1. All Mohn's rho values are low (<<0.2).

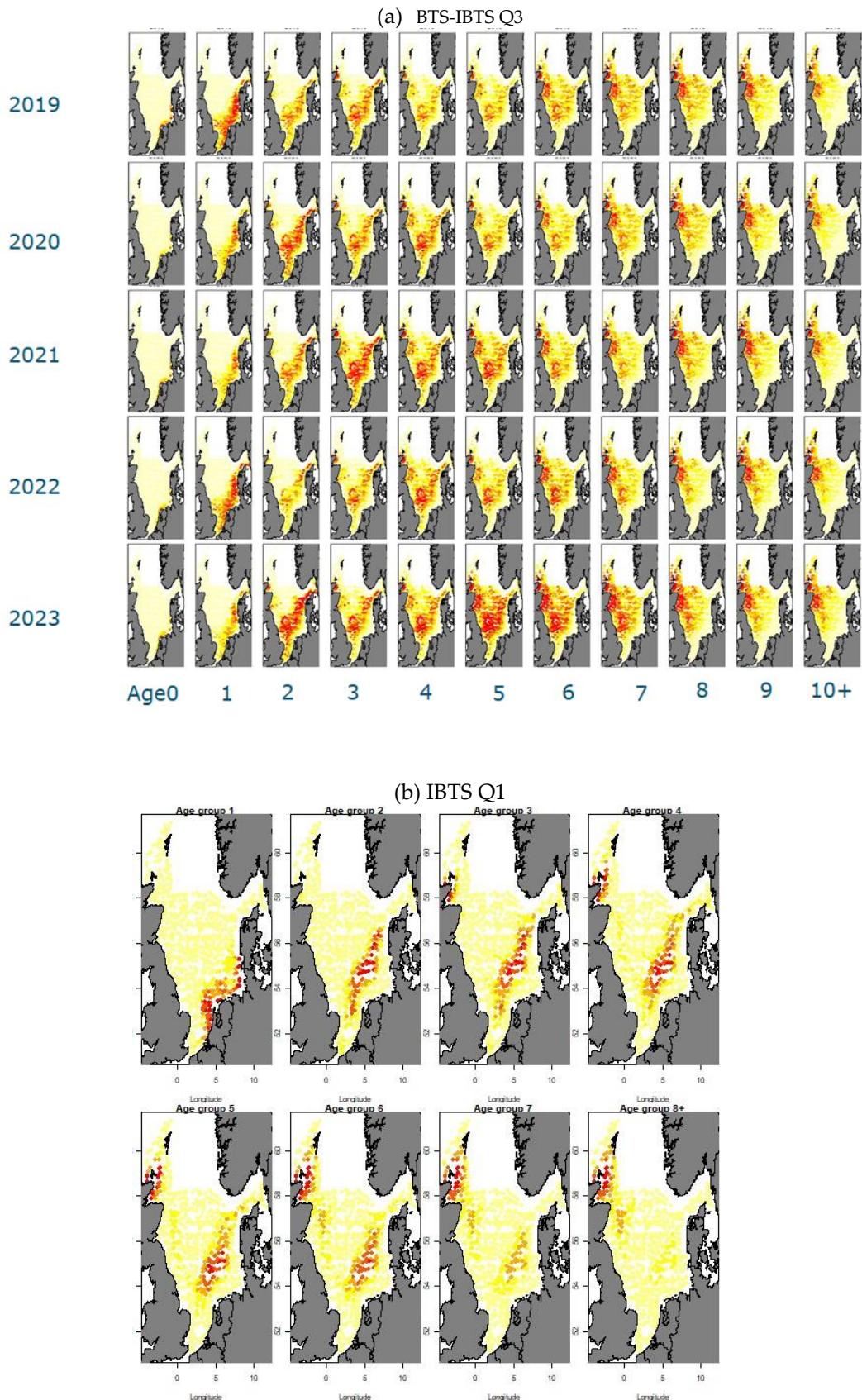


Figure 13.2.11. Plaice in Subarea 4 and Subdivision 20. The abundance map per age for (a) BTS-IBTS Q3 (2019-2023), (b) IBTS-Q1, estimated using delta-GAM method. BTS-IBTS Q3 includes age 0-10+. IBTS Q1 includes age 1-8+. Abundance decreasing from red to white colour.

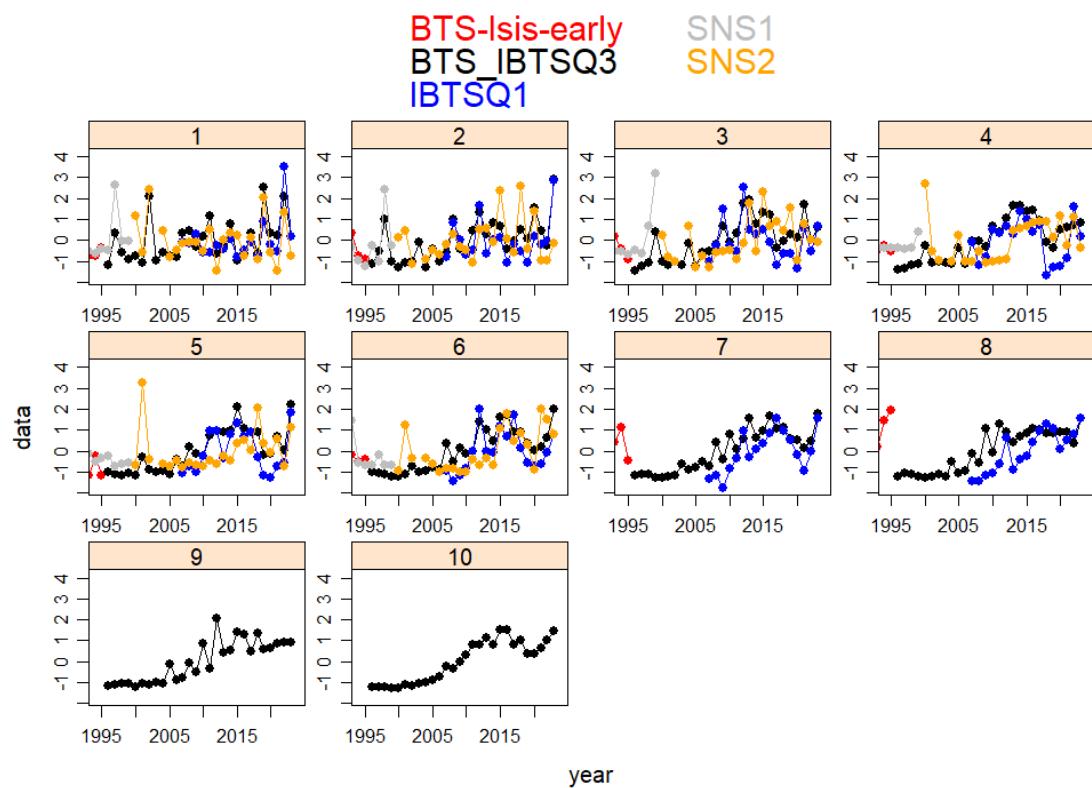


Figure 13.2.12. Plaice in Subarea 4 and Subdivision 20. Standardized survey tuning indices used for tuning stock assessment model: BTS-IBTS Q3 combined (1996–2023, black), BTS-Isis-early (1985–1995, red), IBTS Q1 (2007–2023, blue), SNS-1 (1970–1999, gray), and SNS-2 (2000–2023, yellow). Note: only ages used in the assessment are presented. Time series are presented only from 1993.

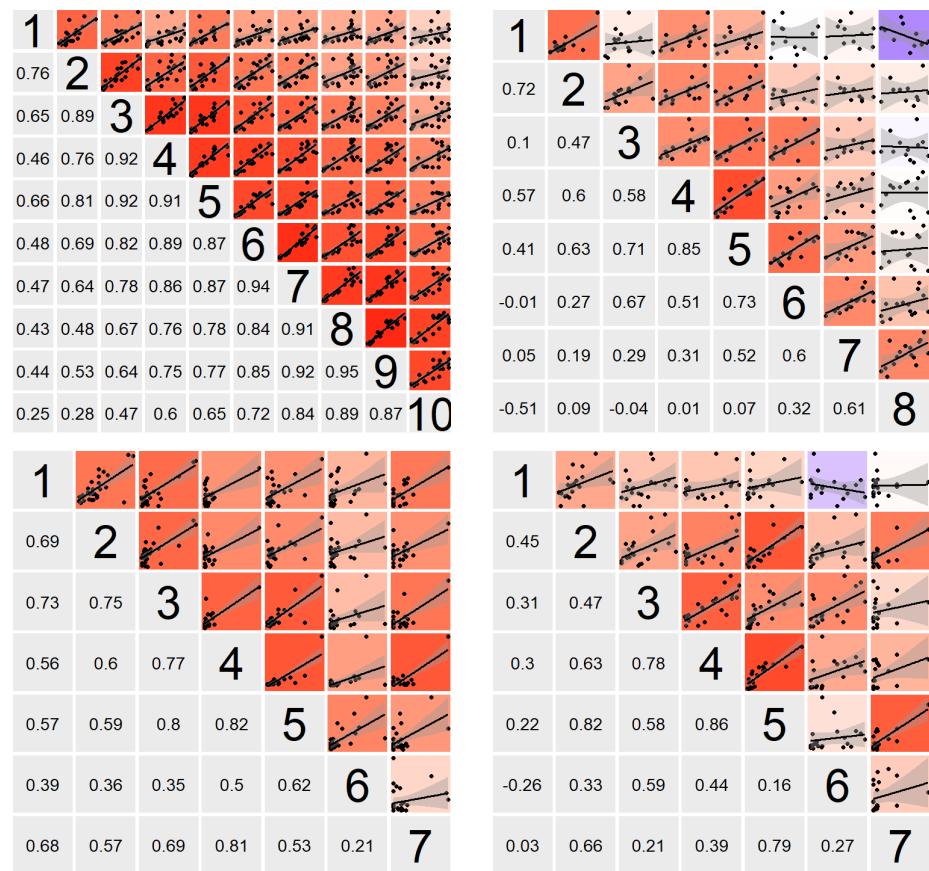


Figure 13.2.13. Plaice in Subarea 4 and Subdivision 20. Internal consistency plot for surveys. top left: BTS-IBTSQ3; top right: IBTS-Q1, bottom left: SNS1 1970-1999; bottom right: SNS2 2000-now

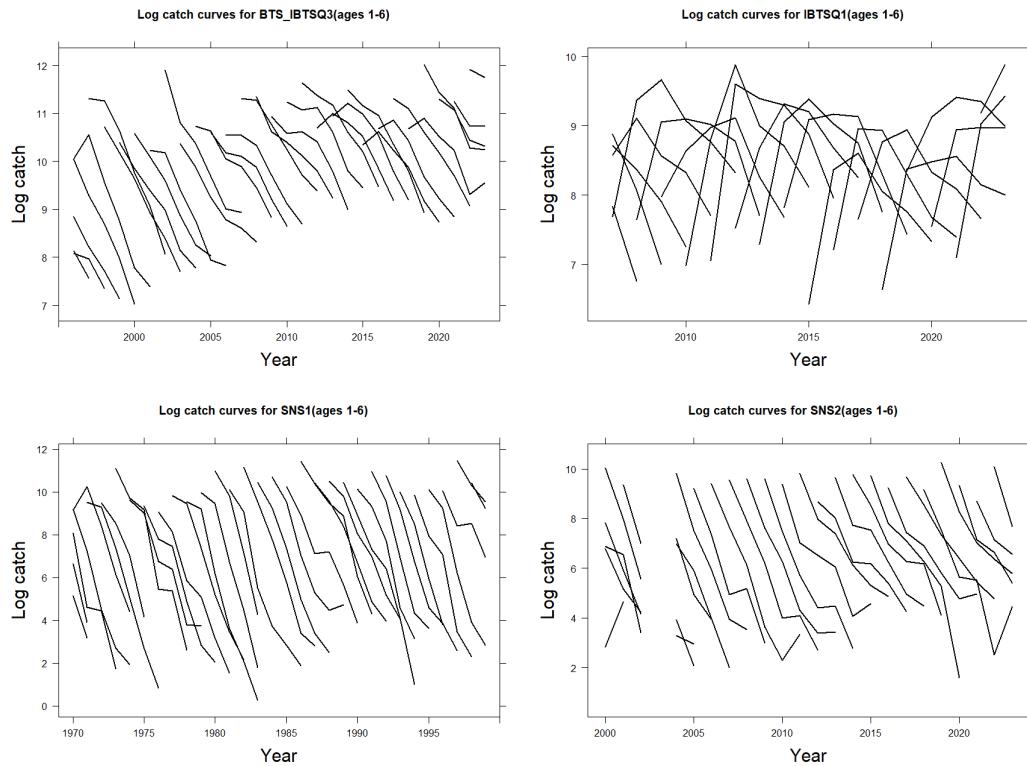


Figure 13.2.14. Plaice in Subarea 4 and Subdivision 20. Catch curves for Surveys in age 1–6.

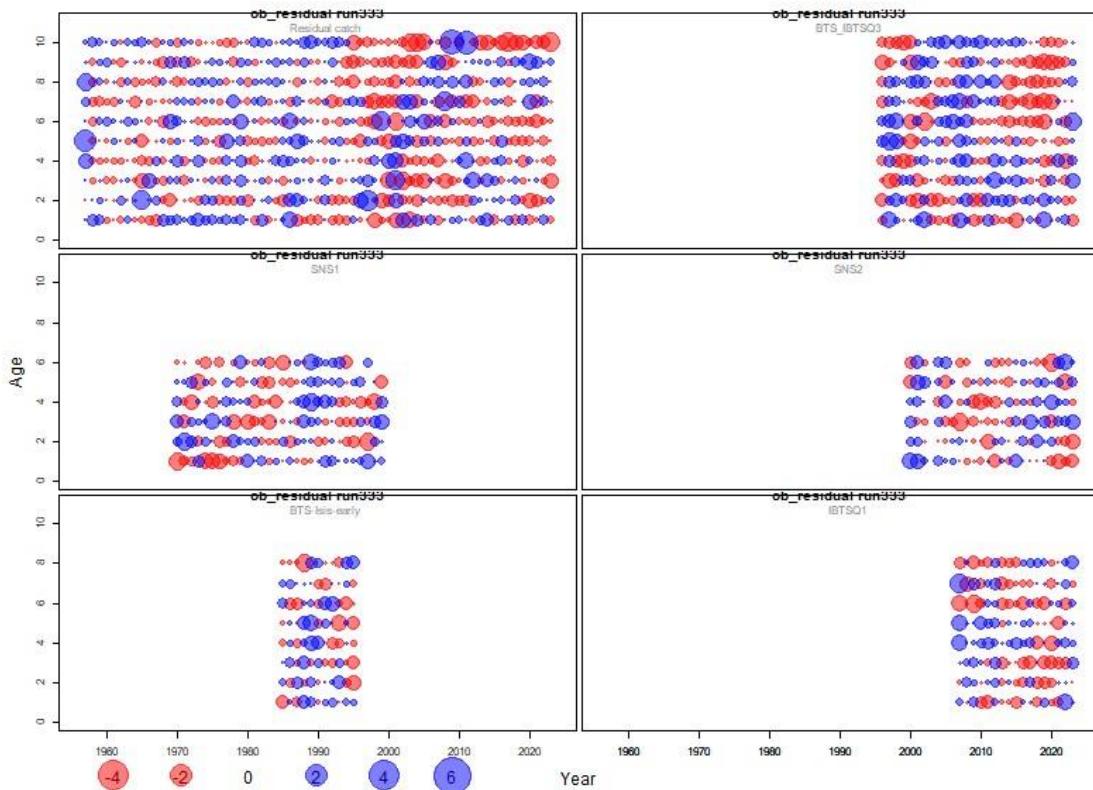


Figure 13.3.1. Plaice in Subarea 4 and Subdivision 20. Standardized one step ahead observation residuals for catch and survey indices. Positive values are in blue and negative values are in red.



Figure 13.3.2. Plaice in Subarea 4 and Subdivision 20. Process error for $\log N$ and $\log F$. Positive values are in blue and negative values are in red.

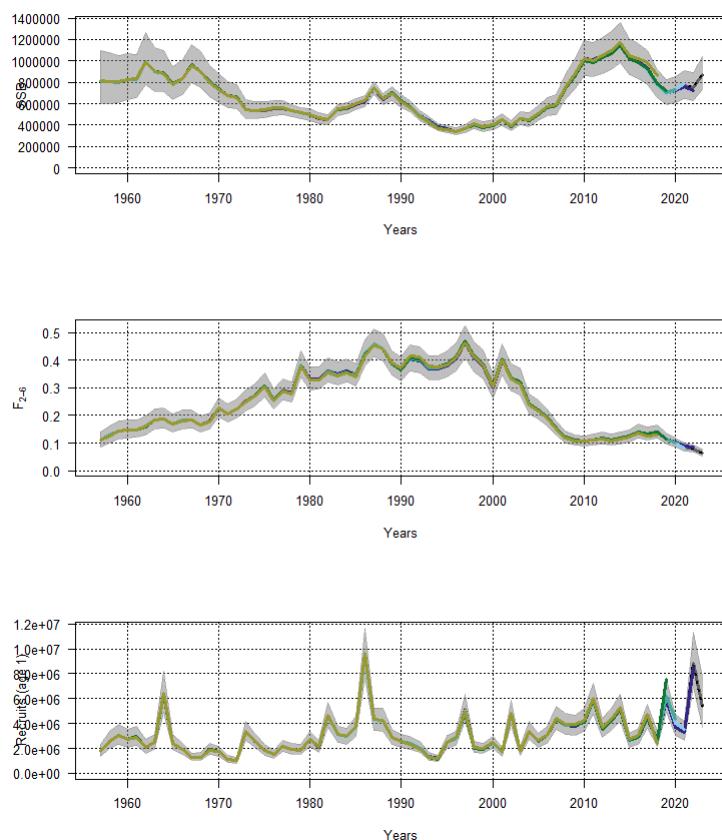


Figure 13.3.3. Plaice in Subarea 4 and Subdivision 20. Retrospective analysis for SSB (Mohn's rho=0.029), recruitment (Mohn's rho=0.052) and F (Mohn's rho=0.003).

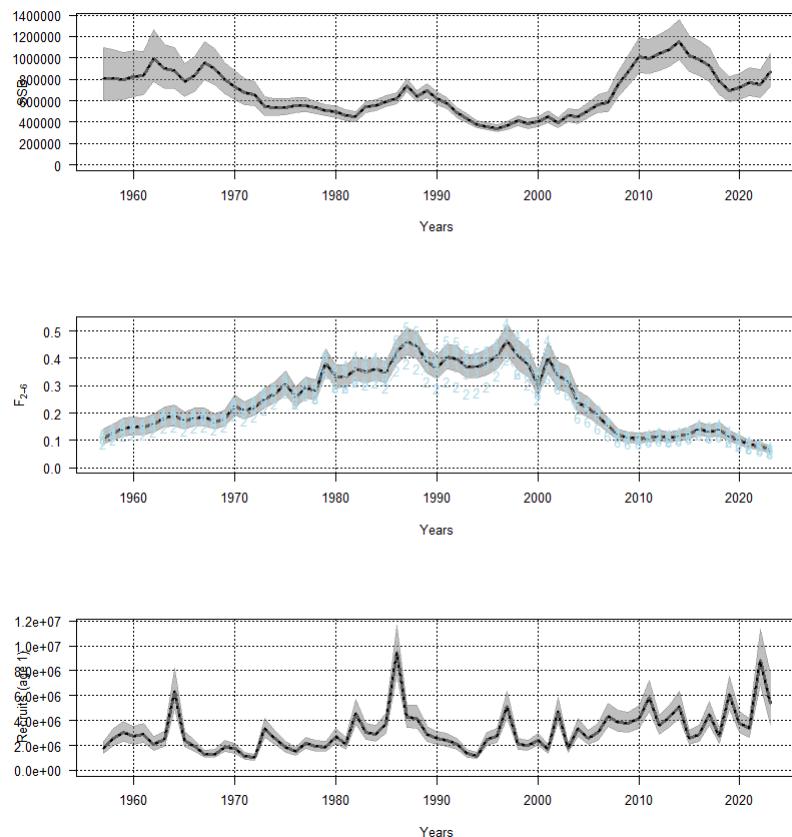


Figure 13.3.4. Plaice in Subarea 4 and Subdivision 20. Stock assessment output for ple.27.420. SSB (top), fishing mortality (middle), recruitment (bottom) estimates of the assessment.

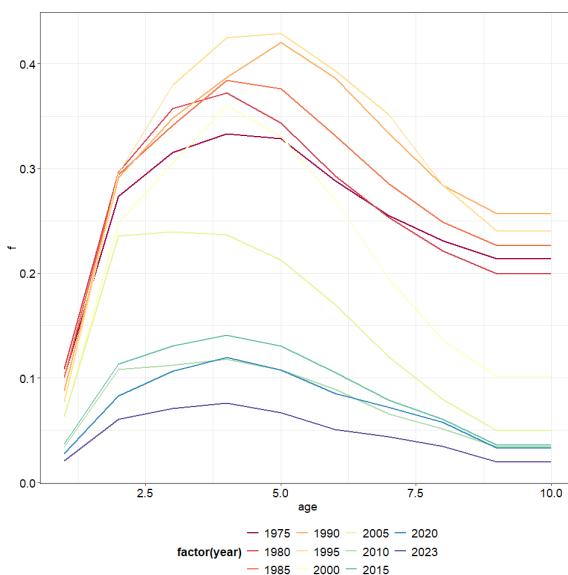


Figure 13.3.5. Plaice in Subarea 4 and Subdivision 20. Estimated fishing mortality by age since 1975.

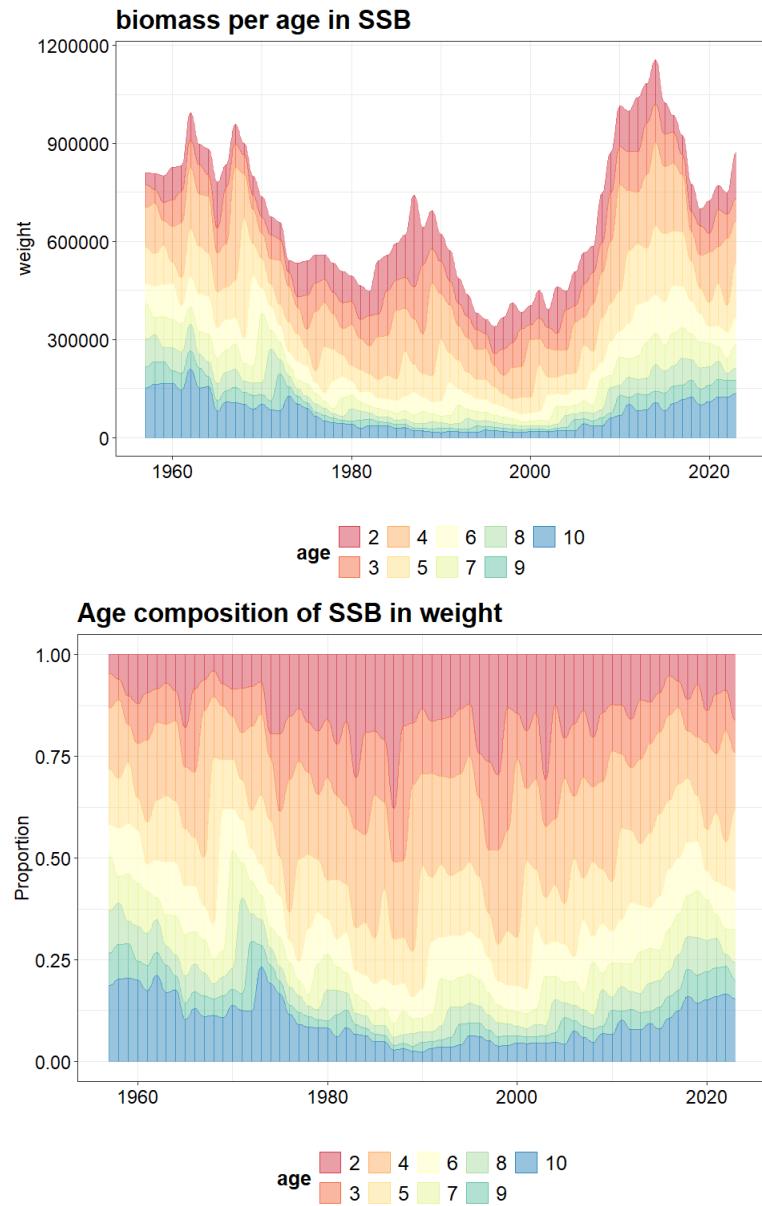


Figure 13.3.6. Plaice in Subarea 4 and Subdivision 20. Age compositions in the estimated SSB.

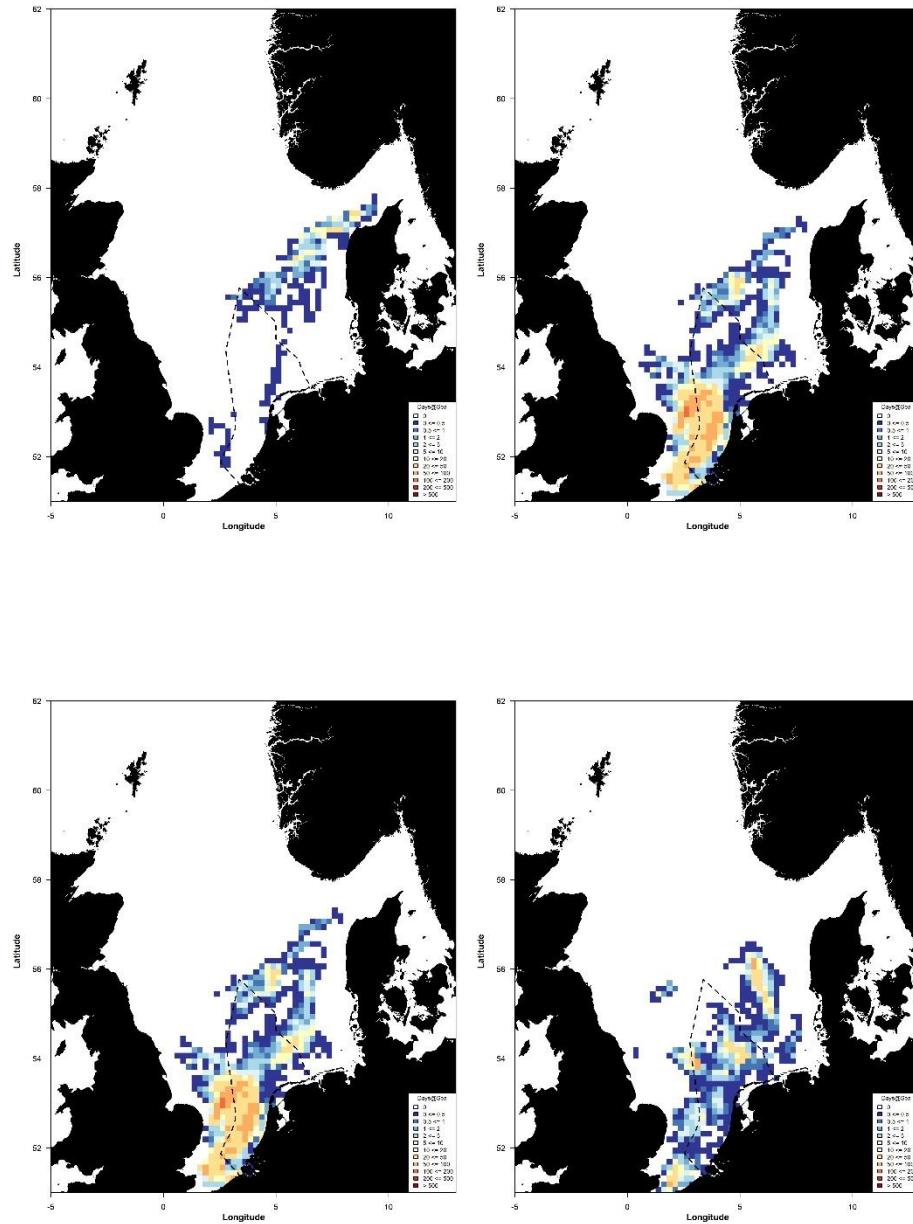


Figure 13.3.7. Plaice in Subarea 4 and Subdivision 20. Spatial distribution of fishing effort (hours fished) from The Netherlands in 2023: top left: BT1 fleet; top right: BT2 fleet; bottom left: TR1 fleet; bottom right: TR2 fleet. BT2 and TR1 are the two major gears in catching plaice in North Sea.

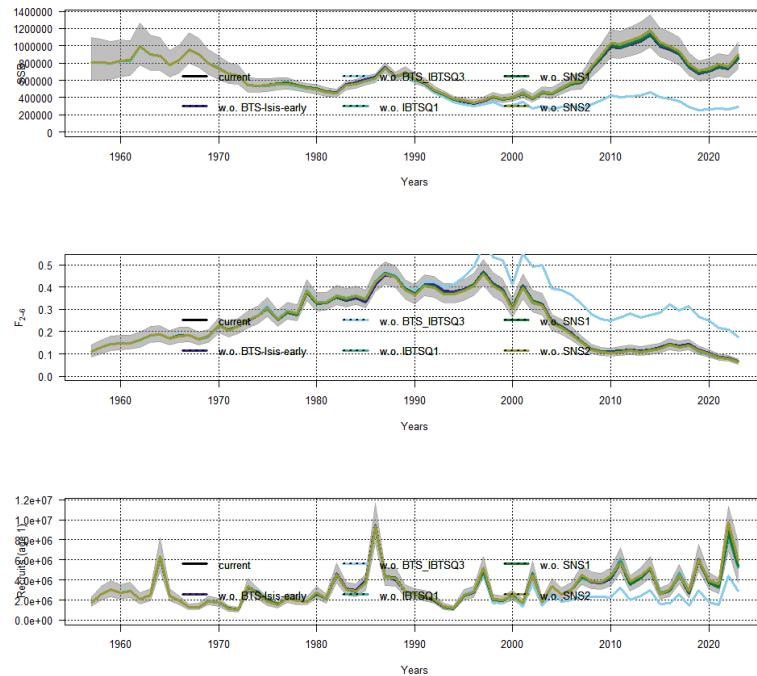


Figure 13.3.8. Plaice in Subarea 4 and Subdivision 20. Leave one out runs.

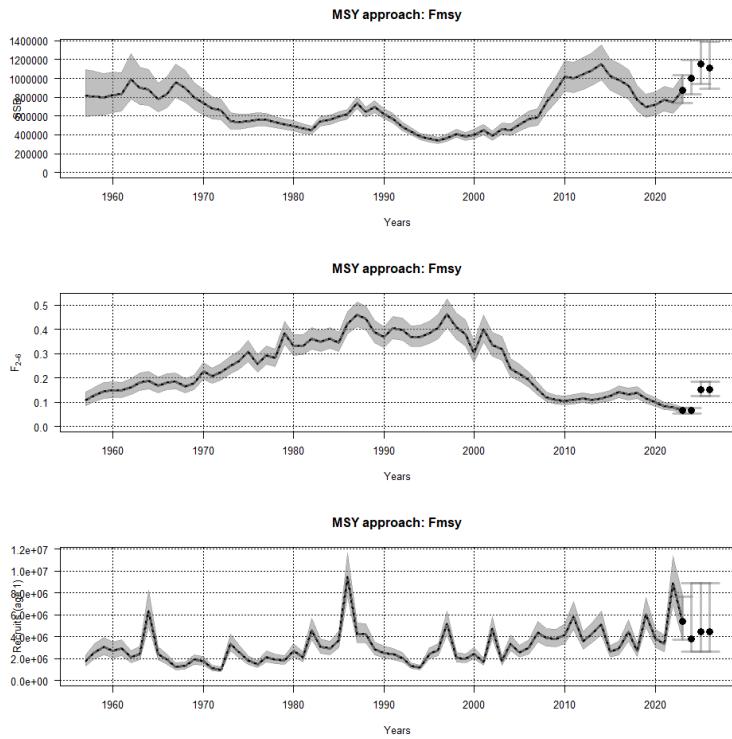


Figure 13.3.9. Plaice in Subarea 4 and Subdivision 20. Stock short term forecast under F_{MSY} option.

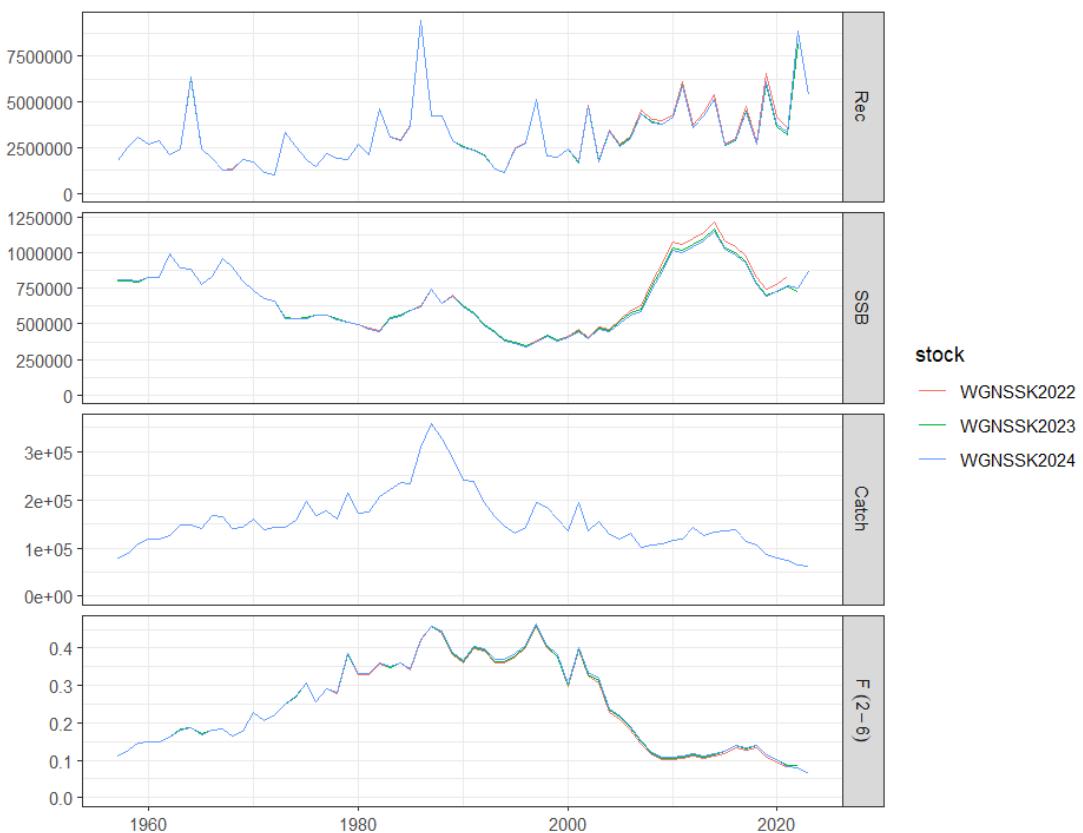
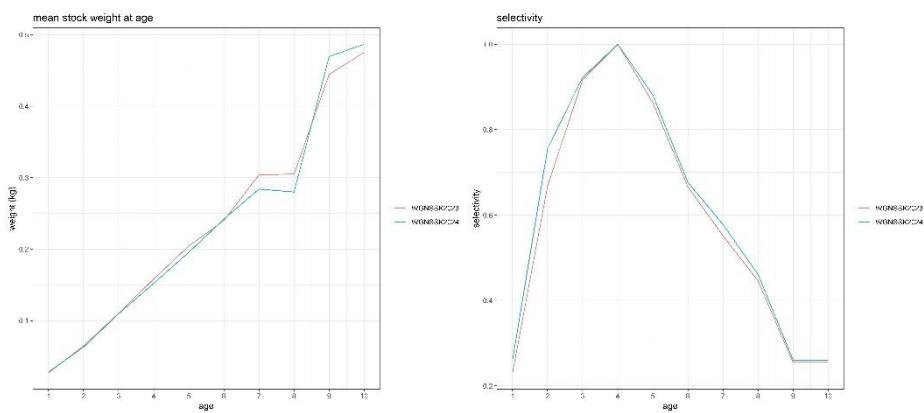


Figure 13.3.10. Plaice in Subarea 4 and Subdivision 20. Comparison between the assessment carried out during WGNSSK 2024 and previous years WGNSSK assessments.



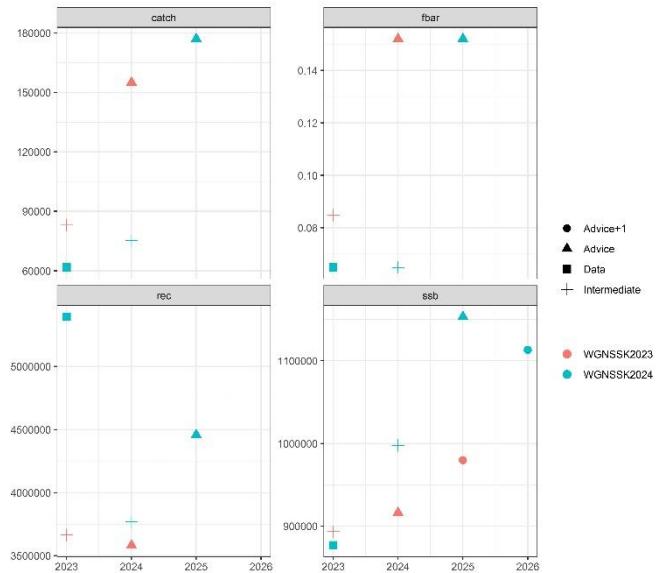


Figure 13.3.11. Plaice in Subarea 4 and Subdivision 20. Forecast assumptions comparison between the assessment carried out during WGNSSK 2023 and WGNSSK 2024. Top left: stock mean weight; top right: selectivity; bottom: catch, Fbar, R, SSB.

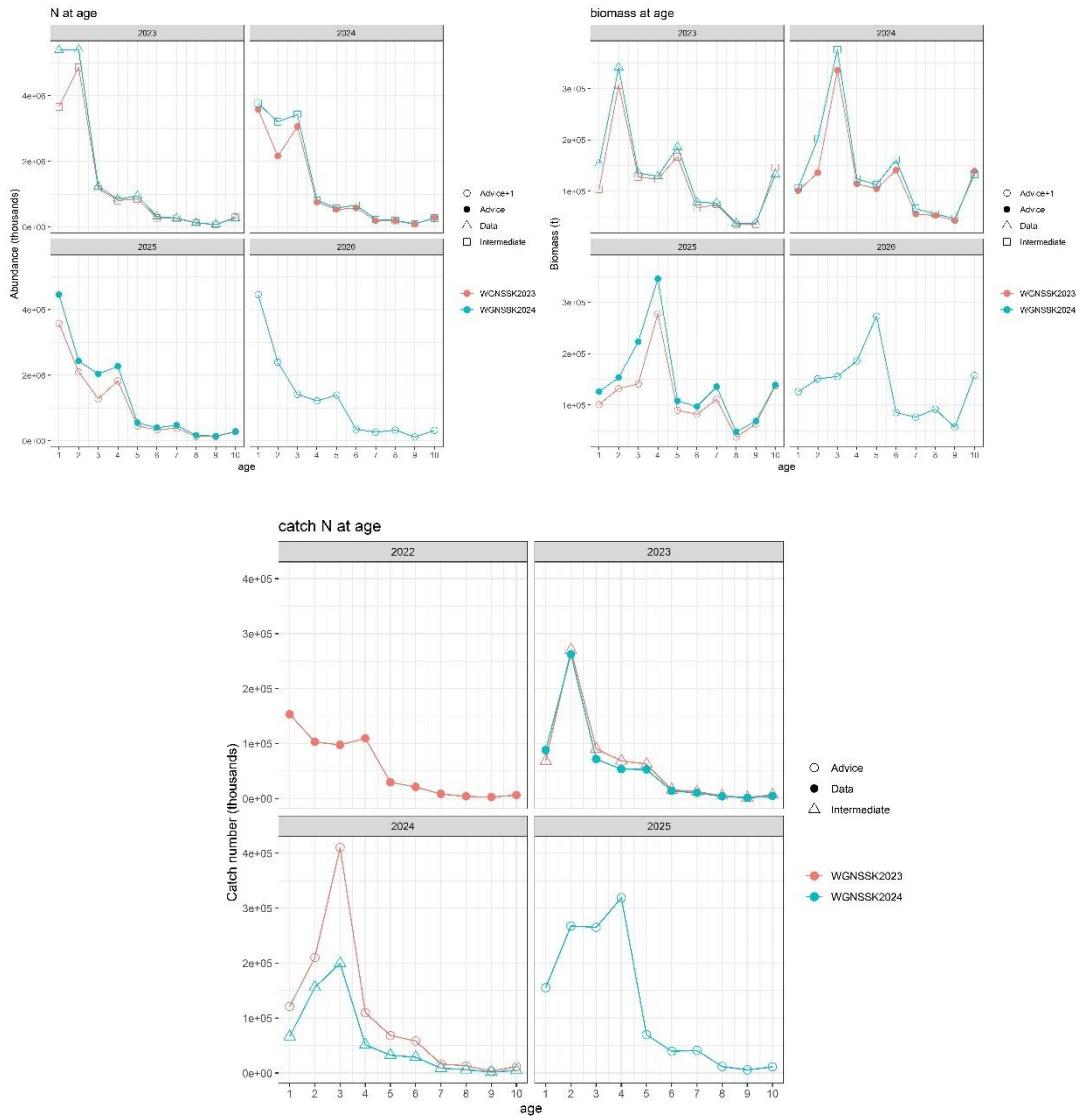


Figure 13.3.12. Plaice in Subarea 4 and Subdivision 20. Comparison between the assessment and forecast carried out during WGNSSK 2023 and WGNSSK 2024. Top left: numbers at age; top right: biomass at age; bottom: catch number at age.

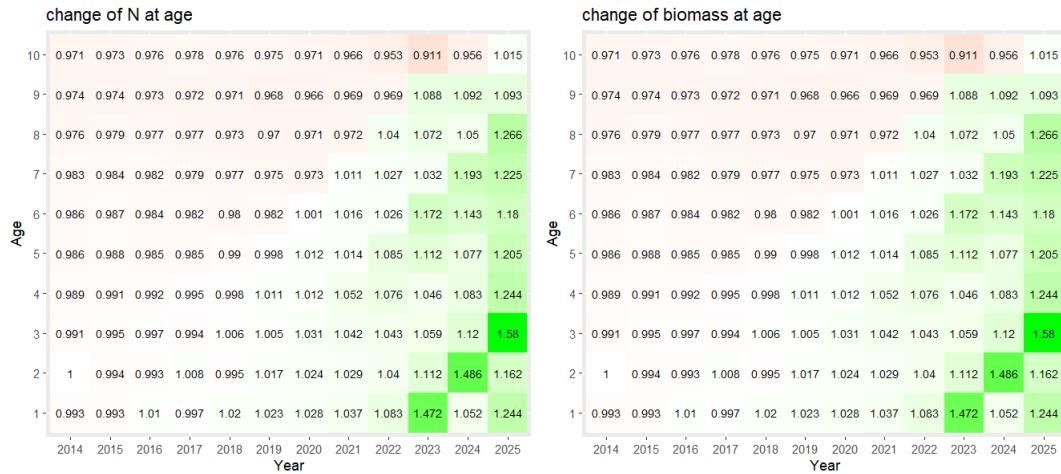


Figure 13.3.13. Plaice in Subarea 4 and Subdivision 20. Comparison between the assessment and forecast carried out during WGNSSK 2023 and WGNSSK 2024. Left: ratio of N-at-age from assessment and forecast at WGNSSK 2024 / N-at-age from assessment and forecast at WGNSSK 2023; Right: ratio of biomass-at-age from assessment and forecast at WGNSSK 2024 / biomass-at-age from assessment and forecast at WGNSSK 2023.

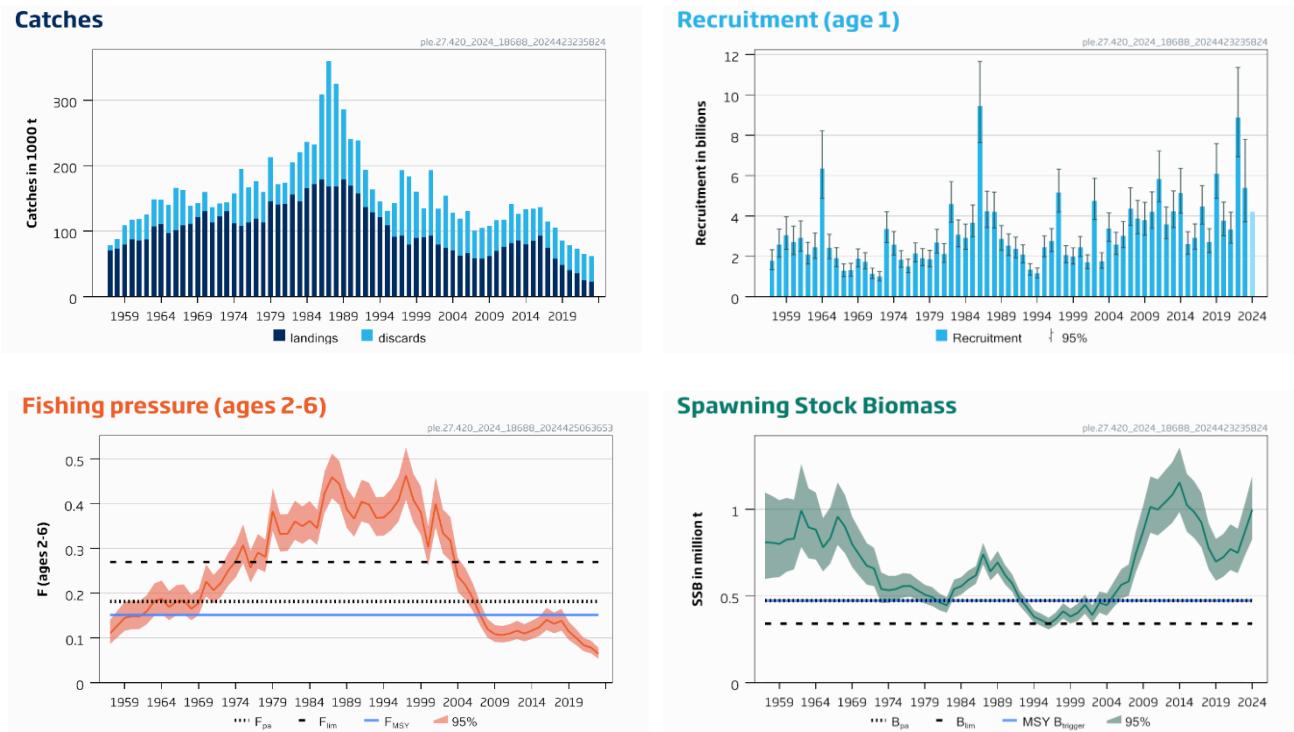


Figure 13.4.1. Plaice in Subarea 4 and Subdivision 20. Stock development over time.

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