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*Version 4, 28 August 2015*

## 8.3.2 Cod (*Gadus morhua*) Western Baltic stock in Subdivisions 22–24 (Western Baltic Sea)

### ICES stock advice

ICES advises that when the MSY approach is applied, catches of the western Baltic cod stock in 2016 should be no more than 7797 tonnes*. This includes recreational catch but does not include catches of the eastern Baltic cod stock in the Western Baltic area (Subdivisions 22–24). If some eastern Baltic stock catches are allocated to the Western Baltic area (Subdivisions 22–24) TAC, a sub-TAC should be given for Subdivisions 22–23 to protect the western Baltic cod stock.

### Stock development over time

The spawning–stock biomass (SSB) has increased in 2014–2015; however, it is below the limit reference point $B_{lim}$. The fishing mortality is well above $F_{MSY}$. Recruitment has been low since the mid-2000s compared to earlier years.

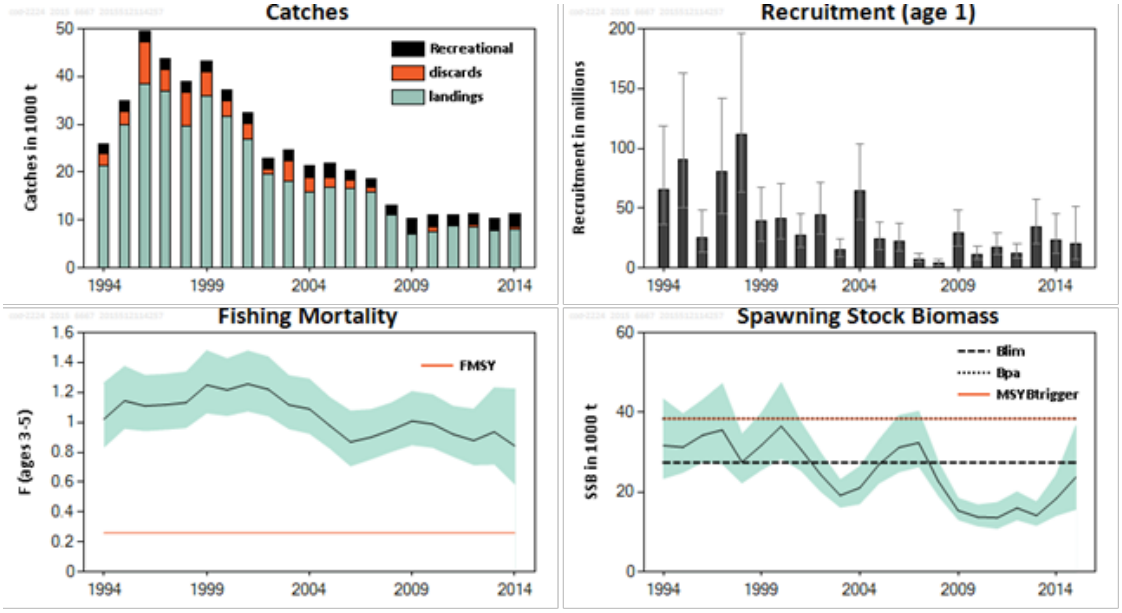


**Figure 8.3.2.1** Western Baltic cod stock in Subdivisions 22–24. Summary of stock assessment (weights in thousand tonnes). Recruitment, F, and SSB have uncertainty boundaries (95%) in the plot.

### Stock and exploitation status

**Table 8.3.2.1** Western Baltic cod stock in Subdivisions 22–24. State of the stock and fishery, relative to reference points.

| | | Fishing pressure | | | | Stock size | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2012 | 2013 | 2014 | | | 2013 | 2014 | 2015 | |
| Maximum Sustainable Yield | $F_{MSY}$ | ✗ | ✗ | ✗ | Above | MSY $B_{trigger}$ | ✗ | ✗ | ✗ | Below trigger |
| Precautionary approach | $F_{pa}$, $F_{lim}$ | ? | ? | ? | Undefined | $B_{pa}$, $B_{lim}$ | ✗ | ✗ | ✗ | Reduced reproductive capacity |
| Management Plan** | $F_{MGT}$ | - | - | - | Not applicable | $SSB_{MGT}$ | - | - | - | Not applicable |

* Version 3: value updated.
**The current management plan and the basis for the stock assessment no longer match.

## Catch options

**Table 8.3.2.2**[†] Western Baltic cod stock in Subdivisions 22–24. The basis for the forecast. Weights in tonnes. Recruitment in thousands.

| Variable | Value | Source | Notes |
|---|---|---|---|
| F ages 3–5 (2015) | 0.52 | ICES (2015a) | Based on TAC constraint, the proportion of WB cod in commercial catches in SD 22–24 in 2014, and mean recreational catch (2012–2014)* |
| SSB (2016) | 33 373 | ICES (2015a) | |
| $R_{age0}$ (2016) | 45 071 | ICES (2015a) | Sampled from the last 10 years |
| $R_{age1}$ (2016) | 17 916 | ICES (2015a) | Based on age 0 in 2015 sampled from the last 10 years |
| $R_{age1}$ (2017) | 18 660 | ICES (2015a) | Based on age 0 in 2016 sampled from the last 10 years |
| Total catch (2015) | 11 303 | ICES (2015a) | Based on TAC constraint, the proportion of WB cod in commercial catches in SD 22–24 in 2014, and mean recreational catch (2012–2014)* |
| Commercial wanted catch (2015) | 8391 | ICES (2015a) | Based on TAC constraint and the proportion of WB cod in commercial catches in SD 22–24 in 2014, and the average fraction (in tonnes) of discards from commercial catch of WB cod in 2012–2014 |
| Commercial unwanted catch (2015) | 354 | ICES (2015a) | Based on TAC constraint and the proportion of WB cod in commercial catches in SD 22–24 in 2014 and the average fraction (in tonnes) of discards from commercial catch of WB cod in 2012–2014. |
| Recreational catches (2015) | 2558 | | Mean recreational catch (2012–2014) |

*****Total commercial catch in SD 22–24 in 2015 was assumed to be equal to TAC (15 900 t). In 2014, 55 % of cod commercial catches in SD 22–24 were estimated to be western Baltic cod. Assuming the same proportion in 2015, under TAC constraint, results in commercial catches of western Baltic cod at 8745 t in SD 22-24. Recreational catch in 2015 is assumed to be an average of the estimates for 2012–2014.

[†] Version 3: table updated

**Table 8.3.2.3‡** Western Baltic cod stock in Subdivisions 22–24. The forecast and catch options. Weights in thousand tonnes.

| Rational | Total catch 2016* | Basis | $F_{total}$ 2016 | SSB 2017 | %SSB change^ |
|---|---|---|---|---|---|
| MSY approach | 7797 | $F = F_{MSY} \times (SSB_{2016} / MSY\ B_{trigger})$ | 0.23 | 48 907 | 47 |
| $F_{MSY}$ | 8709 | $F_{MSY}$ | 0.26 | 47 841 | 43 |
| $F_{MSY}$ ranges without Advice Rule^^ | 5258 | MSY $F_{lower}$ | 0.15 | 51 953 | 56 |
| | 13 937 | MSY $F_{upper}$ | 0.45 | 41 762 | 25 |
| $F_{MSY}$ ranges with Advice Rule included^^ | 4594 | $F = MSY\ F_{lower(AR)} \times (SSB_{2016} / MSY\ B_{trigger})$ | 0.13 | 52 840 | 58 |
| | 12 366 | $F = MSY\ F_{upper(AR)} \times (SSB_{2016} / MSY\ B_{trigger})$ | 0.39 | 43 557 | 31 |
| Zero catch | 0 | $F_{2015} \times 0$ | 0 | 58 226 | 74 |
| Management plan** | 20 880 | 90% $F_{2014}$ ($F_{3–6}$) | 0.8*** | 33 370 | 0 |
| Management plan long-term target** | 16 912 | $F_{total} = 0.6$ ($F_{3–6}$) | 0.6*** | 38 247 | 15 |
| Other options | 15 322 | $F_{2014} \times 0.6$ | 0.51 | 39 993 | 20 |
| | 16 646 | $F_{2014} \times 0.66$ | 0.56 | 38 400 | 15 |
| | 19 140 | $F_{2014} \times 0.8$ | 0.68 | 35 471 | 6 |
| | 20 871 | $F_{2014} \times 0.9$ | 0.76 | 33 445 | 0 |
| | 22 466 | $F_{2014} \times 1.0$ | 0.84 | 31 472 | −6 |
| | 23 990 | $F_{2014} \times 1.1$ | 0.93 | 29 820 | −11 |
| | 28 045 | $F_{2014} \times 1.4$ | 1.18 | 25 234 | −24 |
| | 31 318 | $F_{2014} \times 1.7$ | 1.43 | 21 569 | −35 |

* Includes commercial (wanted and unwanted) and recreational catch.

** The current management plan and the basis for the stock assessment no longer match.

*** The fishing mortality provided for a reference F age range of 3–6.

^ SSB 2017 relative to SSB 2016.

^^ According to ICES (2015b), $F_{MSY}$ ranges are specified with and without the ICES Advice Rule (AR). For ranges without the AR $F_{lower}$ and $F_{upper}$ are not modified by SSB in the catch advice year. For the ranges with the AR, $SSB_{2016} < MSY\ B_{trigger}$; therefore, $F_{lower(AR)}$ and $F_{upper(AR)}$ are reduced by the factor SSB / $MSY\ B_{trigger}$.

‡ Version 3: table updated

## Basis of the advice

**Table 8.3.2.4** Western Baltic cod stock in Subdivisions 22–24. The basis of the assessment and advice.

| Advice basis | MSY approach |
|---|---|
| Management plan | ICES is not using the management plan as basis for advice but has used the MSY. A management plan for cod in the western Baltic Sea was agreed in September 2007 by the EU (EC, 2007). This plan aims for a reduction in F by 10% each year until the target F is reached. ICES evaluated the management plan in 2009 and 2011 and considered it, at that time, to be in accordance with the precautionary approach. ICES has in 2006–2013 provided advice in accordance with the management plan (10% annual reduction in F). Although the catches for most years since 2008 have been below the level advised by ICES, the fishing mortality has not declined as anticipated. This seems to be due to a systematic overestimation of fishing possibilities in ICES catch forecast. Due to this effect it is considered that following the relative F reductions (10%) as stipulated in the plan will not reduce F.<br><br>Furthermore, the current assessment is conducted for the western Baltic cod stock only (i.e. cod in Subdivisions 22–23 plus the western Baltic cod stock component in Subdivision 24). The current management plan and the basis for the stock assessment no longer match. |

## Quality of the assessment

Mixing of the eastern and western Baltic cod stocks is a major issue in Subdivision 24. The stock mixing within Subdivision 24 is variable spatially and possibly between seasons and age groups. This introduces uncertainty to the stock separation. Also, stock separation data have been extrapolated for 13 out of 21 years in the time-series. The longest gap in the data is from 2001 to 2007. For later years a splitting key is available at least for every second year. Furthermore, preparation of assessment input data to separate between the western and eastern Baltic cod stocks involves a number of additional assumptions which introduce uncertainty to the assessment. Nevertheless, the present assessment is considered to provide a more realistic picture of the western Baltic cod stock development, compared to the assessments conducted in earlier years on mixed populations within the area of Subdivisions 22–24. Thus, the uncertainties introduced to earlier assessments by the eastern Baltic stock component (e.g. age-reading issues, higher discards) have been reduced in the current assessment. Data for stock separation prior to 1994 have not been processed and the current assessment is truncated to 1994.

The estimation of recreational catches is a minimum estimate for the whole period as it includes only German data. The German data are considered reliable after 2005 and were extrapolated for previous years.

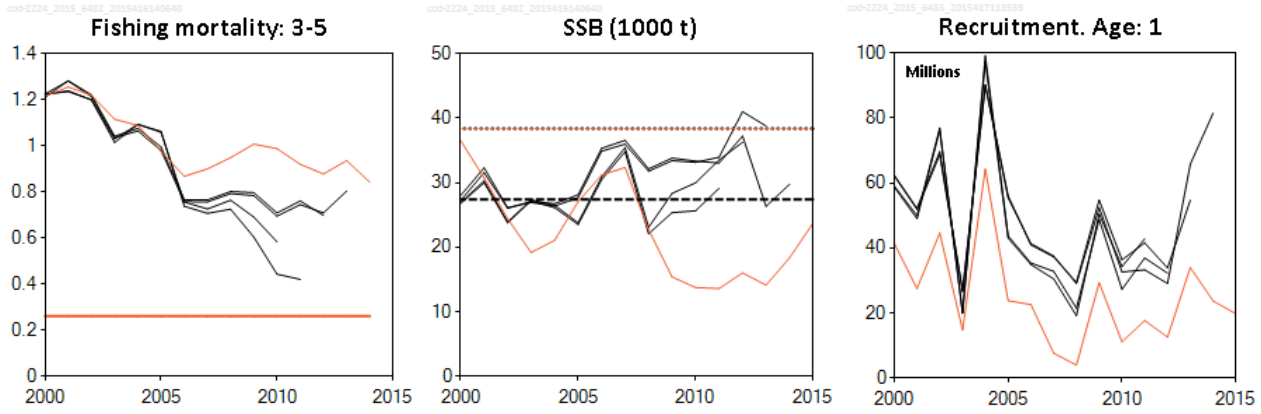


**Figure 8.3.2.2** Western Baltic cod stock in Subdivisions 22–24. Historical assessment results (final-year recruitment estimates included). The assessments for previous years were for cod in the area of Subdivisions 22–24 that contains a fraction of the eastern Baltic cod stock. This year's assessment is conducted for the western Baltic cod stock only, and is not comparable to the previous assessments conducted for Subdivisions 22–24.

## Issues relevant for the advice

A mixture of eastern and western Baltic cod stocks is caught in the western Baltic management area (Subdivisions 22–24). The assessment and this advice only include the western Baltic (WB) cod stock in Subdivisions 22–24. The basis for the forecast has been updated in version 3 to reflect a more realistic assumption about the proportion of western Baltic cod in the total catch of cod assumed to be taken in 2015 in Subdivision 22–24.

To derive a management area-based total catch for the western Baltic area (Subdivisions 22–24), the assumed catch of the eastern Baltic (EB) stock taken in Subdivision 24 could be added to the advised total catch for the WB cod stock. Any allocated catch of EB cod in Subdivision 24 should be deducted from the advised catch for the EB cod stock when setting the TAC for the eastern Baltic area (Subdivisions 25–32).

ICES is not in a position to give specific advice for a management area-based total catch for the western Baltic management area (Subdivisions 22–24) because it requires management choices. ICES also has no basis for advising on the allocation of the advised catch to commercial and recreational fisheries. The commercial catches corresponding to the advice will depend on the recreational landings and vice versa.

ICES notes, however, that the following topics should be taken into account:

- The distribution area of the WB cod stock is within Subdivisions 22–24.
- The distribution area for EB cod includes Subdivision 24.
- Commercial fishing in Subdivisions 22–23 will provide a catch of the WB cod stock only.
- Commercial fishing in Subdivision 24 will provide a mixed catch of the EB and WB cod stocks.
- Recreational catches of cod in the western Baltic management area are considered to consist of 100% WB cod. Recreational fisheries are currently not regulated by total catch limits. The total landings weight is rather stable from year to year and seems independent of the stock size of WB cod. A catch weight for recreational fishing must be subtracted from the advised catch of WB cod to get the catch weight for commercial fishing.
- The catch in Subdivision 24 of EB cod has been estimated to be a significant part of the total catch taken in the western Baltic management area.
- Species TAC for an area that includes two stocks of the species must be set to minimize the risk of overexploitation of the weakest stock, which at present is the WB cod.

These facts have management implications and a number of potential approaches:

- Set aside an amount to cover the recreational fishery in Subdivisions 22–24.
- A simple solution to area allocation would be to set the TAC for the WB management area to the advised catch for the WB cod stock and include the assumed catch for EB cod for Subdivision 24 into the TAC for management area Subdivisions 25–32 (see examples 1 and 2, Table 8.3.2.5). This option, however, will slightly increase the fishing mortality in the EB cod stock as some EB cod will still be caught in Subdivision 24.
- An alternative area allocation would be to include the advised catch for EB cod for Subdivision 24 into the WB management area TAC. In doing so it must be ensured that the allocated catch of EB cod is not taken in Subdivisions 22–23, to minimize the risk of overexploitation of the WB cod stock. This could be done by setting a sub-TAC for Subdivisions 22–23. To protect the local spawners in Subdivision 22 no more than 65% of the western Baltic stock commercial catch should be taken in in Subdivisions 22–23 (see examples 3 to 6, Table 8.3.2.5).

A number of specific catch options are provided below in Table 8.3.2.5; these have been selected to illustrate ways to respond to the issues discussed above. It is recognized that other options might be considered, and for that purpose Table 8.3.2.6 provides a guide to calculating the area TACs from the advice. None of the present options illustrating the allocation of EB cod to Subdivision 24, including the three options illustrated below (Table 8.3.2.5), are preferred over the other by ICES; this is considered a managerial decision. Similarly, ICES does not address whether it is possible to regulate recreational catch. Options 1, 3, and 5, included in Table 8.3.2.5, assume *status quo* recreational catch.

**Table 8.3.2.5**[§] Western Baltic cod stock in Subdivisions 22–24. Examples for calculations to derive catch limits for management areas (TACs) from the stock-based ICES advice for Baltic cod. Weights in tonnes. The basis of the calculations (A–H) is described in Table 8.3.2.6 and Figure 8.3.2.3.

| Rationale | | Western Baltic cod stock | | | Eastern Baltic cod stock | | TAC 22–24 | Sub-TAC 22–23 ^^^ | TAC 25–32 |
|---|---|---|---|---|---|---|---|---|---|
| | | advised | recreat. catch | commercial catch *** | advised | comm. catch in SD 24 | | | |
| | | **A** | B | C | **D** | E | F | G | H |
| 1 | Maximum protection for western stock, max. TAC for eastern area, recr. fishery assumed unchanged | **7797** | 2558 * | 5239 | **29 220** | 0 | 5239 | not required | 29 220 |
| 2 | Maximum protection for western stock, max. TAC for eastern area, recr. fishery reduced proportionally | **7797** | 1765 ** | 6032 | **29 220** | 0 | 6032 | not required | 29 220 |
| 3 | Same proportion of stock in WB area as 2014 (with MSY/precautionary advice), recr. fishery assumed unchanged | **7797** | 2558 * | 5239 | **29 220** | 4450 ^ | 9689 | 3405 | 24 770 |
| 4 | Same proportion of stock in WB area as 2014 (with MSY/precautionary advice), recr. fishery reduced proportionally | **7797** | 1765 ** | 6032 | **29 220** | 4450 ^ | 10 482 | 3921 | 24 770 |
| 5 | Maximum TAC for western area, recr. fishery assumed unchanged | **7797** | 2558 * | 5239 | **29 220** | 7121 ^^ | 12 360 | 3405 | 22 099 |
| 6 | Maximum TAC for western area, recr. fishery reduced proportionally | **7797** | 1765 ** | 6032 | **29 220** | 7121 ^^ | 13 153 | 3921 | 22 099 |

* Mean recreational catch for 2012–2014 (incomplete, only German data included in the assessment and forecast).

** Based on the reduction of total assumed catch (2015) to total advised catch (2016): factor 0.70.

*** Difference between advised total catch and recreational catch.

^ Assumed catch of EB cod reduced proportionally with advised catch for EB cod.

^^ Catch of EB cod in Subdivision 24 (2014).

^^^ Based on the mean fraction of commercial catch of western Baltic cod stock caught in Subdivisions 22–23 (2012–2014): 0.65.

[§] Version 3: table updated

**Table 8.3.2.6** Western Baltic cod stock in Subdivisions 22–24. Guide to calculations to obtain area TACs for western and eastern Baltic cod from ICES stock-based catch advice, taking into account the historical migration of the eastern stock to the western area, allocation for recreational catches for the western stock, and protection of local spawners in Subdivisions 22–23. Illustrations of calculations (A–H) can be found in Table 8.3.2.5 and Figure 8.3.2.3.

| Parameter | | Calculation / value | Notes |
|---|---|---|---|
| Advised catch of WB cod stock | A | no more than 7797 t** | If MSY approach is applied, catches of western Baltic cod stock in 2016 |
| Amount set aside for recreational landings | B | Managers choice | Recreational catch that was estimated at 2558 tonnes as an average of the last three years. |
| Allocated commercial catch of WB cod in Subdivisions 22–24 | C | C = A−B | Subtract catch set aside for recreational fisheries |
| Advised catch of EB cod stock | D | no more than 29 220 t | If MSY approach is applied, catches of eastern* Baltic cod stock in 2016 |
| Amount of EB cod to be taken in Western Baltic (Subdivision 24) | E | Managers choice | See examples in Table 8.3.2.2. |
| Allocated commercial catch for WB area | F | E+C | The overall TAC for Subdivisions 22−24 |
| Allocated commercial catch for WB area (Subdivisions 22–23) | G | F × 0.65 or C | Remainder F−G is to be taken in Subdivision 24 |
| Allocated catch for EB area (Subdivisions 25–32) | H | D−E | EB stock minus component that is allocated to Subdivision 24 |

* Version 2: corrected.

**Version 3: value updated.

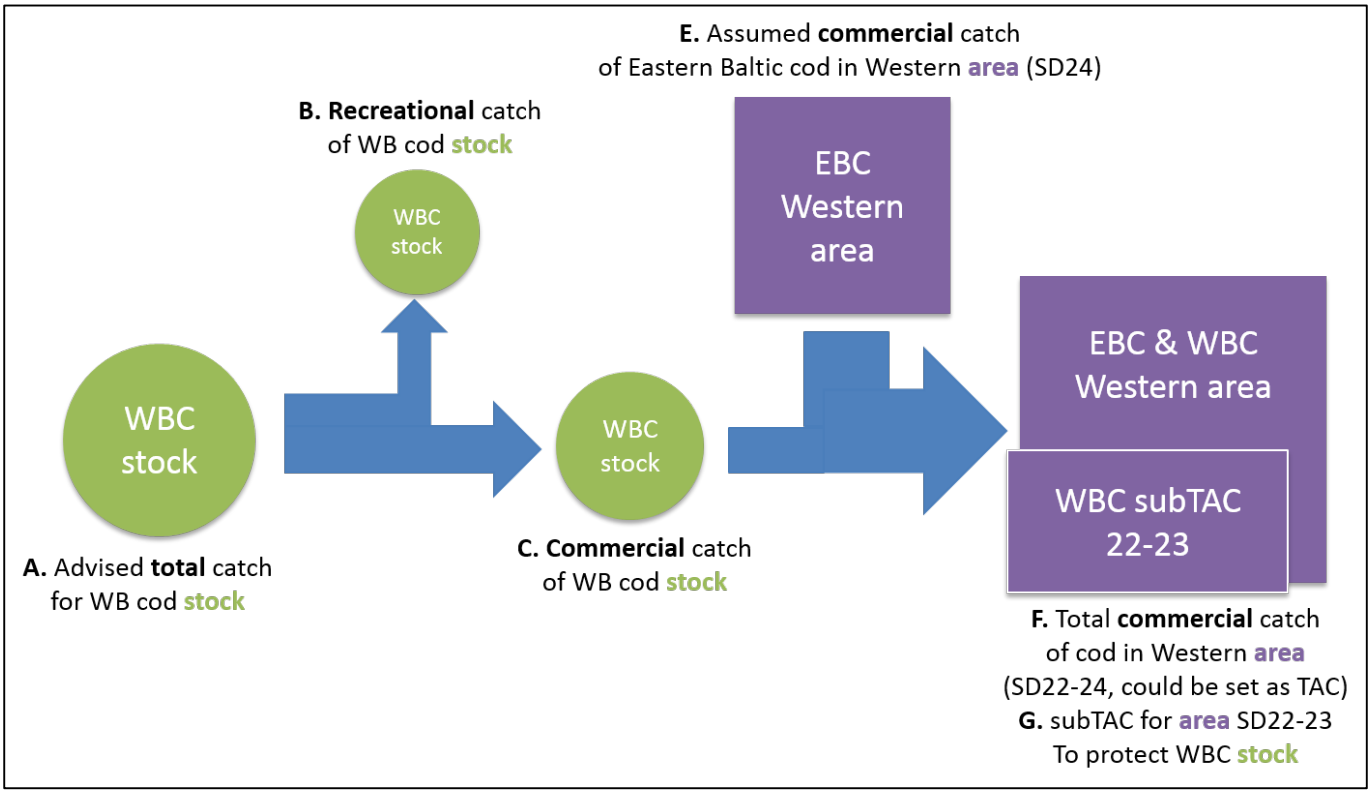


**Figure 8.3.2.3** Western Baltic cod stock in Subdivisions 22–24. Illustration of calculations to obtain area TACs for western and eastern Baltic cod from ICES stock-based catch advice, taking into account migration of the eastern stock to the western area, recreational catches for the western stock, and protection for local spawners in Subdivisions 22–23.

**Table 8.3.2.7** Western Baltic cod stock in Subdivisions 22–24. ICES catches in the western Baltic management area (Subdivisions 22–24) for western and eastern Baltic cod stocks (in tonnes).

| Year | WB cod stock | | | | | EB cod stock | | | | | EB+WB cod stock |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Landings | Discards | Recreational catch | Fraction of catch in SDs 22–23 | Fraction of catch in SD 24 | Landings in SD 24 | Discards in SD24 | Landings in SDs 25–32 | Discards in SDs 25–32 | Fraction of catch in SD 24 | Catch in SDs 22–24 |
| 1994 | 21 409 | 2 386 | 1 991 | 0.46 | 0.54 | 1 784 | — | 100 856 | 1 956 | | |
| 1995 | 29 854 | 2 896 | 2 163 | 0.66 | 0.34 | 4 041 | — | 107 718 | 1 872 | | |
| 1996 | 38 335 | 8 851 | 2 192 | 0.65 | 0.35 | 10 210 | — | 124 189 | 1 443 | | |
| 1997 | 37 009 | 4 405 | 2 337 | 0.65 | 0.35 | 6 615 | — | 88 600 | 3 462 | | |
| 1998 | 29 628 | 7 044 | 2 205 | 0.61 | 0.39 | 4 588 | — | 67 428 | 2 299 | | |
| 1999 | 35 817 | 5 202 | 2 278 | 0.66 | 0.34 | 6 338 | — | 72 995 | 1 838 | | |
| 2000 | 31 653 | 3 231 | 2 244 | 0.68 | 0.32 | 6 694 | — | 89 289 | 6 019 | | |
| 2001 | 26 983 | 3 181 | 2 335 | 0.64 | 0.36 | 7 261 | — | 91 328 | 2 891 | | |
| 2002 | 19 592 | 1 077 | 2 218 | 0.71 | 0.29 | 4 566 | — | 67 740 | 1 462 | | |
| 2003 | 18 055 | 4 318 | 2 187 | 0.62 | 0.38 | 6 569 | 17 | 69 476 | 2 024 | 0.08 | 31 147 |
| 2004 | 15 916 | 3 010 | 2 474 | 0.68 | 0.32 | 4 925 | 0 | 68 578 | 1 201 | 0.07 | 26 325 |
| 2005 | 16 845 | 2 013 | 2 967 | 0.67 | 0.33 | 5 191 | 2 981 | 55 032 | 1 670 | 0.13 | 29 997 |
| 2006 | 16 472 | 1 878 | 1 959 | 0.70 | 0.30 | 6 279 | 0 | 65 532 | 4 644 | 0.08 | 26 588 |
| 2007 | 15 859 | 1 014 | 1 781 | 0.65 | 0.35 | 7 876 | 1 186 | 50 843 | 4 146 | 0.14 | 27 716 |
| 2008 | 11 148 | 103 | 1 765 | 0.67 | 0.33 | 8 934 | 1 020 | 42 235 | 3 746 | 0.18 | 22 970 |
| 2009 | 7 093 | 247 | 2 888 | 0.51 | 0.49 | 8 456 | 568 | 48 439 | 3 328 | 0.15 | 19 252 |
| 2010 | 7 641 | 942 | 2 607 | 0.60 | 0.40 | 6 479 | 429 | 50 277 | 3 543 | 0.11 | 18 098 |
| 2011 | 8 845 | 230 | 2 032 | 0.71 | 0.29 | 7 487 | 551 | 50 368 | 3 850 | 0.13 | 19 145 |
| 2012 | 8 654 | 307 | 2 354 | 0.64 | 0.36 | 8 419 | 598 | 50 972 | 6 795 | 0.14 | 20 331 |
| 2013 | 7 742 | 274 | 2 428 | 0.67 | 0.33 | 5 226 | 1 976 | 31 175 | 5 020 | 0.17 | 17 646 |
| 2014 | 8 099 | 452 | 2 891 | 0.63 | 0.37 | 5 439 | 1 682 | 28 908 | 9 627 | 0.16 | 18 563 |

## Reference points

**Table 8.3.2.8** Western Baltic cod stock in Subdivisions 22–24. Reference points, values, and their technical basis.

| Framework | Reference point | Value | Technical basis | Reference |
|---|---|---|---|---|
| MSY approach | $F_{MSY}$ | 0.26 | | ICES, 2015b |
| | MSY $B_{trigger}$ | 38 400 t | $B_{pa}$ | ICES, 2015c |
| Precautionary approach | $B_{lim}$ | 27 400 t | Break point of the stock–recruitment relationship. | ICES, 2015c |
| | $B_{pa}$ | 38 400 t | 1.4 × $B_{lim}$ | ICES, 2015c |
| | $F_{lim}$ | Not defined. | | |
| | $F_{pa}$ | Not defined. | | |
| Management plan* | $SSB_{MGT}$ | Not defined. | | |
| | $F_{MGT}$ | 0.60 | EU management plan based on stochastic simulations (reference F age range 3–6). | EC, 2007 |

* The basis for the management plan (cod in the area of Subdivisions 22–24) is not comparable to the basis for the current stock assessment (western Baltic cod stock).

## Basis of the assessment

**Table 8.3.2.9** Western Baltic cod stock in Subdivisions 22–24. The basis of the assessment and advice.

| | |
|---|---|
| ICES stock data category | 1 (ICES, 2015d) |
| 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, ages and length frequencies from catch sampling), recreational catch (only German data included). Two survey indices (BITS-Q1 and BITS-Q4); Annual maturity data from BITS-Q1 surveys. Natural mortalities for age 1 derived from multispecies assessment, unchanged since 1996. Annual stock separation key to split catches in Subdivision 24 to eastern and western cod, derived from otolith shape analyses combined with genetics. |
| Discards and bycatch | Included in the assessment since 1994, dataseries from the main fleets. |
| Indicators | None. |
| Other information | Benchmarked in 2015 (ICES, 2015c). The basis for the assessment changed this year to being for the western Baltic cod stock, whereas assessments in earlier years were for the area of Subdivisions 22–24. |
| Working group | Baltic Fisheries Assessment Working Group (WGBFAS) |

## Information from stakeholders

There is no available information.

## History of advice, catch, and management

**Table 8.3.2.10** Western Baltic cod stock in Subdivisions 22–24. History of ICES advice, the agreed TAC, and ICES estimates of landings by area. Weights in thousand tonnes.

| Year | ICES advice | Predicted catch corresponding to advice | Agreed TAC* | ICES estimated commercial landings Subdivisions 22–24 |
|---|---|---|---|---|
| 1987 | TAC | 9 | | 29 |
| 1988 | TAC | 16 | | 29 |
| 1989 | TAC | 14 | 220 | 19 |
| 1990 | TAC | 8 | 210 | 18 |
| 1991 | TAC | 11 | 171 | 17 |
| 1992 | Substantial reduction in F | - | 100 | 18 |
| 1993 | F at lowest possible level | - | 40 | 21 |
| 1994 | TAC | 22 | 60 | 31 |
| 1995 | 30% reduction in fishing effort from 1994 level | - | 120 | 34 |
| 1996 | 30% reduction in fishing effort from 1994 level | - | 165 | 51 |
| 1997 | Fishing effort should not be allowed to increase above the level of recent years | - | 180 | 44 |
| 1998 | 20% reduction in F from 1996 | 35 | 160 | 34 |
| 1999 | At or below $F_{sq}$ with 50% probability | 38 | 126 | 42 |
| 2000 | Reduce F by 20% | 44.6 | 105 | 38 |
| 2001 | Reduce F by 20% | 48.6 | 105 | 34 |
| 2002 | Reduce F to below 1.0 | 36.3 | 76 | 24 |
| 2003 | Reduce F to below 1.0 | 22.6–28.8** | 75 | 25 |
| 2004 | Reduce F to below 1.0 | < 29.6 | 29.6 | 21 |
| 2005 | Reduce F to below 0.92 | < 23.4 | 24.7 | 22 |
| 2006 | Management plan | < 28.4 | 28.4 | 23 |
| 2007 | Keep SSB at $B_{pa}$ | < 20.5 | 26.7 | 24 |
| 2008 | Rebuild SSB to $B_{pa}$ | < 13.5 | 19.2 | 20 |
| 2009 | Rebuild SSB to $B_{pa}$ | < 13.7 | 16.3 | 15.3 |
| 2010 | Management plan | < 17.7 | 17.7 | 14.1 |
| 2011 | See scenarios | - | 18.8 | 16.3 |
| 2012 | Management plan | 21.3 | 21.3 | 17.1 |
| 2013 | Management plan | 20.8 | 20.0 | 13.0 |
| 2014 | Management plan | 17.0 | 17.0 | 13.5 |
| 2015 | MSY approach | 8.793*** | 15.9 | |
| 2016 | MSY approach (F = 0.23^^^) | ≤ 7.797 ^^ | | |

* Included in TAC for total Baltic, until and including 2003.

** Two options based on implementation of the adopted mesh regulation.

*** Commercial catch.

^ Estimated for the western Baltic cod stock including recreational catches. The values for the other years are for the area of Subdivisions 22–24 and include a fraction of the eastern Baltic cod stock.

^^ Version 3: value updated.

^^^ Version 4: value corrected.

## History of catch and landings

**Table 8.3.2.11** Western Baltic cod stock in Subdivisions 22–24. Catch distribution by fleet in 2014 as estimated by ICES.

| Total catch (2014) | Commercial landings | | Commercial discards | Recreational catch (partially reported) |
|---|---|---|---|---|
| 11.4 kt | 60% trawl | 40% gillnet | 0.5 kt | 2.9 kt |
| | 8.0 kt | | | |

**Table 8.3.2.12** Western Baltic cod stock in Subdivisions 22–24. History of commercial landings, both official and ICES estimated values are presented by area for each country participating in the fishery (includes landings of the eastern Baltic cod stock in Subdivision 24).

| Year | Denmark | | | | Finland | German Dem.Rep.* | Germany, FRG | | | Estonia | | Lithuania | Latvia | Poland | | Sweden | | | Total | | | Unalloc. | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 24 | 22 | 23 | 22+24 | 24 | 22+24 | 22 | 24 | 22+24 | 22 | 24 | 24 | 24 | 24 | 24 | 22 | 23 | 22+24 | 22 | 23 | 24 | | |
| 1965 | | | | 19 457 | | 9 705 | | | 13 350 | | | | | | | | | 2 182 | 27 867 | | 17 007 | | 44 874 |
| 1966 | | | | 20 500 | | 8 393 | | | 11 448 | | | | | | | | | 2 110 | 27 864 | | 14 587 | | 42 451 |
| 1967 | | | | 19 181 | | 10 007 | | | 12 884 | | | | | | | | | 1 996 | 28 875 | | 15 193 | | 44 068 |
| 1968 | | | | 22 593 | | 12 360 | | | 14 815 | | | | | | | | | 2 113 | 32 911 | | 18 970 | | 51 881 |
| 1969 | | | | 20 602 | | 7 519 | | | 12 717 | | | | | | | | | 1 413 | 29 082 | | 13 169 | | 42 251 |
| 1970 | | | | 20 085 | | 7 996 | | | 14 589 | | | | | | | | | 1 289 | 31 363 | | 12 596 | | 43 959 |
| 1971 | | | | 23 715 | | 8 007 | | | 13 482 | | | | | | | | | 1 419 | 32 119 | | 14 504 | | 46 623 |
| 1972 | | | | 25 645 | | 9 665 | | | 12 313 | | | | | | | | | 1 277 | 32 808 | | 16 092 | | 48 900 |
| 1973 | | | | 30 595 | | 8 374 | | | 13 733 | | | | | | | | | 1 655 | 38 237 | | 16 120 | | 54 357 |
| 1974 | | | | 25 782 | | 8 459 | | | 10 393 | | | | | | | | | 1 937 | 31 326 | | 15 245 | | 46 571 |
| 1975 | | | | 23 481 | | 6 042 | | | 12 912 | | | | | | | | | 1 932 | 31 867 | | 12 500 | | 44 367 |
| 1976 | | | 712 | 29 446 | | 4 582 | | | 12 893 | | | | | | | | | 1 800 | 33 368 | 712 | 15 353 | | 49 433 |
| 1977 | | | 1 166 | 27 939 | | 3 448 | | | 11 686 | | | | | | | 550 | | 1 516 | 29 510 | 1 716 | 15 079 | | 46 305 |
| 1978 | | | 1 177 | 19 168 | | 7 085 | | | 10 852 | | | | | | | 600 | | 1 730 | 24 232 | 1 777 | 14 603 | | 40 612 |
| 1979 | | | 2 029 | 23 325 | | 7 594 | | | 9 598 | | | | | | | 700 | | 1 800 | 26 027 | 2 729 | 16 290 | | 45 046 |
| 1980 | | | 2 425 | 23 400 | | 5 580 | | | 6 657 | | | | | | | 1 300 | | 2 610 | 22 881 | 3 725 | 15 366 | | 41 972 |
| 1981 | | | 1 473 | 22 654 | | 11 659 | | | 11 260 | | | | | | | 900 | | 5 700 | 26 340 | 2 373 | 24 933 | | 53 646 |
| 1982 | | | 1 638 | 19 138 | | 10 615 | | | 8 060 | | | | | | | 140 | | 7 933 | 20 971 | 1 778 | 24 775 | | 47 524 |
| 1983 | | | 1 257 | 21 961 | | 9 097 | | | 9 260 | | | | | | | 120 | | 6 910 | 24 478 | 1 377 | 22 750 | | 48 605 |
| 1984 | | | 1 703 | 21 909 | | 8 093 | | | 11 548 | | | | | | | 228 | | 6 014 | 27 058 | 1 931 | 20 506 | | 49 495 |
| 1985 | | | 1 076 | 23 024 | | 5 378 | | | 5 523 | | | | | | | 263 | | 4 895 | 22 063 | 1 339 | 16 757 | | 40 159 |
| 1986 | | | 748 | 16 195 | | 2 998 | | | 2 902 | | | | | | | 227 | | 3 622 | 11 975 | 975 | 13 742 | | 26 692 |
| 1987 | | | 1 503 | 13 460 | | 4 896 | | | 4 256 | | | | | | | 137 | | 4 314 | 12 105 | 1 640 | 14 821 | | 28 566 |
| 1988 | | | 1 121 | 13 185 | | 4 632 | | | 4 217 | | | | | | | 155 | | 5 849 | 9 680 | 1 276 | 18 203 | | 29 159 |
| 1989 | | | 636 | 8 059 | | 2 144 | | | 2 498 | | | | | | | 192 | | 4 987 | 5 738 | 828 | 11 950 | | 18 516 |
| 1990 | | | 722 | 8 584 | | 1 629 | | | 3 054 | | | | | | | 120 | | 3 671 | 5 361 | 842 | 11 577 | | 17 780 |
| 1991 | | | 1 431 | 9 383 | | | | | 2 879 | | | | | | | 232 | | 2 768 | 7 184 | 1 663 | 7 846 | | 16 693 |
| 1992 | | | 2 449 | 9 946 | | | | | 3 656 | | | | | | | 290 | | 1 655 | 9 887 | 2 739 | 5 370 | | 17 996 |
| 1993 | | | 1 001 | 8 666 | | | | | 4 084 | | | | | | | 274 | | 1 675 | 7 296 | 1 275 | 7 129 | 5 528 | 21 228 |
| 1994 | | | 1 073 | 13 831 | | | | | 4 023 | | | | | | | 555 | | 3 711 | 8 229 | 1 628 | 13 336 | 7 502 | 30 695 |
| 1995 | | | 2 547 | 18 762 | 132 | | | | 9 196 | | | | 15 | | | 611 | | 2 632 | 16 936 | 3 158 | 13 801 | | 33 895 |
| 1996 | | | 2 999 | 27 946 | 50 | | | | 12 018 | | 50 | | 32 | | | 1 032 | | 4 418 | 21 417 | 4 031 | 23 097 | 2 300 | 50 845 |
| 1997 | | | 1 886 | 28 887 | 11 | | | | 9 269 | | 6 | | | 263 | | 777 | | 2 525 | 21 966 | 2 663 | 18 995 | | 43 624 |
| 1998 | | | 2 467 | 19 192 | 13 | | | | 9 722 | | 8 | | 13 | 623 | | 607 | | 1 571 | 15 093 | 3 074 | 16 049 | | 34 216 |
| 1999 | | | 2 839 | 23 074 | 116 | | | | 13 224 | | 10 | | 25 | 660 | | 682 | | 1 525 | 20 409 | 3 521 | 18 225 | | 42 155 |
| 2000 | | | 2 451 | 19 876 | 171 | | | | 11 572 | | 5 | | 84 | 926 | | 698 | | 2 564 | 18 934 | 3 149 | 16 264 | | 38 347 |
| 2001 | | | 2 124 | 17 446 | 191 | | | | 10 579 | | 40 | | 46 | 646 | | 693 | | 2 479 | 14 976 | 2 817 | 16 451 | | 34 244 |
| 2002 | | | 2 055 | 11 657 | 191 | | | | 7 322 | | | | 71 | 782 | | 354 | | 1 727 | 11 968 | 2 409 | 9 781 | | 24 158 |
| 2003 | | | 1 373 | 13 275 | 59 | | | | 6 775 | | | | 124 | 568 | | 551 | | 1 899 | 9 573 | 1 925 | 13 127 | | 24 624 |
| 2004 | | | 1 927 | 11 386 | | | | | 4 651 | | | | 221 | 538 | | 393 | | 1 727 | 9 091 | 2 320 | 9 430 | 13 | 20 854 |
| 2005 | | | 1 902 | 9 867 | 2 | | | | 7 002 | 72 | 67 | | 476 | 1 093 | | 720 | | 835 | 8 729 | 2 621 | 10 686 | 9 | 22 045 |
| 2006 | | | 1 899 | 9 761 | 242 | | | | 7 516 | | 91 | | 586 | 801 | | | | 1 855 | 9 979 | 1 914 | 10 858 | | 22 751 |
| 2007 | | | 2 169 | 8 975 | 220 | | | | 6 802 | | 69 | | 273 | 2 371 | | 534 | | 2 322 | 7 840 | 2 713 | 13 183 | | 23 736 |
| 2008 | | | 1 612 | 8 582 | 159 | | | | 5 489 | | 134 | | 30 | 1 361 | | 525 | | 2 189 | 5 687 | 2 139 | 12 256 | | 20 082 |
| 2009 | | | 567 | 7 871 | 259 | | | | 4 020 | | 194 | | 23 | 529 | | 269 | | 1 817 | 3 451 | 839 | 11 259 | | 15 549 |
| 2010 | | | 689 | 6 849 | 203 | | | | 4 250 | | | 9 | 159 | 319 | | 490 | | 1 151 | 3 925 | 1 179 | 9 016 | | 14 120 |
| 2011 | | | 783 | 7 799 | 149 | | | | 4 521 | | | | 24 | 487 | | 414 | | 2 153 | 5 493 | 1 198 | 9 641 | | 16 332 |

| Year | Denmark | | | | Finland | German Dem.Rep.* | Germany, FRG | | | Estonia | | Lithuania | Latvia | Poland | | Sweden | | | Total | | | Unalloc. | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 24 | 22 | 23 | 22+24 | 24 | 22+24 | 22 | 24 | 22+24 | 22 | 24 | 24 | 24 | 24 | 24 | 22 | 23 | 22+24 | 22 | 23 | 24 | | |
| 2012 | | | 733 | 8 381 | 260 | | | | 4 522 | | 3 | | 11 | 818 | | | 390 | 1 955 | 4 896 | 1 123 | 11 053 | | 17 072 |
| 2013 | | | 580 | 6 566 | 50 | | | | 3 237 | | | | 128 | 708 | | | 380 | 1 317 | 4 675 | 960 | 7 333 | | 12 968 |
| 2014 | 4 597 | 2 206 | 795 | | 7 | | 2 109 | 1 134 | | | | | 39 | 854 | 1 230 | 1 | 565 | | 4 316 | 1 361 | 7 862 | | 13 538 |

* Includes landings from October to December 1990 of Fed.Rep.Germany.

## Summary of the assessment

**Table 8.3.2.13** Western Baltic cod stock in Subdivisions 22–24. Assessment summary with weights (in tonnes). Recruitment in thousands.

| Year | Recruit(Age 1) | High | Low | SSB | High | Low | Landings | Discards | Mean F (Ages 3–5) | High | Low | Rec. catch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1994 | 65 186 | 118 648 | 35 813 | 31 666 | 43 304 | 23 156 | 21 409 | 2 386 | 1.02 | 1.26 | 0.83 | 1 991.21 |
| 1995 | 90 672 | 163 136 | 50 396 | 31 257 | 39 596 | 24 674 | 29 854 | 2 896 | 1.14 | 1.37 | 0.95 | 2 162.71 |
| 1996 | 25 387 | 48 580 | 13 267 | 34 269 | 43 126 | 27 231 | 38 335 | 8 851 | 1.11 | 1.31 | 0.94 | 2 192.27 |
| 1997 | 80 098 | 141 272 | 45 413 | 35 561 | 47 172 | 26 808 | 37 009 | 4 405 | 1.12 | 1.32 | 0.95 | 2 337.32 |
| 1998 | 111 302 | 196 147 | 63 157 | 27 529 | 34 411 | 22 023 | 29 628 | 7 044 | 1.13 | 1.34 | 0.96 | 2 204.61 |
| 1999 | 38 910 | 67 812 | 22 326 | 31 761 | 39 856 | 25 311 | 35 817 | 5 202 | 1.25 | 1.48 | 1.06 | 2 277.65 |
| 2000 | 41 481 | 70 880 | 24 276 | 36 534 | 47 393 | 28 163 | 31 653 | 3 231 | 1.22 | 1.43 | 1.04 | 2 243.64 |
| 2001 | 27 502 | 45 191 | 16 736 | 30 730 | 37 565 | 25 139 | 26 983 | 3 181 | 1.26 | 1.48 | 1.07 | 2 334.57 |
| 2002 | 44 623 | 71 622 | 27 801 | 24 416 | 29 921 | 19 924 | 19 592 | 1 077 | 1.22 | 1.44 | 1.04 | 2 217.84 |
| 2003 | 14 704 | 24 715 | 8 748 | 19 176 | 23 065 | 15 942 | 18 055 | 4 318 | 1.12 | 1.31 | 0.95 | 2 186.96 |
| 2004 | 64 344 | 103 682 | 39 931 | 21 068 | 26 417 | 16 801 | 15 916 | 3 010 | 1.09 | 1.29 | 0.92 | 2 473.68 |
| 2005 | 23 766 | 37 852 | 14 922 | 27 065 | 33 239 | 22 038 | 16 845 | 2 013 | 0.98 | 1.17 | 0.82 | 2 966.83 |
| 2006 | 22 584 | 37 001 | 13 784 | 31 195 | 39 226 | 24 807 | 16 472 | 1 878 | 0.87 | 1.08 | 0.70 | 1 958.85 |
| 2007 | 7 606 | 12 181 | 4 749 | 32 370 | 40 220 | 26 053 | 15 859 | 1 014 | 0.90 | 1.08 | 0.75 | 1 780.70 |
| 2008 | 3 911 | 7 494 | 2 041 | 22 697 | 27 513 | 18 724 | 11 148 | 103 | 0.95 | 1.13 | 0.80 | 1 765.36 |
| 2009 | 29 319 | 48 534 | 17 712 | 15 386 | 18 461 | 12 823 | 7 093 | 247 | 1.01 | 1.21 | 0.84 | 2 888.19 |
| 2010 | 11 107 | 17 768 | 6 943 | 13 747 | 16 785 | 11 259 | 7 641 | 942 | 0.99 | 1.18 | 0.83 | 2 607.37 |
| 2011 | 17 654 | 29 058 | 10 725 | 13 586 | 17 355 | 10 635 | 8 845 | 230 | 0.92 | 1.11 | 0.77 | 2 032.23 |
| 2012 | 12 555 | 20 311 | 7 761 | 16 012 | 20 038 | 12 795 | 8 654 | 307 | 0.88 | 1.09 | 0.71 | 2 353.91 |
| 2013 | 33 996 | 57 563 | 20 078 | 14 118 | 17 511 | 11 382 | 7 742 | 274 | 0.94 | 1.23 | 0.71 | 2 427.96 |
| 2014 | 23 695 | 44 954 | 12 489 | 18 363 | 24 299 | 13 877 | 8 099 | 452 | 0.84 | 1.22 | 0.58 | 2 891.07 |
| 2015 | 19 750 | 51 149 | 7 626 | 23 742 | 36 604 | 15 399 | | | | | | |
| **Average** | **36 825** | **64 343** | **21 213** | **25 102** | **31 958** | **19 771** | **19 650** | **2527** | **1.04** | **1.26** | **0.87** | **2 299.757** |

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