

## Sole (*Solea solea*) in subdivisions 20–24 (Skagerrak and Kattegat, western Baltic Sea)

### ICES advice on fishing opportunities

ICES advises that when the maximum sustainable yield (MSY) approach and precautionary considerations are applied, there should be zero catch in 2026.

### Non-fisheries conservation considerations

Conservation aspects and associated management measures may exist at a national or regional level but were not reviewed by ICES.

### Stock development over time

Fishing pressure on the stock is below  $F_{MSY}$  and  $F_{PA}$ , and spawning-stock biomass (SSB) is below  $MSY B_{trigger}$ ,  $B_{PA}$ , and  $B_{lim}$ .

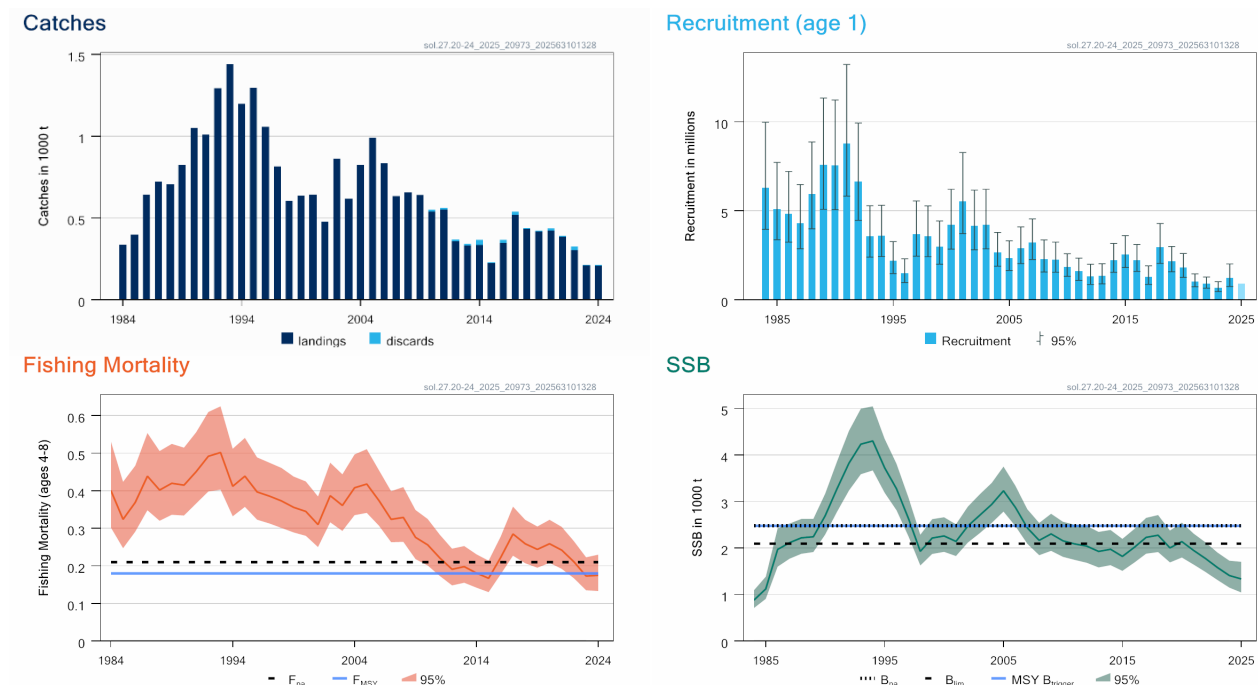


**Figure 1** Sole in subdivisions 20–24. Summary of the stock assessment. The assumed recruitment value for 2025 is shaded in a lighter color. Discards are only available since 2010.

### Catch scenarios

**Table 1** Sole in subdivisions 20–24. Values in the forecast and for the interim year.

| Variable                           | Value | Notes                                                     |
|------------------------------------|-------|-----------------------------------------------------------|
| $F_{ages\ 4-8}$ (2025)             | 0.175 | $F_{sq} = F_{(2024)}$                                     |
| Spawning-stock biomass (SSB; 2026) | 1 353 | Short-term forecast; tonnes                               |
| $R_{age1}$ (2025–2026)             | 915   | Median resampled recruitment (2022–2024); thousands       |
| Projected landings (2025)          | 204   | Short-term forecast; assuming $F_{sq}$ in 2025; tonnes    |
| Projected discards (2025)          | 6     | Assuming average discard rate of 2.9% (2020–2024); tonnes |
| Total catch (2025)                 | 210   | Short-term forecast using $F_{sq}$ plus discards; tonnes  |

**Table 2** Sole in subdivisions 20–24. Annual catch scenarios. Weights are in tonnes.

| Basis                                                                                                     | Total catch* (2026) | Projected landings (2026) | Projected discards (2026) | F <sub>ages 4–8</sub> projected landings (2026) | SSB (2027) | % SSB change ** | % total allowable catch (TAC) change <sup>^</sup> | % advice change <sup>^^</sup> | Probability (SSB (2027) < B <sub>lim</sub> ) |
|-----------------------------------------------------------------------------------------------------------|---------------------|---------------------------|---------------------------|-------------------------------------------------|------------|-----------------|---------------------------------------------------|-------------------------------|----------------------------------------------|
| ICES advice basis                                                                                         |                     |                           |                           |                                                 |            |                 |                                                   |                               |                                              |
| Maximum sustainable yield (MSY) approach, zero catch                                                      | 0                   | 0                         | 0                         | 0                                               | 1 517      | 12.1            | –100                                              | –100                          | 97                                           |
| Other scenarios                                                                                           |                     |                           |                           |                                                 |            |                 |                                                   |                               |                                              |
| EU multiannual plan (MAP) <sup>#</sup> : F <sub>MSY</sub> × SSB <sub>2026</sub> /MSY B <sub>trigger</sub> | 119                 | 116                       | 3                         | 0.099                                           | 1 398      | 3.3             | –43                                               | –72                           | 99                                           |
| ^^^EU MAP <sup>#</sup> : F <sub>lower</sub> × SSB <sub>2026</sub> /MSY B <sub>trigger</sub>               | 91                  | 88                        | 3                         | 0.074                                           | 1 430      | 5.7             | –57                                               | –72                           | 99                                           |
| ^^^EU MAP <sup>#</sup> : F <sub>upper</sub> × SSB <sub>2026</sub> /MSY B <sub>trigger</sub>               | 136                 | 132                       | 4                         | 0.114                                           | 1 381      | 2.1             | –35                                               | –68                           | 99                                           |
| F <sub>MSY</sub>                                                                                          | 210                 | 204                       | 6                         | 0.182                                           | 1 304      | –3.6            | 0.46                                              | –51                           | 100                                          |
| F <sub>PA</sub>                                                                                           | 239                 | 232                       | 7                         | 0.21                                            | 1 275      | –5.8            | 14.2                                              | –44                           | 100                                          |
| ^^^MAP range F <sub>upper</sub>                                                                           | 238                 | 231                       | 7                         | 0.21                                            | 1 276      | –5.7            | 14.2                                              | –45                           | 100                                          |
| ^^^MAP range F <sub>lower</sub>                                                                           | 161                 | 156                       | 5                         | 0.136                                           | 1 354      | 0.07            | –23                                               | –50                           | 100                                          |
| Total allowable catch (TAC) 2025 × 1.2                                                                    | 251                 | 244                       | 7                         | 0.22                                            | 1 261      | –6.8            | 20                                                | –42                           | 100                                          |
| <sup>§</sup> SSB (2027) = B <sub>lim</sub>                                                                | –                   | –                         | –                         | –                                               | –          | –               | –                                                 | –                             | –                                            |
| <sup>§</sup> SSB (2027) = B <sub>PA</sub>                                                                 | –                   | –                         | –                         | –                                               | –          | –               | –                                                 | –                             | –                                            |
| <sup>§</sup> SSB (2027) = MSY B <sub>trigger</sub>                                                        | –                   | –                         | –                         | –                                               | –          | –               | –                                                 | –                             | –                                            |
| SSB(2027) = SSB(2026)                                                                                     | 169                 | 164                       | 5                         | 0.140                                           | 1 346      | –0.52           | –19.2                                             | –61                           | 100                                          |
| SSB(2027)=SSB(2026)+10%                                                                                   | 33                  | 32                        | 1                         | 0.026                                           | 1 488      | 10.0            | –84                                               | –92                           | 98                                           |
| <sup>§</sup> p(SSB [2027] < B <sub>lim</sub> ) < 5%                                                       | –                   | –                         | –                         | –                                               | –          | –               | –                                                 | –                             | –                                            |
| F = F <sub>2025</sub>                                                                                     | 203                 | 197                       | 6                         | 0.182                                           | 1 313      | –3.0            | –3.0                                              | –53                           | 100                                          |

<sup>#</sup> EU multiannual plan (MAP) for the North Sea (EU, 2018).

\* Total catch is calculated based on projected landings and assuming 2.9% discard ratio (in weight).

\*\* SSB 2027 relative to SSB 2026.

<sup>^</sup> Total advised catch in 2026 relative to the TAC in 2025 (209 tonnes).

<sup>^^</sup> Advice value 2026 relative to the advice value 2025 (429 tonnes).

<sup>^^^</sup> ICES advice change for F<sub>lower</sub> and F<sub>upper</sub> in 2026 relative to ICES advice F<sub>lower</sub> and F<sub>upper</sub> in 2025 (322 and 429 tonnes, respectively).

<sup>§</sup> Options left blank because B<sub>lim</sub>, B<sub>PA</sub>, and MSY B<sub>trigger</sub> cannot be achieved in 2027, even with zero catch in 2026.

There is no fishing mortality value that can bring the stock above B<sub>lim</sub> with a probability higher than 50%; hence, the advice for 2026 is zero catch.

### Basis of the advice

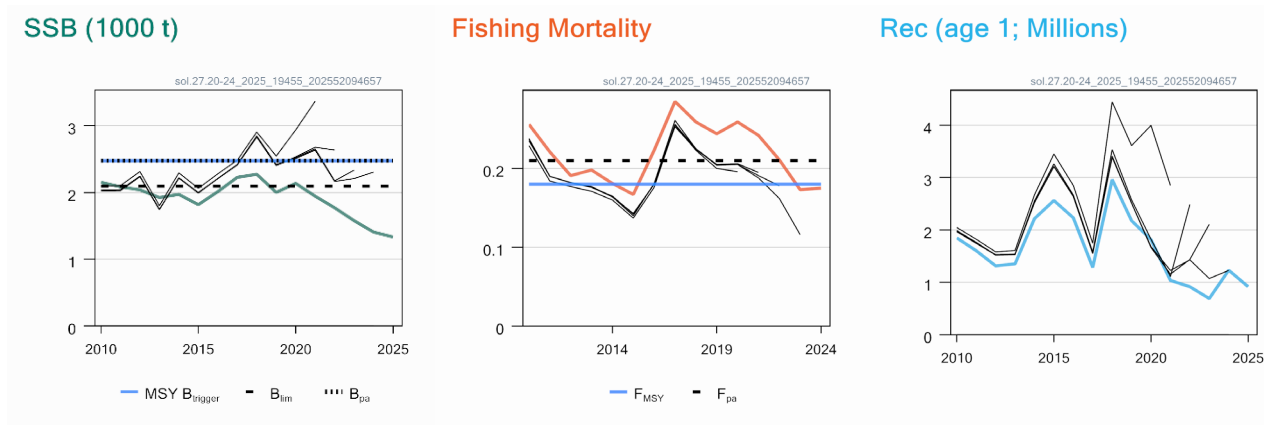
**Table 3** Sole in subdivisions 20–24. The basis of the advice.

| Advice basis    | EU multiannual plan (MAP) for stocks in the North Sea (EU, 2018)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Management plan | The MAP for stocks in the North Sea and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the F <sub>MSY</sub> range for the stock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                 | <p>In accordance with the MAP, catches higher than those corresponding to F<sub>MSY</sub> can only be taken provided that spawning-stock biomass (SSB) is greater than MSY B<sub>trigger</sub> and that one of the following conditions is met:</p> <ul style="list-style-type: none"> <li>taking the higher catches is necessary for the achievement of mixed-fisheries objectives;</li> <li>to avoid serious harm to a stock caused by intra- or inter-species stock dynamics; or</li> <li>to limit variations in fishing opportunities between consecutive years to no more than 20%.</li> </ul> <p>ICES considers that the F<sub>MSY</sub> range for this stock used in the MAP is precautionary.</p> |

### Quality of the assessment

The survey index used in the assessment has been updated using a method that incorporates expanded survey areas since 2016, primarily in the Skagerrak and the Belts. As the coverage of the new survey index has improved, it is considered to provide a better reflection of the stock dynamics than the index used previously. For the older age groups, the revised index shows lower values in recent years. The revised survey index has led to a significant change in stock perception, with lower SSB and higher fishing mortality over the past decade. This shift in stock development necessitated a re-estimation of the reference points.

**Figure 2** Sole in subdivisions 20–24. Historical assessment results (final-year recruitment assumptions included for each line).



The reference points were revised in 2025 and only the last assessment results should be compared to the reference points indicated.

### Issues relevant for the advice

It is noted that the advised catches have not been fully taken for most of the time-series, likely because of the combination of low stock size and rules restricting bycatch of other species. SSB has continued to decrease; therefore, factors other than fishing pressure have likely contributed to the stock's reduced productivity. Recruitment has continuously declined over decades and is in recent years at an historic low.

SSB is not expected to rebuild to above  $B_{lim}$  in the short term. Even with no catches in 2026, SSB is estimated to only increase by 12% in 2027, which is still far below  $B_{lim}$ .

### Reference points

**Table 4** Sole in subdivisions 20–24. Reference points, values, and their technical basis. Weights are in tonnes.

| Framework                                | Reference point       | Value | Technical basis                                                                                                                                       | Source      |
|------------------------------------------|-----------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Maximum sustainable yield (MSY) approach | MSY $B_{trigger}$     | 2 477 | $B_{PA}$                                                                                                                                              | ICES (2025) |
|                                          | $F_{MSY}$             | 0.182 | Stochastic simulations (EqSim), based on the recruitment period 1992–2024 with a segmented regression                                                 | ICES (2025) |
| Precautionary approach                   | $B_{lim}$             | 2 094 | Empirical $B_{lim}$ . The average of three lowest spawning-stock biomass (SSB) values (1998, 1999, 2001) that resulted in an above median recruitment | ICES (2025) |
|                                          | $B_{PA}$              | 2 477 | $B_{lim} \times \exp(1.645 \times \sigma)$ , $\sigma = 0.102$ ; in tonnes.                                                                            | ICES (2025) |
|                                          | $F_{PA}$              | 0.21  | $F_{P05}$ ; the F that leads to $SSB \geq B_{lim}$ with 95% probability                                                                               | ICES (2025) |
| Management plan*                         | MAP $B_{MGT}$         | 2 477 | MSY $B_{trigger}$                                                                                                                                     | ICES (2025) |
|                                          | MAP $B_{lim}$         | 2 094 | $B_{lim}$                                                                                                                                             | ICES (2025) |
|                                          | MAP $F_{MSY}$         | 0.182 | $F_{MSY}$                                                                                                                                             | ICES (2025) |
|                                          | MAP range $F_{lower}$ | 0.136 | Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY                                                    | ICES (2025) |
|                                          | MAP range $F_{upper}$ | 0.21  | Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY                                                    | ICES (2025) |
|                                          |                       |       |                                                                                                                                                       |             |

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

## Basis of the assessment

**Table 5** Sole in subdivisions 20–24. Basis of the assessment and advice.

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ICES stock data category | 1 ( <a href="#">ICES, 2023</a> )                                                                                                                                                                                                                                                                                                                                                                               |
| Assessment type          | Age-based analytical stochastic assessment (SAM) that uses landings only in the model. Discards are included in the forecast (ICES, 2024).                                                                                                                                                                                                                                                                     |
| Input data               | Commercial catches (international landings, ages and length frequencies from catch sampling); one survey index (Fishermen–DTU Aqua sole survey, 2004–2024, [G4052]); two commercial indices, private logbook gillnetters (1994–2007) and private logbook trawlers (1987–2008); fixed maturity and fixed natural mortality (0.1) for all age groups. Annual varying stock/catch weight-at-age data (1984–2024). |
| Discards and bycatch     | Used to provide advice but not included in the assessment. Discard information available since 2000, average discard ratio by weight in 2020–2024 is 2.9%.                                                                                                                                                                                                                                                     |
| Indicators               | None                                                                                                                                                                                                                                                                                                                                                                                                           |
| Other information        | Stock interbenchmarked in 2015 (ICES, 2015). Survey index revised in 2025. Reference points re-estimated in 2025.                                                                                                                                                                                                                                                                                              |
| Working group            | Baltic Fisheries Assessment Working Group ( <a href="#">WGBFAS</a> )                                                                                                                                                                                                                                                                                                                                           |

\* [View Assessment in Transparent Assessment Framework \(TAF\)](#).

## History of the advice, catch, and management

**Table 6** Sole in subdivisions 20–24. History of ICES advice, agreed total allowable catch (TAC), and ICES estimates of landings and discards. Weights are in tonnes.

| Year | ICES advice                        | Catch corresponding to advice | Landings corresponding to advice | Agreed TAC* | ICES landings | ICES discards** |
|------|------------------------------------|-------------------------------|----------------------------------|-------------|---------------|-----------------|
| 1987 | -                                  | -                             | -                                | 850         | 722           | -               |
| 1988 | -                                  | -                             | -                                | 950         | 706           | -               |
| 1989 | TAC                                | -                             | < 800                            | 800         | 824           | -               |
| 1990 | Precautionary TAC                  | -                             | 600                              | 500         | 1 050         | -               |
| 1991 | TAC                                | -                             | 1 000                            | 1 000       | 1 001         | -               |
| 1992 | TAC                                | -                             | 1 000                            | 1 400       | 1 282         | -               |
| 1993 | TAC at recent catch levels         | -                             | 1 000                            | 1 600       | 1 448         | -               |
| 1994 | No advice due to uncertain catches | -                             | -                                | 2 100       | 1 198         | -               |
| 1995 | No advice                          | -                             | -                                | 2 250       | 1 297         | -               |
| 1996 | No advice                          | -                             | -                                | 2 250       | 1 059         | -               |
| 1997 | No advice                          | -                             | -                                | 2 250       | 814           | -               |
| 1998 | No advice                          | -                             | -                                | 1 800       | 605           | -               |
| 1999 | No increase in F                   | -                             | 800                              | 1 350       | 637           | -               |
| 2000 | No increase in F                   | -                             | 650                              | 950         | 645           | 169             |
| 2001 | No increase in F                   | -                             | 700                              | 700         | 478           | -               |
| 2002 | F below $F_{PA}$                   | -                             | 500                              | 500         | 862           | 10              |
| 2003 | F below $F_{PA}$                   | -                             | 300                              | 350         | 618           | 43              |
| 2004 | F below $F_{PA}$                   | -                             | 500                              | 520         | 824           | -               |
| 2005 | No increase in F                   | -                             | 850                              | 900         | 990           | -               |
| 2006 | F below $F_{PA}$                   | -                             | 820                              | 900         | 836           | -               |
| 2007 | Limit catches to 2002–2005 average | -                             | 740                              | 900         | 633           | -               |
| 2008 | F below $F_{PA}$                   | -                             | 970                              | 940         | 655           | -               |
| 2009 | F below $F_{PA}$                   | -                             | 800                              | 800         | 641           | -               |
| 2010 | F below $F_{PA}$                   | -                             | 620                              | 700         | 538           | 14              |
| 2011 | See scenarios                      | -                             | -                                | 840         | 552           | 8               |

| Year | ICES advice                                                                                                          | Catch corresponding to advice                                             | Landings corresponding to advice | Agreed TAC* | ICES landings | ICES discards** |
|------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------|-------------|---------------|-----------------|
| 2012 | Maximum sustainable yield (MSY) framework                                                                            | -                                                                         | 610                              | 610***      | 358           | 11              |
| 2013 | MSY framework                                                                                                        | -                                                                         | 560                              | 590         | 332           | 10              |
| 2014 | MSY approach                                                                                                         | 353                                                                       | 353^                             | 350         | 335           | 32              |
| 2015 | MSY approach                                                                                                         | 211                                                                       | 205                              | 205         | 224           | 6               |
| 2016 | MSY approach                                                                                                         | ≤ 394                                                                     | 379                              | 391         | 348           | 17              |
| 2017 | MSY approach                                                                                                         | ≤ 555                                                                     | -                                | 555         | 520           | 17              |
| 2018 | MSY approach                                                                                                         | ≤ 453                                                                     | -                                | 448         | 434           | 7               |
| 2019 | Proposed multiannual plan (MAP) F ranges, $F_{lower}$ to $F_{upper}$                                                 | 422–562                                                                   | -                                | 502         | 417           | 8               |
| 2020 | MAP target F ranges: $F_{lower}$ to $F_{upper}$ , but F higher than $F_{MSY}$ only under conditions specified in MAP | 452–600, but catch higher than 539 only under conditions specified in MAP |                                  | 533         | 424           | 12              |
| 2021 | Management plan                                                                                                      | 596 (range 502–665)                                                       |                                  | 596         | 387           | 6               |
| 2022 | Management plan                                                                                                      | 723 (range 544– 723)                                                      |                                  | 715         | 302           | 23              |
| 2023 | Management plan                                                                                                      | 504 (range 380– 504)                                                      |                                  | 498         | 211           | 2               |
| 2024 | Management plan                                                                                                      | 436 (range 327– 436)                                                      |                                  | 327         | 208           | 5               |
| 2025 | Management plan                                                                                                      | 429 (range 322 - 429)                                                     |                                  | 209         |               |                 |
| 2026 | MSY approach and precautionary considerations                                                                        | 0                                                                         |                                  |             |               |                 |

\* TAC applies to subdivisions 20–21 and the EC waters of subdivisions 22–32.

\*\* Discard estimates are not available for all years.

\*\*\* No more than 461 tonnes in subdivisions 20–21.

^ Discarding is assumed to be negligible.

## History of the catch and landings

**Table 7** Sole in subdivisions 20–24. Catch distribution by fleet in 2024 as estimated by ICES.

| Catch       | Landings         |                   | Discards |
|-------------|------------------|-------------------|----------|
| 212 tonnes* | Active gears 51% | Passive gears 49% | 5 tonnes |
|             | 208 tonnes       |                   |          |

\* Discrepancies between total catches and landings + discards result from rounding.

**Table 8** Sole in subdivisions 20–24. History of landings by country and area. Weights are in tonnes.

| Year  | Denmark  |           |       | Sweden                 | Germany                | Belgium   | Netherlands | Norway    | Total official landings | ICES estimated landings |
|-------|----------|-----------|-------|------------------------|------------------------|-----------|-------------|-----------|-------------------------|-------------------------|
|       | Kattegat | Skagerrak | Belts | Skagerrak and Kattegat | Kattegat and the Belts | Skagerrak | Skagerrak   | Skagerrak |                         |                         |
| 1952  | 156      |           |       | 51                     | 59                     |           |             |           | 266                     | 266                     |
| 1953  | 159      |           |       | 48                     | 42                     |           |             |           | 249                     | 249                     |
| 1954  | 177      |           |       | 43                     | 34                     |           |             |           | 254                     | 254                     |
| 1955  | 152      |           |       | 36                     | 35                     |           |             |           | 223                     | 223                     |
| 1956  | 168      |           |       | 30                     | 57                     |           |             |           | 255                     | 255                     |
| 1957  | 265      |           |       | 29                     | 53                     |           |             |           | 347                     | 347                     |
| 1958  | 226      |           |       | 35                     | 56                     |           |             |           | 317                     | 317                     |
| 1959  | 222      |           |       | 30                     | 44                     |           |             |           | 296                     | 296                     |
| 1960  | 294      |           |       | 24                     | 83                     |           |             |           | 401                     | 401                     |
| 1961  | 339      |           |       | 30                     | 61                     |           |             |           | 430                     | 430                     |
| 1962  | 356      |           |       |                        | 58                     |           |             |           | 414                     | 414                     |
| 1963  | 338      |           |       |                        | 27                     |           |             |           | 365                     | 365                     |
| 1964  | 376      |           |       |                        | 45                     |           |             |           | 421                     | 421                     |
| 1965  | 324      |           |       |                        | 50                     |           |             |           | 374                     | 374                     |
| 1966  | 312      |           |       |                        | 20                     |           |             |           | 332                     | 332                     |
| 1967  | 429      |           |       |                        | 26                     |           |             |           | 455                     | 455                     |
| 1968  | 290      |           |       |                        | 16                     |           |             |           | 306                     | 306                     |
| 1969  | 261      |           |       |                        | 7                      |           |             |           | 268                     | 268                     |
| 1970  | 158      | 25        |       |                        |                        |           |             |           | 183                     | 183                     |
| 1971  | 242      | 32        |       |                        | 9                      |           |             |           | 283                     | 283                     |
| 1972  | 327      | 31        |       |                        | 12                     |           |             |           | 370                     | 370                     |
| 1973  | 260      | 52        |       |                        | 13                     |           |             |           | 325                     | 325                     |
| 1974  | 388      | 39        |       |                        | 9                      |           |             |           | 436                     | 436                     |
| 1975  | 381      | 55        |       | 16                     | 16                     |           | 9           |           | 477                     | 468                     |
| 1976  | 367      | 34        |       | 11                     | 21                     | 2         | 155         |           | 590                     | 435                     |
| 1977  | 400      | 91        |       | 13                     | 8                      | 1         | 276         |           | 789                     | 513                     |
| 1978  | 336      | 141       |       | 9                      | 9                      |           | 141         |           | 636                     | 495                     |
| 1979  | 301      | 57        |       | 8                      | 6                      | 1         | 84          |           | 457                     | 373                     |
| 1980  | 228      | 73        |       | 9                      | 12                     | 2         | 5           |           | 329                     | 324                     |
| 1981  | 199      | 59        |       | 7                      | 16                     | 1         |             |           | 282                     | 282                     |
| 1982  | 147      | 52        |       | 4                      | 8                      | 1         | 1           |           | 213                     | 212                     |
| 1983  | 180      | 70        |       | 11                     | 15                     |           | 31          |           | 307                     | 276                     |
| 1984  | 235      | 76        |       | 13                     | 13                     |           | 54          |           | 391                     | 337                     |
| 1985  | 275      | 102       |       | 19                     | 1                      | +         | 132         |           | 529                     | 397                     |
| 1986  | 456      | 158       |       | 26                     | 1                      | 2         | 109         |           | 752                     | 643                     |
| 1987  | 564      | 137       |       | 19                     |                        | 2         | 70          |           | 792                     | 722                     |
| 1988  | 540      | 138       |       | 24                     |                        | 4         |             |           | 706                     | 706                     |
| 1989  | 578      | 217       |       | 21                     | 7                      | 1         |             |           | 824                     | 824                     |
| 1990  | 464      | 128       |       | 29                     |                        | 2         |             |           | 623                     | 1 050                   |
| 1991  | 746      | 216       |       | 38                     | 1                      |           |             |           | 1 001                   | 1 011                   |
| 1992  | 856      | 372       |       | 54                     |                        |           |             |           | 1 282                   | 1 294                   |
| 1993  | 1 016    | 355       |       | 68                     | 9                      |           |             |           | 1 448                   | 1 439                   |
| 1994  | 890      | 296       |       | 12                     | 4                      |           |             |           | 1 202                   | 1 198                   |
| 1995  | 850      | 382       |       | 65                     | 6                      |           |             |           | 1 303                   | 1 297                   |
| 1996  | 784      | 203       |       | 57                     | 612                    |           |             |           | 1 656                   | 1 059                   |
| 1997  | 560      | 200       |       | 52                     | 2                      |           |             |           | 814                     | 814                     |
| 1998  | 367      | 145       |       | 90                     | 3                      |           |             |           | 605                     | 605                     |
| 1999  | 431      | 158       |       | 45                     | 3                      |           |             |           | 637                     | 637                     |
| 2000  | 399      | 320       | 13    | 34                     | 11                     |           |             |           | 777                     | 645                     |
| 2001  | 249      | 286       | 21    | 25                     |                        |           |             |           | 581                     | 478                     |
| 2002* | 360      | 177       | 18    | 15                     | 11                     |           |             |           | 581                     | 862                     |
| 2003* | 195      | 77        | 17    | 11                     | 17                     |           |             |           | 317                     | 618                     |
| 2004* | 249      | 109       | 40    | 16                     | 18                     |           | 23          |           | 455                     | 824                     |
| 2005* | 531      | 132       | 118   | 30                     | 34                     |           | 9           |           | 854                     | 990                     |

| Year | Denmark  |           |       | Sweden                 | Germany                | Belgium   | Netherlands | Norway    | Total official landings | ICES estimated landings |
|------|----------|-----------|-------|------------------------|------------------------|-----------|-------------|-----------|-------------------------|-------------------------|
|      | Kattegat | Skagerrak | Belts | Skagerrak and Kattegat | Kattegat and the Belts | Skagerrak | Skagerrak   | Skagerrak |                         |                         |
| 2006 | 521      | 114       | 107   | 38                     | 43                     |           | 4           | 9         | 836                     | 836                     |
| 2007 | 366      | 81        | 93    | 45                     | 39                     |           | 3           | 9         | 636                     | 633                     |
| 2008 | 361      | 102       | 113   | 34                     | 35                     |           | 3           | 7         | 655                     | 655                     |
| 2009 | 325      | 103       | 145   | 37                     | 27                     |           |             | 4         | 641                     | 641                     |
| 2010 | 273      | 61        | 125   | 46                     | 26                     |           | 3           | 3         | 537                     | 538                     |
| 2011 | 271      | 127       | 65    | 53                     | 33                     |           |             | 3         | 552                     | 552                     |
| 2012 | 154      | 140       | 28    | 30                     |                        |           |             | 6         | 358                     | 358                     |
| 2013 | 153      | 78        |       | 54                     | 9                      |           |             | 6         | 300                     | 332                     |
| 2014 | 141      | 104       | 48    | 36                     | 2                      |           | 0.3         | 3         | 335                     | 335                     |
| 2015 | 95       | 66        | 36    | 9                      | 7                      |           | 6           | 5         | 224                     | 224                     |
| 2016 | 164      | 78        | 56    | 14                     | 17                     |           | 16          | 2         | 348                     | 348                     |
| 2017 | 215      | 166       | 46    | 19                     | 21                     |           | 31          | 2         | 501                     | 520                     |
| 2018 | 158      | 140       | 57    | 16                     | 15                     |           | 47          |           | 434                     | 434                     |
| 2019 | 150      | 88        | 82    | 13                     | 15                     |           | 69          | 2         | 417                     | 417                     |
| 2020 | 136      | 109       | 85    | 9                      | 24                     |           | 60          | 1         | 424                     | 424                     |
| 2021 | 121      | 116       | 70    | 10                     | 23                     |           | 47          |           | 387                     | 387                     |
| 2022 | 71       | 79        | 98    | 8                      | 32                     |           | 14          | 1         | 302                     | 302                     |
| 2023 | 37       | 71        | 75    | 5                      | 16                     |           | 6           |           | 211                     | 211                     |
| 2024 | 44       | 47        | 90    | 7                      | 3                      |           | 16          | 1         | 208                     | 208                     |

\* Assuming misreporting rates at 50%, 100%, 100%, and 20% in 2002–2005, respectively.

## Summary of the assessment

**Table 9** Sole in subdivisions 20–24. Assessment summary. Weights are in tonnes, recruitment in thousands. “High” and “Low” correspond to 95% confidence intervals.

| Year | Recruitment |      |       | Spawning-stock biomass |      |      | Landings | Discards | Fishing mortality (ages 4–8) |      |      |
|------|-------------|------|-------|------------------------|------|------|----------|----------|------------------------------|------|------|
|      | Low         | R    | High  | Low                    | SSB  | High |          |          | Low                          | F    | High |
|      | thousands   |      |       | tonnes                 |      |      | tonnes   |          |                              |      |      |
| 1984 | 3965        | 6292 | 9985  | 707                    | 878  | 1091 | 337      |          | 0.30                         | 0.40 | 0.53 |
| 1985 | 3375        | 5105 | 7723  | 906                    | 1120 | 1384 | 397      |          | 0.25                         | 0.32 | 0.42 |
| 1986 | 3245        | 4838 | 7215  | 1598                   | 1969 | 2426 | 643      |          | 0.29                         | 0.37 | 0.47 |
| 1987 | 2870        | 4313 | 6482  | 1769                   | 2114 | 2526 | 722      |          | 0.35                         | 0.44 | 0.55 |
| 1988 | 3991        | 5951 | 8871  | 1875                   | 2219 | 2626 | 706      |          | 0.32                         | 0.40 | 0.51 |
| 1989 | 5085        | 7593 | 11339 | 1912                   | 2241 | 2627 | 824      |          | 0.34                         | 0.42 | 0.53 |
| 1990 | 5066        | 7543 | 11230 | 2288                   | 2694 | 3171 | 1050     |          | 0.33                         | 0.42 | 0.52 |
| 1991 | 5828        | 8780 | 13228 | 2779                   | 3277 | 3865 | 1011     |          | 0.37                         | 0.45 | 0.56 |
| 1992 | 4465        | 6658 | 9931  | 3234                   | 3824 | 4521 | 1294     |          | 0.40                         | 0.49 | 0.61 |
| 1993 | 2406        | 3566 | 5285  | 3585                   | 4233 | 4997 | 1439     |          | 0.40                         | 0.50 | 0.63 |
| 1994 | 2429        | 3593 | 5313  | 3667                   | 4302 | 5047 | 1198     |          | 0.33                         | 0.41 | 0.51 |
| 1995 | 1476        | 2198 | 3275  | 3187                   | 3724 | 4350 | 1297     |          | 0.36                         | 0.44 | 0.54 |
| 1996 | 968         | 1493 | 2305  | 2809                   | 3272 | 3811 | 1059     |          | 0.32                         | 0.40 | 0.49 |
| 1997 | 2456        | 3695 | 5559  | 2250                   | 2636 | 3089 | 814      |          | 0.31                         | 0.39 | 0.48 |
| 1998 | 2422        | 3577 | 5282  | 1624                   | 1927 | 2287 | 605      |          | 0.30                         | 0.37 | 0.46 |
| 1999 | 2001        | 2978 | 4432  | 1871                   | 2214 | 2621 | 637      |          | 0.29                         | 0.36 | 0.44 |
| 2000 | 2847        | 4206 | 6213  | 1916                   | 2259 | 2662 | 645      |          | 0.28                         | 0.35 | 0.43 |
| 2001 | 3719        | 5549 | 8278  | 1826                   | 2141 | 2511 | 478      |          | 0.25                         | 0.31 | 0.39 |
| 2002 | 2813        | 4166 | 6169  | 2116                   | 2473 | 2891 | 862      |          | 0.32                         | 0.39 | 0.48 |
| 2003 | 2868        | 4221 | 6213  | 2318                   | 2704 | 3155 | 618      |          | 0.29                         | 0.36 | 0.44 |
| 2004 | 1893        | 2677 | 3787  | 2537                   | 2936 | 3398 | 824      |          | 0.34                         | 0.41 | 0.50 |
| 2005 | 1647        | 2338 | 3319  | 2782                   | 3230 | 3752 | 990      |          | 0.34                         | 0.42 | 0.51 |
| 2006 | 2036        | 2889 | 4102  | 2469                   | 2872 | 3340 | 836      |          | 0.31                         | 0.37 | 0.46 |
| 2007 | 2262        | 3208 | 4548  | 2089                   | 2433 | 2835 | 633      |          | 0.26                         | 0.32 | 0.40 |
| 2008 | 1564        | 2295 | 3368  | 1844                   | 2164 | 2540 | 655      |          | 0.26                         | 0.33 | 0.41 |
| 2009 | 1551        | 2245 | 3248  | 1938                   | 2303 | 2737 | 641      |          | 0.22                         | 0.28 | 0.35 |
| 2010 | 1317        | 1848 | 2593  | 1809                   | 2154 | 2565 | 538      | 14       | 0.20                         | 0.26 | 0.33 |

| Year | Recruitment |      |      | Spawning-stock biomass |      |      | Landings | Discards | Fishing mortality (ages 4–8) |       |      |
|------|-------------|------|------|------------------------|------|------|----------|----------|------------------------------|-------|------|
|      | Low         | R    | High | Low                    | SSB  | High |          |          | Low                          | F     | High |
|      | thousands   |      |      | tonnes                 |      |      |          |          |                              |       |      |
| 2011 | 1096        | 1603 | 2345 | 1743                   | 2087 | 2500 | 552      | 8        | 0.173                        | 0.22  | 0.28 |
| 2012 | 863         | 1314 | 2003 | 1682                   | 2041 | 2477 | 358      | 11       | 0.148                        | 0.191 | 0.25 |
| 2013 | 896         | 1350 | 2033 | 1581                   | 1926 | 2347 | 332      | 10       | 0.155                        | 0.198 | 0.25 |
| 2014 | 1545        | 2214 | 3173 | 1630                   | 1973 | 2389 | 335      | 32       | 0.142                        | 0.181 | 0.23 |
| 2015 | 1818        | 2562 | 3609 | 1507                   | 1819 | 2197 | 224      | 6        | 0.130                        | 0.167 | 0.21 |
| 2016 | 1600        | 2231 | 3110 | 1685                   | 2014 | 2409 | 348      | 17       | 0.178                        | 0.22  | 0.28 |
| 2017 | 864         | 1285 | 1911 | 1877                   | 2229 | 2649 | 520      | 17       | 0.23                         | 0.28  | 0.36 |
| 2018 | 2042        | 2960 | 4291 | 1911                   | 2275 | 2709 | 434      | 7        | 0.21                         | 0.26  | 0.32 |
| 2019 | 1579        | 2176 | 2999 | 1689                   | 2003 | 2376 | 417      | 8        | 0.195                        | 0.24  | 0.31 |
| 2020 | 1264        | 1815 | 2606 | 1795                   | 2138 | 2547 | 424      | 12       | 0.21                         | 0.26  | 0.32 |
| 2021 | 734         | 1035 | 1460 | 1641                   | 1946 | 2309 | 387      | 6        | 0.192                        | 0.24  | 0.30 |
| 2022 | 653         | 915  | 1282 | 1482                   | 1772 | 2120 | 302      | 24       | 0.167                        | 0.21  | 0.27 |
| 2023 | 465         | 689  | 1021 | 1310                   | 1579 | 1903 | 211      | 2        | 0.135                        | 0.173 | 0.22 |
| 2024 | 751         | 1231 | 2019 | 1147                   | 1408 | 1728 | 208      | 5        | 0.133                        | 0.175 | 0.23 |
| 2025 |             | 915* |      | 1043                   | 1334 | 1704 |          |          |                              |       |      |

\* Resampled median from recruitment in 2022–2024.

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