

### 8.3.13 Plaice (*Pleuronectes platessa*) in Subdivisions 21–23 (Kattegat, Belt Sea, Sound)

#### ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2016 should be no more than 8639 tonnes. If discard rates do not change from 2014, this implies landings of no more than 4642 tonnes.

#### Stock development over time

Spawning-stock biomass (SSB) has increased significantly from 2009 and has been above  $B_{pa}$  since 2010. Fishing mortality has declined since 2000 and has been below  $F_{MSY}$  since 2011. Recruitment has decreased in recent years.



Figure 8.3.13.1 Plaice in Subdivisions 21–23. Summary of stock assessment. Catch weights in thousand tonnes. Predicted values are not shaded.

#### Stock and exploitation status

Table 8.3.13.1 Plaice in Subdivisions 21–23. State of the stock and fishery, relative to reference points.

|                           |                      | Fishing pressure |      |                         | Stock size           |      |                              |
|---------------------------|----------------------|------------------|------|-------------------------|----------------------|------|------------------------------|
|                           |                      | 2012             | 2013 | 2014                    | 2013                 | 2014 | 2015                         |
| Maximum Sustainable Yield | $F_{MSY}$            | ✓                | ✓    | ✓ Below                 | $MSY$                | ✓    | ✓ Above $B_{trigger}$        |
| Precautionary approach    | $F_{pa}$ , $F_{lim}$ | ✓                | ✓    | ✓ Harvested sustainably | $B_{pa}$ , $B_{lim}$ | ✓    | ✓ Full reproductive capacity |
| Management Plan           | $F_{MGT}$            | -                | -    | - Not applicable        | $SSB_{MGT}$          | -    | - Not applicable             |

## Catch options

**Table 8.3.13.2** Plaice in Subdivisions 21–23. The basis for the catch options.

| Variable                   | Value            | Source      | Notes   |
|----------------------------|------------------|-------------|---|
| F ages 3–5 (2015)          | 0.2              | ICES, 2015a | $F_{sq}$ , unscaled average over the last three years |
| SSB (2016)                 | 19 102 t         | ICES, 2015a | MFDP1a  |
| $R_{age1}$ (2016)          | 32 154 thousands | ICES, 2015a | GM(1999–2014)   |
| $R_{age1}$ (2017)          | 32 154 thousands | ICES, 2015a | GM(1999–2014)   |
| Total catch (2015)         | 5 157 t          | ICES, 2015a | MFDP1a (SAM)  |
| Commercial landings (2015) | 2 771 t          | ICES, 2015a | MFDP1a (SAM)  |
| Discards (2015)            | 2 386 t          | ICES, 2015a | MFDP1a (SAM)  |

**Table 8.3.13.3** Plaice in Subdivisions 21–23. The catch options. Weights in thousand tonnes.

| Rationale              | Catches (2016) | Landings (2016) | Discards (2016) | Basis  | F (2016) | SSB (2016) | SSB (2017) | %SSB change | %Advice change* |
|------------------------|----------------|-----------------|-----------------|--|----------|------------|------------|-------------|-----------------|
| MSY approach           | 8.639          | 4.642           | 3.997           | $F_{MSY}$                                    | 0.37     | 19.102     | 18.57      | -3%         | 114%**          |
| Precautionary approach | 15.466         | 8.311           | 7.155           | $F_{pa} = F_{sq} \times 3.28$                | 0.67     | 19.102     | 14.53      | -24%        | 284%**          |
| Zero catch             | 0              | 0.000           | 0.000           | $F(2015) = 0$                                | 0.00     | 19.102     | 23.68      | 24%         | -100%           |
| Other options          | 2.664          | 1.432           | 1.232           | 50% $F_{sq}$ ( $F_{2015} \times 0.5$ )       | 0.10     | 19.102     | 22.10      | 16%         | -34%**          |
|                        | 3.418          | 1.837           | 1.581           | -15% Advice ( $F_{2015} \times 0.65$ )       | 0.13     |            | 21.65      | 13%         | -15%            |
|                        | 4.033          | 2.167           | 1.866           | No changed advice ( $F_{2015} \times 0.78$ ) | 0.16     |            | 21.29      | 11%         | 0%              |
|                        | 5.111          | 2.747           | 2.364           | $F_{sq}$ ( $F_{2015}$ )                      | 0.20     | 19.102     | 20.65      | 8%          | 27%**           |
|                        | 4.638          | 2.492           | 2.146           | +15% Advice ( $F_{2015} \times 0.9$ )        | 0.18     |            | 20.93      | 10%         | 15%             |

\* Catches in 2016 relative to the ICES advised catch for 2015.

\*\* Version 2: values corrected.

## Basis of the advice

**Table 8.3.13.4** Plaice in Subdivisions 21–23. The basis of the advice.

|                 |  |
|-----------------|--|
| Advice basis    | MSY approach.  |
| Management plan | There is no management plan for plaice in this area. |

## Quality of the assessment

This stock was benchmarked in 2015 (ICES, 2015b). The assessment suffers from a relative short time-series (1999–2014) and the confidence limits are in general quite large. Technically the assessment performs quite well with no obvious pattern in residuals for catch matrix or tuning series.

## Issues relevant for the advice

Following the benchmark in 2015, the basis of the advice has changed from last year. In 2014 advice was given based on a category 3.1 approach. This year's advice is given based on a category 1 assessment and MSY approach.

As a consequence of the relative short time-series available, the present reference point values will probably have to be revised within few years.

**Reference points**

**Table 8.3.13.5** Plaice in Subdivisions 21–23. Reference points, values, and their technical basis.

| Framework              | Reference point   | Value        | Technical basis   | Source      |
|------------------------|-------------------|--------------|---|-------------|
| MSY approach           | MSY $B_{trigger}$ | 5 550 t      | = $B_{pa}$  | ICES, 2015a |
|                        | $F_{MSY}$         | 0.37         | EQSIM (model segmental regression, 1999–2014)           | ICES, 2015a |
| Precautionary approach | $B_{lim}$         | 4 480 t      | = $B_{loss}$ (Lowest observed SSB)                      | ICES, 2015a |
|                        | $B_{pa}$          | 5 550 t      | ( $B_{pa} = B_{lim} \times \exp(\sigma \times 1.645)$ ) | ICES, 2015a |
|                        | $F_{lim}$         | Not defined. |   |             |
|                        | $F_{pa}$          | 0.67         |   |             |
| Management plan        | $SSB_{MGT}$       | Not defined. |   |             |
|                        | $F_{MGT}$         | Not defined. |   |             |

**Basis of the assessment**

**Table 8.3.13.6** Plaice in Subdivisions 21–23. The basis of the assessment.

|                          |  |
|--------------------------|--|
| ICES stock data category | 1 (ICES, 2015c).   |
| Assessment type          | Age-based analytical assessment (SAM; ICES, 2015a) that uses catches in the model and in the forecast.   |
| Input data               | Commercial catches (international landings, catch numbers by age, mean weight in catch by age); two survey indices (IBTSQ1 and Q3, BITS–Q1and Q4); 3-year running mean maturity data (from commercial catch during surveys); natural mortalities are fixed and assumed to be 0.1 except for age 1, which has 0.2. No age 0 included in the assessment. |
| Discards and bycatch     | Discard information available from 1999 from the main fleets (covering 100% of the landings).  |
| Indicators               | None.  |
| Other information        | The stock was last benchmarked in 2015 (ICES, 2015b).  |
| Working group            | Baltic Fisheries Assessment Working Group ( <a href="#">WGBFAS</a> ).  |

### Information from stakeholders

There is no available information.

### History of advice, catch and management

**Table 8.3.13.7** Plaice in Subdivisions 21–23. History of ICES advice, the agreed TAC, and ICES estimates of landings and discards. Weights in thousand tonnes.

| Year | ICES advice                                    | Pred. catch corresp. to advice SDs 21–23 | Pred. catch corresp. to advice for Skagerrak and Kattegat combined | TAC Kattegat (SD 21) | TAC Baltic Sea (SDs 22–32) | ICES landings (SDs 21–23) | Discards (SDs 21–23) |
|------|--|--|--|----------------------|----------------------------|---------------------------|----------------------|
| 1992 | TAC  |  | 14.0   | 2.8                  |                            | 2.7                       |                      |
| 1993 | Precautionary TAC                              |  | -  | 2.8                  |                            | 1.7                       |                      |
| 1994 | If required, precautionary TAC                 |  | -  | 2.8                  |                            | 2.1                       |                      |
| 1995 | If required, precautionary TAC                 |  | -  | 2.8                  |                            | 2.1                       |                      |
| 1996 | If required, precautionary TAC                 |  | -  | 2.8                  |                            | 3.5                       |                      |
| 1997 | No advice                                      |  | -  | 2.8                  |                            | 3.4                       |                      |
| 1998 | No increase in F from the present level        |  | 11.9   | 2.8                  |                            | 2.9                       |                      |
| 1999 | No increase in F from the present level        |  | 11.0   | 2.8                  |                            | 3.4                       | 2.313                |
| 2000 | $F < F_{pa}$                                   |  | 11.8   | 2.8                  |                            | 3.9                       | 2.313                |
| 2001 | $F < F_{pa}$                                   |  | 9.4  | 2.35                 |                            | 4.1                       | 2.313                |
| 2002 | $F < F_{pa}$                                   |  | 8.5*   | 1.6**                |                            | 3.9                       | 4.357                |
| 2003 | $F < F_{pa}$                                   |  | 18.4   | 3.0                  |                            | 3.4                       | 2.004                |
| 2004 | $F < F_{pa}^{***}$                             |  | ***  | 1.8                  |                            | 2.6                       | 1.368                |
| 2005 | $F < F_{pa}$                                   |  | < 9.5  | 1.9                  |                            | 2.4                       | 1.197                |
| 2006 | No increase in F                               |  | < 9.6  | 1.9                  |                            | 2.4                       | 1.769                |
| 2007 | Maintain current TAC                           |  | < 9.6  | 2.1                  |                            | 2.6                       | 1.190                |
| 2008 | No increase in catch                           |  | < 9.4  | 2.3                  |                            | 2.0                       | 1.901                |
| 2009 | Same advice as last year                       |  | < 9.4  | 2.3                  |                            | 1.7                       | 1.447                |
| 2010 | Same advice as last year                       |  | < 9.4  | 2.3                  |                            | 1.5                       | 1.488                |
| 2011 | Last three years' average landings (2007–2009) |  | < 8.0  | 1.988                | 3.041                      | 1.6                       | 2.045                |
| 2012 | Reduce catch                                   |  | -  | 1.988                | 2.889                      | 1.8                       | 1.350                |
| 2013 | Increase catch by 16%, transition to $F_{MSY}$ | < 1.8 <sup>^</sup>                       |  | 1.8                  | 2.889                      | 2.0                       | 1.637                |
| 2014 | Increase landings by 20%                       | 2.224 <sup>^</sup>                       |  | 2.16                 | 3.409                      | 1.931                     | 1.946 <sup>^^</sup>  |
| 2015 | Increase catch by 20%                          | 4.031                                    |  | 2.626                | 3.409                      |                           |                      |
| 2016 | MSY approach                                   | ≤ 8.639                                  |  |                      |                            |                           |                      |

\*In March 2002 ACFM revised its advice to 11.6 for both areas combined.

\*\*The TAC for the two areas combined was adjusted to 11 200 tonnes in mid-2002.

\*\*\*The exploitation of this stock should be conducted in the context of mixed fisheries.

<sup>^</sup>Landings.

<sup>^^</sup> Version 3: value corrected.

### History of catch and landings

**Table 8.3.13.8** Plaice in Subdivisions 21–23. Catch distribution by fleet in 2014 as estimated by ICES.

| Total catch (2014) | Landings         |                   | Discards   |
|--------------------|------------------|-------------------|--|
|                    | 64% active gears | 36% passive gears |  |
| 3 877 t            | 1 931 t          |                   | Total discard is 1 946* tonnes (≈1% from passive and 99% from active gears). |

\*Version 3: value corrected.

**Table 8.3.13.9** Plaice in Subdivisions 21–23. History of official landings and ICES estimates of discards presented by area and country. Weights in tonnes.

| Year/SD | SD 21   |         |        | SD 22   |         |        | SD 23  |         | Total landing | Total discard |
|---------|---------|---------|--------|---------|---------|--------|--------|---------|---------------|---------------|
|         | Denmark | Germany | Sweden | Denmark | Germany | Sweden | Sweden | Denmark |               |               |
| 1970    |         |         |        | 3 757   | 202     |        |        |         |               |               |
| 1971    |         |         |        | 3 435   | 160     |        |        |         |               |               |
| 1972    | 15 504  | 77      | 348    | 2 726   | 154     |        |        |         | 18 809        |               |
| 1973    | 10 021  | 48      | 231    | 2 399   | 165     |        |        |         | 12 864        |               |
| 1974    | 11 401  | 52      | 255    | 3 440   | 202     |        |        |         | 15 350        |               |
| 1975    | 10 158  | 39      | 296    | 2 814   | 313     |        |        |         | 13 620        |               |
| 1976    | 9 487   | 32      | 177    | 3 328   | 313     |        |        |         | 13 337        |               |
| 1977    | 11 611  | 32      | 300    | 3 452   | 353     |        |        |         | 15 748        |               |
| 1978    | 12 685  | 100     | 312    | 3 848   | 379     |        |        |         | 17 324        |               |
| 1979    | 9 721   | 38      | 333    | 3 554   | 205     |        |        |         | 13 851        |               |
| 1980    | 5 582   | 40      | 313    | 2 216   | 89      |        |        |         | 8 240         |               |
| 1981    | 3 803   | 42      | 256    | 1 193   | 80      |        |        |         | 5 374         |               |
| 1982    | 2 717   | 19      | 238    | 716     | 45      |        |        |         | 3 735         |               |
| 1983    | 3 280   | 36      | 334    | 901     | 42      |        |        |         | 4 593         |               |
| 1984    | 3 252   | 31      | 388    | 803     | 30      |        |        |         | 4 504         |               |
| 1985    | 2 979   | 4       | 403    | 648     | 94      |        |        |         | 4 128         |               |
| 1986    | 2 470   | 2       | 202    | 570     | 59      |        |        |         | 3 303         |               |
| 1987    | 2 846   | 3       | 307    | 414     | 18      |        |        |         | 3 588         |               |
| 1988    | 1 820   | 0       | 210    | 234     | 10      |        |        |         | 2 274         |               |
| 1989    | 1 609   | 0       | 135    | 167     | 7       |        |        |         | 1 918         |               |
| 1990    | 1 830   | 2       | 202    | 236     | 9       |        |        |         | 2 279         |               |
| 1991    | 1 737   | 19      | 265    | 328     | 15      |        |        |         | 2 364         |               |
| 1992    | 2 068   | 101     | 208    | 316     | 11      |        |        |         | 2 704         |               |
| 1993    | 1 294   | 0       | 175    | 171     | 16      |        | 2      |         | 1 658         |               |
| 1994    | 1 547   | 0       | 227    | 355     | 1       |        | 6      |         | 2 136         |               |
| 1995    | 1 254   | 0       | 133    | 601     | 75      |        | 12     | 64      | 2 139         |               |
| 1996    | 2 337   | 0       | 205    | 859     | 43      | 1      | 13     | 81      | 3 539         |               |
| 1997    | 2 198   | 25      | 255    | 902     | 51      |        | 13     |         | 3 444         |               |
| 1998    | 1 786   | 10      | 185    | 642     | 213     |        | 13     |         | 2 849         |               |
| 1999    | 1 510   | 20      | 161    | 1 456   | 244     | 1      | 13     |         | 3 405         | 2 313         |
| 2000    | 1 644   | 10      | 184    | 1 932   | 140     |        | 26     |         | 3 936         | 2 313         |
| 2001    | 2 069   |         | 260    | 1 627   | 58      |        | 39     |         | 4 053         | 2 313         |
| 2002    | 1 880   | 0       | 204    | 1 699   | 39      | 0      | 75     | 42      | 3 939         | 4 357         |
| 2003    | 2 132   | 0       | 253    | 1 071   | 31      | 0      | 105    | 26      | 3 618         | 2 004         |
| 2004    | 1 454   | 0       | 137    | 949     | 54      | 0      | 137    | 35      | 2 766         | 1 368         |
| 2005    | 1 145   | 0       | 100    | 874     | 48      | 0      | 152    | 34      | 2 354         | 1 197         |
| 2006    | 1 400   | 0       | 175    | 742     | 45      | 0      | 180    | 39      | 2 580         | 1 769         |
| 2007    | 1 244   | 0       | 172    | 933     | 75      | 0      | 199    | 69      | 2 691         | 1 190         |
| 2008    | 899     | 0       | 137    | 735     | 92      | 0      | 120    | 45      | 2 028         | 1 901         |
| 2009    | 589     | 0       | 84     | 585     | 191     | 0      | 144    | 42      | 1 635         | 1 447         |
| 2010    | 428     | 5       | 66     | 775     | 221     | 0      | 59     | 17      | 1 570         | 1 488         |
| 2011    | 327     | 0       | 40     | 851     | 310     | 0      | 46     | 11      | 1 584         | 2 045         |
| 2012    | 196     | 0       | 30     | 1 189   | 365     | 0      | 54     | 12      | 1 845         | 1 350         |
| 2013    | 232     | 1       | 60     | 1 252   | 319     | 0      | 76     | 14      | 1 956         | 1 637         |
| 2014    | 343     | 1       | 68     | 1 097   | 320     | 0      | 45     | 57      | 1 931         | 1 946*        |

\*Version 3: value corrected.

## Summary of the assessment

**Table 8.3.13.10** Plaice in Subdivisions 21–23. Assessment summary with weights (in tonnes). Recruitment in thousands.

| Year           | Recruitment<br>(age 1) | High          | Low           | SSB          | High         | Low          | Landings     | Mean F<br>(ages 3–5) | High         | Low         |
|----------------|------------------------|---------------|---------------|--------------|--------------|--------------|--------------|----------------------|--------------|-------------|
| 1999           | 53 316                 | 70 454        | 40 347        | 4 077        | 5 220        | 3 184        | 3 406        | 0.912                | 1.182        | 0.703       |
| 2000           | 47 810                 | 62 267        | 36 711        | 5 045        | 6 229        | 4 086        | 3 935        | 0.969                | 1.196        | 0.786       |
| 2001           | 29 349                 | 39 954        | 21 558        | 6 326        | 7 815        | 5 121        | 4 054        | 0.923                | 1.133        | 0.752       |
| 2002           | 36 279                 | 47 851        | 27 506        | 6 693        | 8 342        | 5 370        | 3 939        | 0.85                 | 1.056        | 0.684       |
| 2003           | 25 978                 | 34 586        | 19 512        | 6 217        | 7 673        | 5 038        | 3 618        | 0.757                | 0.949        | 0.605       |
| 2004           | 31 634                 | 41 398        | 24 174        | 5 786        | 7 076        | 4 732        | 2 766        | 0.712                | 0.908        | 0.558       |
| 2005           | 25 668                 | 33 652        | 19 578        | 5 634        | 6 887        | 4 609        | 2 354        | 0.69                 | 0.901        | 0.528       |
| 2006           | 22 561                 | 30 112        | 16 904        | 5 561        | 6 907        | 4 478        | 2 580        | 0.718                | 0.948        | 0.544       |
| 2007           | 24 053                 | 31 020        | 18 650        | 5 277        | 6 621        | 4 205        | 2 691        | 0.678                | 0.941        | 0.489       |
| 2008           | 25 745                 | 35 209        | 18 825        | 5 072        | 6 519        | 3 945        | 2 028        | 0.601                | 0.868        | 0.415       |
| 2009           | 32 273                 | 42 176        | 24 696        | 5 139        | 6 861        | 3 849        | 1 635        | 0.49                 | 0.742        | 0.323       |
| 2010           | 41 982                 | 54 428        | 32 382        | 5 941        | 8 166        | 4 323        | 1 570        | 0.401                | 0.649        | 0.248       |
| 2011           | 44 802                 | 59 294        | 33 852        | 7 347        | 10 201       | 5 291        | 1 584        | 0.336                | 0.556        | 0.203       |
| 2012           | 39 066                 | 52 307        | 29 177        | 9 477        | 13 375       | 6 715        | 1 845        | 0.23                 | 0.382        | 0.138       |
| 2013           | 31 039                 | 42 913        | 22 451        | 12 182       | 17 152       | 8 652        | 1 956        | 0.198                | 0.327        | 0.119       |
| 2014           | 22 181                 | 34 082        | 14 436        | 14 402       | 20 339       | 10 198       | 1 931        | 0.186                | 0.314        | 0.11        |
| 2015           | 32 154*                |               |               | 16 133       | 23 296       | 11 172       |              |                      |              |             |
| <b>Average</b> | <b>33 288</b>          | <b>44 481</b> | <b>25 047</b> | <b>7 430</b> | <b>9 922</b> | <b>5 586</b> | <b>2 618</b> | <b>0.603</b>         | <b>0.816</b> | <b>0.45</b> |

\*Geometric mean (1999–2014).

## Sources and references

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