Summary of ICES advice

Fishing opportunities, catch and effort of Baltic Sea fish stocks in 2019

12 June 2018

Update 18 June: Correction to corresponding quota for Western Baltic cod

On 31 May 2018, the International Council for the Exploration of the Sea (ICES) published advice regarding the exploitation of the Baltic Sea fish stocks for 2019.

This paper is a summary of that ICES advice. It contains the top lines along with a potential TAC calculation for each stock. When you consider that some of the individual ICES stock advice sheets are longer than this entire document you might appreciate this relatively short summary covering all the commercial Baltic stocks.

Where possible we have quoted directly from the ICES advice. We have extracted what we thought were the key points and added our own commentary only where we thought it necessary to aid clarity or to highlight relevant issues. When you need to read deeply on a particular stock you of course also need to read the relevant ICES advice sheet.

We have included a summary of ICES advice for each stock including TAC sharing agreements with non-EU countries, details of discards and misreporting and short commentary on some of the main Baltic fish stock management issues.

We hope you find it useful.

If you have corrections, clarifications, questions or suggestions please do get in contact.

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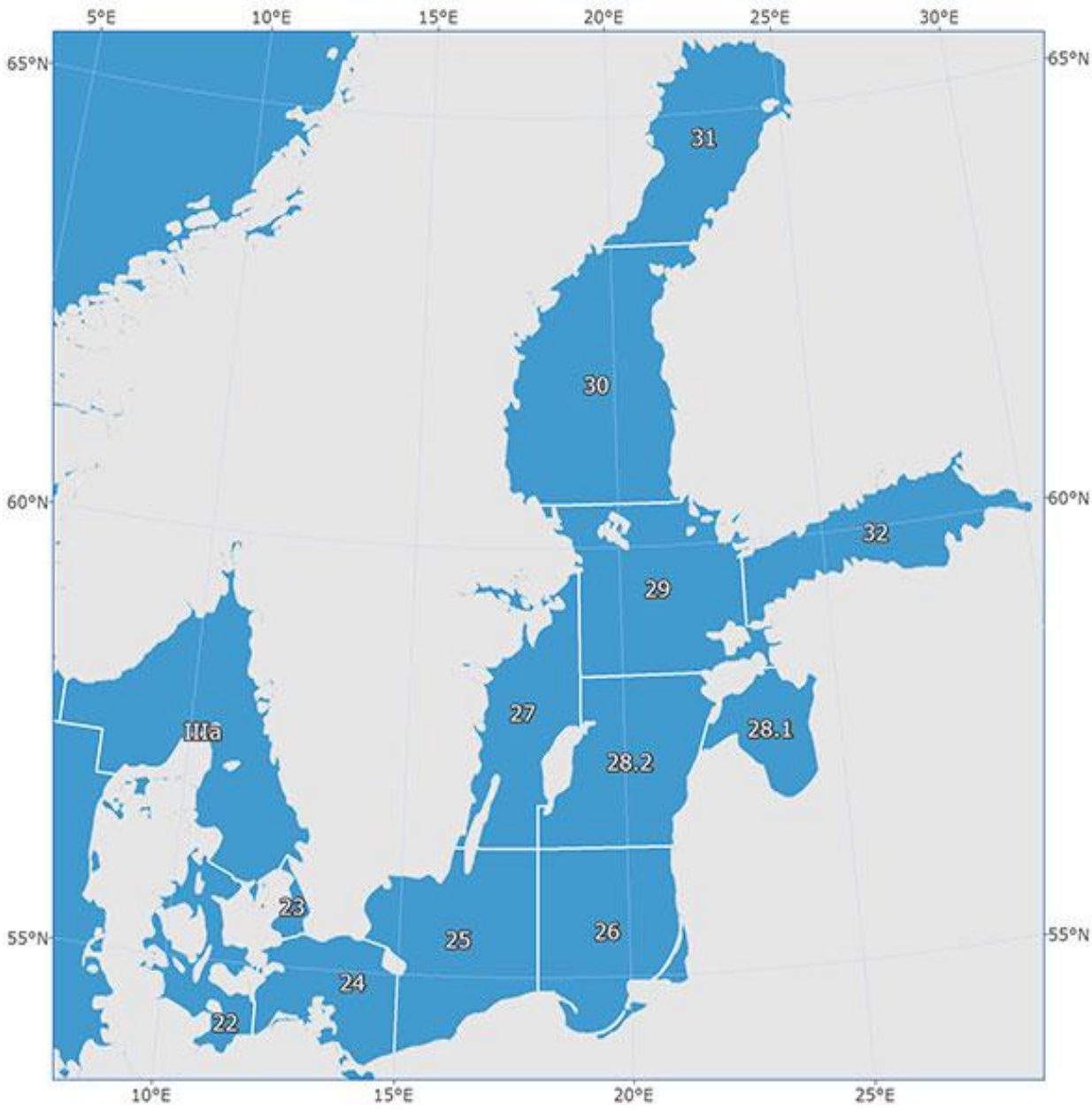
Map of the Baltic Sea showing management subdivisions[1]



Summary table

[1] FAO 2016. [FAO major fishing areas]

Table showing ICES advice for 2019 including the total catch, percentage difference from advice for 2018, and the 2019 EU quota corresponding to ICES advice.

N.B. In the advice where ranges are provided, ICES has restated the intent of the Baltic Multiannual Plan (MAP) that "catches higher than those corresponding to FMSY can only be utilized under conditions specified in the MAP."

Stock by management area and subdivision	ICES advised range or total catch for 2019 up to FMSY (tonnes)	Change in ICES FMSY advice for 2018 (%)	EU commercial quota ranges corresponding to ICES advice for 2019, adjusted for management areas and reduced by third country quotas
Cod, Western Baltic, 22–24	9 094 – 15 021* 9 094**	+72%+	10 041–12 054°++
Cod, Eastern Baltic, 25–32	16 685	-36%	11 137*** ++
Herring, Western Baltic Spring Spawners, 20–24 (TAC for SDs 22-24 & area IIIa)	zero	-100%	zero
Herring, Central Baltic, 25–29 & 32	115 591 – 155 333	-42%	100 497 – 136 464***++
Herring, Gulf of Riga, 28.1	20 664 – 26 932	+8%	24 776 – 31 044++
Herring, Gulf of Bothnia, 30–31	88 703	-7%	88 703
Sprat, Baltic Sea, 22–32	225 752 – 301 125	+3%	202 996 – 270 772
Plaice, Kattegat, Belts & Sound, 21–23	15 237 (MSY = 9 338)	+282% +73%	18 962 (MSY option = 13 063)
Plaice, Baltic, 24–32	3 725	+20%	
Salmon, Baltic, 22–31 (*individual fish*)	116 000	0%	62 097***
Salmon, Gulf of Finland, 32 (*individual fish*) (*reared fish only*)	11 800	0%	8 776***
Sea trout, Baltic Sea, 22–32	Reduce fishing	0%	Not quota managed
Flounder, Belt Sea & Sound, 22–23	4 040	0%	
Flounder, Southern Baltic, 24–25	41 628	0%	
Flounder, Eastern Gotland & Gulf of Gdansk, 26 & 28	1 617	0%	
Flounder, Northern Baltic, 27 & 29–32 (*landings*)	395	0%	
Brill, Baltic Sea, 22–32	11.5	0%	
Turbot, Baltic, 22–32	No advice	n/a	
Dab, Baltic Sea, 22–32	No advice	n/a	

* Total catch includes commercial + recreational
° Range depends on assumed recreational catch
** ICES specifically suggests to use $F_{MSY\ lower}$ value
*** Taking account of prior EU-Russia TAC sharing agreement
\+ $F_{MSY\ lower}$ 2019 relative to F_{MSY} in 2018
++ Adjusted to account for stock mixing in adjacent management area

ICES advice notes discards and misreporting in some Baltic fisheries

- Cod in SDs 22-24, Western Baltic Cod: Discards up from 2.5 to 4.8% by weight.
- Cod in SDs 25-32, Eastern Baltic Cod: Discards 11% by weight (assumed to be an underestimate) and ongoing problems of observer access to vessels. 11% by weight equals 21,2% of the individual fish caught.
- Plaice in SD 21-23: Discards 998 tonnes (approx 23.5%).
- Plaice in SD 24-32: Discards 408 tonnes (approx 38.6%). ICES notes discarded fraction can cover all length classes and comprise as much as 100% of the catch.
- Salmon in SDs 22–31: Misreported 29% (33 640 individual salmon)
- Flounder in SDs 22-23: Discards 1 117 tonnes (approx. 28%)
- Flounder in SDs 24-25: Discards 12 072 tonnes (approx. 29%)

Summary of ICES advice for each Baltic fish stock

Cod in SDs 22–24, Western Baltic

ICES advises that total catches in 2019 corresponding to the F ranges in the Baltic MAP are between 9 094 tonnes and 23 992 tonnes. Catches higher than FMSY (15 021 tonnes) can only be taken under conditions specified in the MAP. Depending on the management decision for recreational catches, assumed to be between 1 754 tonnes and 3 227 tonnes, the corresponding commercial catches are between 5 867 tonnes and 22 238 tonnes.

Somewhat buried in the ICES advice paper is the fact that "ICES suggests to use the FMSYlower value in the MAP when setting the TAC", i.e. 9094 tonnes, which includes recreational catches and Eastern Baltic cod caught in SD 24.

The positive perspective of the stock development in the forecast is mainly due to one strong year class (2016). Although the spawning-stock biomass has increased until 2018, it is still below Blim. Fishing mortality in 2017 was still considerably above FMSY. The 2016 year class is the only strong year class in more than ten years and the present advice is highly dependent on the predicted development of this year class, which is not yet fully recruited to the fishery. The 2016 year class will account for the majority of the predicted catches in 2019 (83%) and SSB in 2020 (81%). Additionally, the 2015 and 2017 year classes are historical lows. There is a risk of growth overfishing because the 2016 year class fish have not yet reached their full growth potential. Therefore, to make use of the full growth potential of the 2016 year class, ICES suggests to use the FMSY lower value in the MAP when setting the TAC.

Although the spawning-stock biomass has increased until 2018, it is still below MSY Btrigger, Bpa, and Blim. However the prediction that the SSB in 2019 will be above MSY Btrigger, means that the ICES advice rule whereby F is adjusted (reduced) by the factor SSB/MSY Btrigger, was not used.

Recruitment figures should be noted - Recruitment (Age 1) in thousands (ICES Table 13)

- **2016 – 2 939**
- **2017 – 85 991**
- **2018 – 1 633**

These figures illustrate what ICES means when it says that recruitment in 2016 (2017 age 1) was strong whilst recruitment in 2016 and 2018 were record lows.

The estimated discard in 2017 was approximately 4.8%, based on observer data, an increase from 2.5% in 2016.

Spawning closure: ICES notes that due to a high recruitment in 2016 and a record low in 2017 it is too early to evaluate the effect of the relocated closure.

Commentary: We note that for 5 of the 8 weeks in 2017 there was fishing for flatfish that was also catching cod, so the closure wasn't actually fully in force during this period. We also note that the ICES Baltic ecoregion report for 2018 says, that in 2016, STECF evaluated revised spawning closures and concluded that the spatial closure appeared greatly beneficial to the western Baltic cod stock.

In the ICES advice the same recreational catch (1754 tonnes) assumed for 2017 was applied in the forecast for 2018, i.e. average over 3 years (2014–2016) of recreational catch (2 654 tonnes) minus the estimated reduction (900 tonnes) due to the introduction of the bag limit in 2017. The recreational catch in 2019 will depend on a management decision on the regulations for the recreational fishery. The recreational catch needs to be deducted before calculating the potential commercial catch.

Mixing between western and eastern Baltic cod in SD 24 complicates quota setting for the Management Area (SD 22–24). In an area that includes two stocks of a species, the species TAC should be set such that the risk of overexploitation of the weakest stock is minimized. This implies that the intended catch of the EB cod stock in SD 24 will determine the amount of WB cod expected to be caught in SD 24.

Mixing of the eastern and western Baltic cod stocks is substantial in Subdivision 24. This stock mixing is variable spatially and possibly between seasons and age groups. This introduces uncertainty in the allocation of catches to stock. The survey data from the main part of SD 24 are not included in the assessment, because it is currently not possible to split the survey data into the stocks. A large part of the commercial fishing is conducted in this area and, therefore, the lack of survey coverage in SD 24 could result in a bias in the assessment.

The distribution area of the WB cod stock is subdivisions 22–24. The proportions of the WB cod stock commercial catch taken in subdivisions 22–23 and Subdivision 24 have been quite stable since 1994, amounting to 73% and 27%, respectively, on average in the most recent three years.

Commercial fishing in SD 24 catches a mix of the EB and WB cod stocks. The ratio EB cod / WB cod averaged over the last three years, has been 2.38. This means that for every 1 western Baltic cod caught in SD 24 there are 2.38 eastern Baltic cod caught.

With a rapidly increasing WB cod stock and a decreasing EB cod stock, it appears likely that this ratio will change towards a higher fraction of WB cod in the catch. In 2017 the proportion was 2.47, i.e. for every 1 WBC caught in SD24 there were 2.47 EBC caught.

All of this complicates the setting of TAC for both the WB cod and EB cod stocks and leaves managers with a variety of inter-related calculations to make to arrive at a TAC figure for each area.

Western Baltic Cod in SDs 22–24: ICES advises that the applicable Baltic MAP range is from 9094 (F-lower) – 15021 (FMSY). ICES suggests / recommends to use F-lower i.e. 9094 tonnes. Based on the ICES recommendation and assuming recreational catch to be between 1754 and 3227 tonnes the commercial catch would be in a range between 10041 and 12054 tonnes, including Eastern Baltic cod caught in SD 24.

Given the complications arising from the mixing of the western and eastern cod stocks in SD 24, ICES provides a range of options for how this may be taken into account. Based on ICES scenario A using F-lower advice, the commercial catch in SDs 22-24 would be in the range of 10041-12054 tonnes depending on the management of the recreational fishery. For other potential figures please refer to the options provided in Table 5 on page 7 of the ICES advice on Western Baltic cod in SDs 22-24, copied below for reference.

Commentary: We note that given the long term serious concerns about the western Baltic cod stocks, the danger of growth over-fishing on one good year class, the record low recruitment in 2015 & 2017 and the uncertainties in the assessment, managers may wish to consider applying article 4.3 of the Baltic multi-annual plan whereby fishing opportunities may be fixed at levels corresponding to lower levels of fishing mortality than those defined in the Annex to the MAP.

As an example: If managers were to apply a 20% increase based on the 2018 TAC (5 597 tonnes) then the TAC for western Baltic cod in SDs 22-24 would be 6 716 tonnes.

Table 5 Cod in subdivisions 22–24, western Baltic stock. Catch scenarios by management area consistent with the ICES advice for the western and eastern Baltic cod stocks and assuming a recreational catch of 1754 tonnes in 2019. Weights are in tonnes.

	Commercial catch WB cod stock			Commercial catch EB cod stock			Commercial catch of cod by management area (TAC)			
	A	B	C	D	E	F	G		H	
Area	Total	SDs 22–23	SD 24	Total	SD 24	SDs 25–32	SDs22–24	% TAC change (SDs 22–24)*	SDs 25–32	% TAC change (SDs 25–32)**
A. Status quo distribution – same settings as last year										
Calculation		= A × 0.73^	= A × 0.27^		= C × 2.38^^	= D – E	= B + C + E		= F	
EU MAP: F_{MSY}	13267	9685	3582	16685	8520	8165	21787	289	8165	–76
F=MAP F_{MSY} lower	7340	5358	1982	16685	4714	11971	12054	115	11971	–65
B. EB cod catch in SD 24 limits WB cod catch – ratio in catches is mean of 2015–2017, max. 10.5% of EB cod total catch in SD 24										
Calculation		= A × 0.73^	=E/ 2.38^^		= D x 0.105***	= D – E	= B + C + E		= F	
EU MAP: F_{MSY}	13267	9685	737	16685	1754	14931	12176	118	14931	–56
F=MAP F_{MSY} lower	7340	5358	737	16685	1754	14931	7849	40	14931	–56
C. EB cod to WB cod ratios in SD 24 catch changed according to stock development – other parameters as in option A										
Calculation		= A × 0.73^	= A × 0.27^		= C × 0.79^^^	= D – E	= B + C + E		= F	
EU MAP: F_{MSY}	13267	9685	3582	16685	2827	13858	16094	188	13858	–60
F=MAP F_{MSY} lower	7340	5358	1982	16685	1564	15121	8904	59	15121	–56

* Compared to the 2018 TAC for subdivisions 22–24 (5597 tonnes).
** Compared to the 2018 TAC for subdivisions 25–32 (34 288 tonnes).
***0.105 (average proportion [2015–2017] of eastern Baltic cod caught in Subdivision 24).
^ Average proportions of the WB cod stock commercial catch that has been caught in subdivisions 22–23 and Subdivision 24 in the most recent three years (2015–2017; Table 6).
^^ The EB cod catch / WB cod commercial catch ratio observed in Subdivision 24 in the most recent three years (2015–2017; Table 6).
^^^ 0.79 = 2.38 x (0.73/2.2), where 0.73 = the relative SSB for eastern Baltic cod 2018/2017 and 2.2 = the western Baltic SSB 2018/2017.

Cod in SDs 24–32, Eastern Baltic

ICES advises that when the precautionary approach is applied, catches in 2019 from the eastern Baltic cod stock should be no more than 16 685 tonnes. This advice applies to all catches from the stock in subdivisions 24–32.

As noted above commercial fishing in SD 24 catches a mix of the EB and WB cod stocks. The advice for these two stocks is inter-dependent and needs to be read together. The potential calculations on TAC for each stock are equally inter-dependent. The TAC for eastern Baltic cod is set based on SDs 25-32. ICES advice is given for SDs 24-32.

As a Category 3 data limited stock, ICES estimates proxy reference points for Eastern Baltic cod based on an abundance index. ICES assesses that fishing pressure on the stock is above FMSY proxy and spawning stock size in 2018 is below MSY Btrigger proxy. The population structure has deteriorated during the last years and shows no improvement. There has been a strong decrease in biomass of cod above 40 cm and the relative harvest rate for larger cod (> 45 cm) since 2017 is higher than the average relative harvest rate of the stock.

ICES notes three main areas of quality concern as the reason for not applying an age-based assessment:

- inability to determine age in eastern Baltic cod;
- potential changes in growth that have not been quantified;
- potential changes in natural mortality that have not been quantified.

Discarding still takes place despite the fact that the landing obligation has been in place since 2015. The estimated discard in 2017 of 11% was based on observer data. ICES notes there have been increasing problems gaining observer access in some countries, thus, the 11% figure is considered to be an underestimate.

ICES also notes the available information from the fisheries and observers suggests that modifications to the selectivity properties of the gear takes place, leading to a higher proportion of smaller fish being caught.

The TACs and catches in 2015–2017 and the TAC for 2018 have been considerably higher than the advised catch. The full TAC has not been taken since 2009.

As described in the section on western Baltic cod mixing of the eastern and western Baltic cod stocks is substantial in SD 24. ICES notes that the stock mixing within SD 24 is variable spatially, and possibly also between seasons and age groups. This introduces uncertainty in the allocation of catches to stock. ICES notes that the intended catch of the EB cod stock in SD24 will determine the amount of WB cod that are expected to be caught in that subdivision.
A previously negotiated TAC sharing agreement with Russia provides their eastern Baltic cod fisheries with 5% of the total TAC so this is deducted to calculate potential EU TAC.

The Russian fishery is on the eastern Baltic cod stock in the area of Kaliningrad.

To derive a management area-based total commercial cod catch for the eastern Baltic areas (SDs 25–32) consistent with ICES advice for the stocks, expected catches of EB cod in the western management area have to be deducted.

Eastern Baltic Cod in SDs 25–32: ICES advises catches of no more than 16 685 tonnes. From this the expected catch of EB cod in SD 24 needs to be deducted. Based on the F-lower figure of 9 094 tonnes for WB cod, the catch of EBC in SD 24 would be 4 714 tonnes. Deducting 4 714 tonnes from the advised 16 685 tonnes leaves 11 971 tonnes of eastern Baltic cod to be caught in SDs 25-32. Taking account of the Russian share (5% of the 16 685 = 834 tonnes), the corresponding EU catch in the TAC area SDs 25-32 should be no more than 11 137 tonnes.

Given the complications arising from the mixing of the western and eastern cod stocks in SD 24, ICES provides a range of options for how this may be taken into account. For other potential figures please refer to the options provided in Table 5 on page 7 of the ICES advice on Western Baltic cod in SDs 22-24, copied above for reference.

Commentary: If managers were to apply a 20% variability to WB cod as discussed in the WB cod section above the corresponding figures for EB cod would be a catch of 2 626 tonnes of EB cod in SD 24 and a TAC of not more than 13 224 tonnes in SDs 25-32.

Herring in SDs 20–24, Western Baltic Spring Spawners (WBSS)

ICES advises that there should be zero catch in 2019. This advice applies to the catch of WBSS in SDs 20–24 and the eastern part of Subarea 4.

There has been a change in perception of the status of the stock after the benchmark in 2018 mainly due to a revision of Blim: The stock is now considered to be below Blim. ICES assesses that fishing pressure on the stock is above FMSY and spawning-stock biomass is below MSY Btrigger, Bpa, and Blim. Recruitment has been low since the mid-2000s and has been declining in recent years, with the lowest values of the time-series in 2016 and 2017. There are no catch scenarios that will rebuild the stock above Blim by 2020. ICES advises zero catch under such circumstances.

The herring assessed in SDs 20–24 is a complex mixture of populations predominantly spawning in spring, but with local components spawning also in autumn and winter. The population dynamics and the relative contribution of these components is presently unknown but are likely to affect the precision of the assessment. Mixing between WBSS and central Baltic herring in SDs 22–24 may contribute to uncertainty in the assessment.

The updated biomass reference points (Blim from 90 000 to 120 000 tonnes, MSY Btrigger from 110 000 to 150 000 tonnes, ICES, 2018a) and the continued decline in recruitment have changed the perception of the stock dynamics. Now SSB has been below Blim since 2006. The basis for changing the reference points is the extension of the time-series where consistently low recruitment at low SSB is observed since 2006. A stock-recruitment relationship has now been identified for the stock.

The reductions in catches over the past years, in line with the scientific advice, have not resulted in the anticipated increase in SSB due to weak recruitment. ICES therefore recommends the implementation of measures to facilitate the recovery of the stock in the short term.

The ICES advice for zero catch also implies that the TAC for Division 3.a should be set to zero in 2019. WBSS herring are also caught as a bycatch of in the fishery targeting NSAS in the eastern part of Division 4.a. The catch of WBSS in the North Sea was around 632 tonnes in 2017. Without an additional area restriction on the herring fishery in the North Sea in 2019, the catch of WBSS in the North Sea will likely be of a similar magnitude in 2019.

Quota transfers were not considered in this catch advice. The catch of herring under other species' quotas (e.g. sprat) under this regulation may result in a substantial risk of overexploitation of WBSS herring. To achieve rebuilding of this stock, any transfer under this regulation should be accounted for in setting the TAC.

This stock is subject to a TAC setting procedure in annually negotiated agreements between the EU and Norway. The interpretation of this TAC rule allocates 50% of the advised catch to the Baltic SD 22–24 and the other 50% to the North Sea.

Herring in SDs 20–24, Western Baltic Spring Spawners (WBSS): ICES advises that there should be zero catch in 2019. This advice applies to the catch of WBSS in SDs 20–24 and the eastern part of Subarea 4. EU TACs for WBSS are set for SDs 22-24 and take account of a 50/50 split in the allocation of WBSS in areas IIIa and SDs 22-24. The ICES advice for zero catch also implies that the TAC for Division 3.a should be set to zero in 2019.

Herring in SDs 25–29 & 32, Central Baltic, excluding Gulf of Riga

ICES advises that catches in 2019 corresponding to the F ranges in the Baltic MAP are between 115 591 tonnes and 192 787 tonnes. Catches higher than FMSY (155 333 tonnes) can only be taken under conditions specified in the MAP. This advice applies to all catches from the stock, including those taken in Subdivision 28.1.

The decreased catch advice is due to a change in the perception of the stock size. The stock size was downscaled and fishing mortality was upscaled due to the low survey indices in the last two years. There is also a downward revision of the 2014 year class.

A high variability between years in the survey index, in particular in the last years due to the large year class of 2014, is the likely cause of the downward revision of SSB and upward revision of fishing mortality for the recent years.

Preliminary investigations indicate that the stocks of western Baltic spring-spawning herring (Division 3.a and SDs 22–24) and central Baltic herring (SDs 25–29 and 32, excluding Gulf of Riga herring) are mixing in SDs 24–26. The level of this mixing is presently unknown and its potential impact on the assessment should be investigated.

Species misreporting of herring has occurred in the past and there are again indications that it is a problem in some nations. Discards are considered negligible.

Under the EU landing obligation, up to 9% interspecies quota transfers are allowed for stocks that are considered to be within safe biological limits. Quota transfers were not considered in this catch advice. To achieve FMSY exploitation, any transfer under this regulation should be accounted for in setting the TAC.

It should be noted that the large 2014 year class will be the main contributor to the yield in 2018 and 2019 and SSB in 2019 and 2020, and no substantial new incoming year classes are predicted. It is uncommon to see such a large contribution of one year class to the SSB as seen in the short term prediction for 2019 and 2020. The three last year classes are below or at the average and if such a situation continues, a marked decline in biomass development can be expected.

A mixture of central Baltic herring (SDs 25–27, 28.2, 29, and 32) and the Gulf of Riga herring (SD 28.1) is caught in the central Baltic Sea. A TAC sharing agreement with Russia provides their herring fisheries with 9.5% of the total TAC.

Potential TAC for Herring in SDs 25-29 & 32 is equal to the advised catch minus the Russian share (9.5%), plus the catch of Gulf of Riga herring assumed to be taken in SD 28.2, Central Baltic (251 tonnes), minus the assumed catch of herring from the central Baltic stock taken in SD 28.1 the Gulf of Riga (4363 tonnes).

Herring in SDs 25–29 & 32, Central Baltic, excluding Gulf of Riga: Calculation

- **ICES advised range is between 115 591 (F-lower) - 155 333 (FMSY) tonnes**
- **Russian share (9.5%) is therefore in the range: 10 981 – 14 757 tonnes**
- **EU share is therefore in the range: 104 609 – 140 576 tonnes**
- **Plus Gulf of Riga herring taken in Central Baltic (+251 tonnes), minus catch of herring from central Baltic stock taken in Gulf of Riga (-4363 tonnes).**
- **So in the final calculation the ICES advised range for the EU TAC is between 100 497 tonnes (F-lower) – 136 464 tonnes (FMSY)**

Herring in SDs 28.1, Gulf of Riga (catches in SDs 28.1 and 28.2)

ICES advises that catches in 2019 that correspond to the F ranges in the Baltic MAP are between 20 664 tonnes and 31 237 tonnes. Catches higher than FMSY (26 932 tonnes) can only be taken under conditions specified in the MAP. This advice applies to all catches from the stock in subdivisions 28.1 and 28.2.

ICES does not consider that the evidence is sufficient to justify an application of the upper FMSY range based on the condition; to avoid serious harm to a stock caused by intra- or inter-species stock dynamics, set out in the MAP.

A mixture of central Baltic herring (SDs 25–27, 28.2, 29, and 32) and the Gulf of Riga (SD 28.1) herring is caught in SDs 28.1 and 28.2. Potential TAC for Herring in SDs 28.1 and 28.2 is equal to the advised catch plus the assumed catch of central Baltic herring taken in SD 28.1 the Gulf of Riga (4 363 tonnes), minus the assumed catch of Gulf of Riga herring taken in SD 28.2 (251 tonnes).

Herring in SDs 28.1, Gulf of Riga (catches in SDs 28.1 and 28.2): Calculation

- **ICES advised range is between 20 664 (F-lower) – 26 932 (FMSY) tonnes**
- **Plus Gulf of Riga herring taken in Central Baltic (+4363 tonnes), minus catch of herring from central Baltic stock taken in Gulf of Riga (-251 tonnes).**
- **So in the final calculation the ICES advised range for the EU TAC is between 24 776 tonnes (F-lower) – 31 044 tonnes (FMSY)**

Herring in SDs 30-31, Gulf of Bothnia

ICES advises that catches in 2019 should be no more than 88 703 tonnes.

ICES assesses that fishing pressure on the stock is above FMSY and Fpa, and below Flim; and spawning stock size is above MSY Btrigger, Bpa, and Blim.

The two stocks in SDs 30 and 31 were merged into one stock during a benchmark (WKBALT; ICES, 2017). The reference points for the merged stock therefore differ from the ones in the Baltic MAP that were relevant to the two stocks when they were divided in herring in SD 30 and herring in SD 31 (EU, 2016).

The reference points calculated by the benchmark are presented in the ICES paper. The resulting FMSY value is 0.21. Corresponding FMSY ranges were calculated and resulted in FMSY lower = 0.15 and FMSY upper = 0.21

Herring in SDs 30-31, Gulf of Bothnia: ICES advises that catches in 2019 should be no more than 88 703 tonnes.

Sprat in SDs 22-32, Baltic Sea

ICES advises that catches in 2019 corresponding to the F ranges in the Baltic MAP are between 225 752 tonnes and 311 523 tonnes. Catches higher than FMSY (301 125 tonnes) can only be taken under conditions specified in the MAP.

ICES recommends that a spatial management plan is developed for the fisheries that catch sprat, with the aim to improve cod condition. The abundance of cod in SDs 25–26 is high compared to other areas in the Baltic and the cod condition is considered to be limited by food availability. Sprat and herring are important food items for cod (especially sprat), but the present high biomass of the two prey stocks is mainly distributed outside the distribution area for cod.

Any fishery on the two prey species in the main cod distribution area (SDs 25–26) will potentially decrease the local sprat density, which may lead to increased food deprivation for cod. The relative catch proportion of sprat in the main cod distribution area has since 2010 increased from 37% of the total catch to 53% in 2012–2017. Any increase in fishing pressure on sprat in the main cod distribution area may deteriorate the feeding condition for cod as prey availability decreases.

Restrictions on sprat catches taken in the main cod area should be established.

Redistribution of the fishery to the northern areas (SDs 27–32) may also reduce the density-dependent effect, i.e. increase growth for the clupeids in the area.

A previously negotiated TAC sharing agreement with Russia provides their sprat fisheries with 10.08% of the total TAC so this is deducted to calculate potential EU TAC.

Sprat in SDs 22-32, Baltic Sea:

- **ICES advised range is between 225 752 (F-lower) – 301 125 (FMSY) tonnes**
- **Russian share (10.08%) is therefore in the range: 22 756 – 30 353 tonnes**
- **So ICES advised range for EU TAC is in the range: 202 996 – 270 772 tonnes**

ICES recommends restrictions on the sprat fishery in SDs 25-26 and redistribution of the fishery to SDs 27–32. ICES has recommended this for several years.

Plaice in SDs 21–23 (Kattegat, Belt Seas, and the Sound)

ICES advises that when the precautionary approach is applied, as requested by the European Commission, catches in 2019 should be no more than 15 237 tonnes.

The large increase in the advice is due to an increase in SSB and to a change of the basis of advice from MSY to precautionary approach. The precautionary approach used by ICES is based on fishing mortality equal to Fpa, which is a much higher harvest rate than MSY. For this stock, next year, the estimates are Fpa=0.69 and Fmsy=0.37.

The landing obligation covers plaice in the Baltic (SDs 22–32) from January 2017 onwards, but plaice in the Kattegat (SD 21) only from 2019 onwards. ICES partitioning of the catch for 2019 (wanted and unwanted catch) is based on the assumption that the observed discard rate and below minimium landing size (BMS) estimates in 2017 will continue.

Landings of fish below the minimum conservation reference size (MCRS) are very low (10 t) and discarding still takes place. The estimated discard, 998 tonnes (23.5%), is based on observer data.

The management areas for plaice in the Baltic Sea (SD 21 and SDs 22–32) are different from the stock areas (SDs 21–23 and 24–32). The catch ratio between SD 21 and SDs 22–23 in 2017 was used to calculate a split of the advised catches for the stock in SDs 21–23 for 2019. The advised catch for the stock in SDs 24–32 was added to the calculated catch for SDs 22–23 to obtain plaice catches by management area that would be consistent with the ICES advice for the two stocks. This results in catches of no more than 4802 tonnes in SD 21 and 14 160 tonnes in SDs 22–32.

Plaice in SDs 21–23 (Kattegat, Belt Seas, and the Sound): ICES advises that catches should be no more than 15 237 tonnes.

Commentary: ICES notes that the change in the basis of the advice, from MSY to precautionary approach, was made at the request of the EU Commission. Our understanding is that in line with the CFP where reference points are in place and the stock set by TAC it is the MSY approach that should be followed. Therefore we note that the ICES MSY advice is 9 338 tonnes (Table 3 of ICES advice sheet).

If the MSY approach (9 338 tonnes) was followed for SD 21-23 the TAC would be no more than 10 120 tonnes in SDs 22-32 and 2 943 tonnes in SD 21.

Plaice in SDs 24–32 (Baltic Sea, excluding the Sound and Belt Seas)

ICES advises that catches in 2019 should be no more than 3 725 tonnes.

The stock size indicator (relative SSB) and relative recruitment have been increasing significantly since 2013. Recruitment has been increasing while fishing mortality has decreased. This has led to a further increase in SSB and contributes to the increase in catch advice for 2019.

Landings of fish below the minimum conservation reference size (MCRS) are very low (7 tonnes) and discarding still takes place despite the landing obligation. The estimated discard of 408 tonnes (38.6%) is based on observer data.

Depending on market prices and the quota of target species (e.g. cod), discarding varies between quarters and years. There is also discarding because some fishing nations have no quota for plaice. The discarded fraction can cover all length classes and comprise as much as 100% of the catch.

The management areas for plaice in the Baltic Sea (SD 21 and SDs 22–32) are different from the stock areas (SDs 21–23 and 24–32). The catch ratio between SD 21 and SDs 22–23 in 2017 was used to calculate a split of the advised catches for the stock in SDs 21–23 for 2019. The advised catch for the stock in SDs 24–32 was added to the calculated catch for SDs 22–23 to obtain plaice catches by management area that would be consistent with ICES advice for the two stocks. This results in catches of no more than 4802 tonnes in SD 21 and 14 160 tonnes in SDs 22–32.

Plaice in SDs 24–32 (Baltic Sea, excluding the Sound and Belt Seas): ICES advises that catches in 2019 should be no more than 3 725 tonnes.

Commentary: If the MSY approach (9 338 tonnes) was followed for SD 21-23 the TAC would be no more than 10 120 tonnes in SDs 22-32 and 2 943 tonnes in SD 21.

Salmon in SDs 22–31, Baltic Sea excluding the Gulf of Finland

ICES advises that total commercial sea catch in 2019 should be no more than 116 000 individual salmon. Applying the same catch proportions estimated from observations in the 2017 fishery, the catch in 2019 would be split as follows: 11 600 unwanted catch (10%; previously referred to as discards) and 104 400 wanted catch (90%; i.e. 55% reported, 6% unreported, and 29% misreported). This would correspond to commercial landings (the reported wanted catch) of 63 300 salmon.

ICES advises that management of salmon fisheries should be based on the status of individual river stocks. Fisheries on mixed stocks that cannot target only river stocks with a healthy status, present

particular threats to wild stocks that do not have a healthy status. Fisheries in open-sea areas or coastal waters are more likely to pose a threat to depleted stocks than fisheries in estuaries and in healthy wild and reared rivers. Effort in these mixed-stock fisheries has been reduced to low levels and should not increase.

The salmon stocks of rivers Rickleån, Sävarån, Öreälven, Lögdeälven, and Testeboån in the Gulf of Bothnia, Emån in southern Sweden, and all rivers in the southeastern Main Basin are especially weak. The offshore and coastal fisheries in the Main Basin catch all these weak salmon stocks on their feeding migration. The coastal fishery in the Åland Sea and Gulf of Bothnia catches salmon from weak stocks from northern rivers on their spawning migration. These stocks need longer-term, stock-specific rebuilding measures, including fisheries restrictions in estuaries and rivers, habitat restoration, and removal of physical barriers. For these weak stocks exploitation should not increase along their feeding and spawning migration routes at sea.

There are indications that M74 mortality is currently increasing, as well as reported deaths of spawners due to an unidentified disease, which may affect the projection. This extra mortality could reduce smolt production and PFA beyond the advice year, though the likely impacts are uncertain. The present advice has not taken into account a potential further increase in M74 mortality.

Misreported catch as a proportion of the total estimated catch increased to 29% in 2017 compared to 16% in 2016. This is caused by a large increase in the reported catch of sea trout by Poland with long-lines in the offshore fishery, from about 10 800 individuals reported in 2016 to 22 400 in 2017. Based on observer data, these catches are almost entirely composed of salmon and therefore misreported.

The release of reared salmon (currently contributing up to 30% of the mixed-stock pre-fishery abundance, PFA, in the Main Basin) is accounted for when assessing fishery opportunities.

For some weak stocks, additional measures (beside TAC restrictions) are required to increase the number of spawners. Such measures could include, for example, reduced fisheries on the migration routes of weak stocks. In addition, as problems in the freshwater environment play a significant role in explaining the poor status of stocks in the southern Baltic rivers work to improve river habitats and migration possibilities and actions to reduce poaching may also be needed to increase the status of weak stocks.

Exploitation in the Main Basin offshore fisheries affects possibilities for recovery of the Gulf of Finland salmon stocks, as some Gulf of Finland salmon are caught in the Main Basin. Very low parr densities observed in Vindelälven (2016–2017) and Ljungan (2017) are expected to result in a drastically reduced smolt production in 2019–2020 (ICES, 2018). The situation in the two rivers is alarming, and local management actions aimed at protecting ascending spawners appear warranted.

All scenarios assume a fixed additional recreational catch at sea of 32 400 salmon. A previously negotiated TAC sharing agreement with Russia provides their salmon fisheries with 1.9% of the total TAC. The 10% unwanted catch is the sum of 2% (undersized salmon) and 8% (seal-damaged salmon).

Salmon in SDs 22–31, Baltic Sea excluding the Gulf of Finland: ICES advises that total commercial sea catch in 2019 should be no more than 116 000 individual salmon. The 10% unwanted catch (11 700), 6% unreported catch (7 300) and 29% misreported (33 700) are deducted. This corresponds to commercial landings (the reported wanted catch) of 63 300 salmon. Taking into account the Russian share (1.9% of 63 300 salmon = 1203 salmon) the EU TAC would be 62 097 salmon.

Salmon in SD 32, Gulf of Finland

ICES advises that catches in 2019 should be no more than 11 800 individual salmon. This assumes that the amount of reared salmon released in 2018 is similar to previous years. Applying the same proportions estimated for 2017 the total of 11 800 commercial sea catch would be split as follows: 15% unwanted catch (previously discarded) and 85% wanted catch (82% reported and 3% unreported). This corresponds to commercial landings (the reported wanted catch) of 9 676 salmon.

Most of the salmon in the Gulf of Finland (GoF) originate from smolt releases (reared). Despite major releases, catches have decreased considerably in the last decade, indicating low post-smolt survival of reared salmon. Measures to focus the fishing effort on reared salmon should be implemented. Fisheries-related mortality on wild salmon from all wild and mixed (hatchery–wild) rivers in the GoF should be as low as possible.

Fin-clipping of reared salmon stocks in all countries would allow wild salmon to be distinguished from reared salmon, as well as helping to identify wild salmon locations and fisheries on wild salmon. Relocation of fisheries away from rivers and rivers mouths supporting wild or mixed stocks, should be maintained. Wild salmon returning to rivers should be protected from poaching.

Salmon from the Gulf of Finland partly migrate to the Main Basin, and an effective protection of these wild stocks would need coordinated management of the Main Basin and GoF fisheries. Effort in the salmon fishery in the Main Basin (SDs 24–29) should not increase, as wild salmon from the Gulf of Finland use the Main Basin as a feeding area.

Tagging data and genetic studies have shown that salmon from Gulf of Bothnia rivers are also present in the GoF (30–35% contribution, with seasonal variation), where the Finnish coastal salmon fishery takes about 90% of the catches.

In Estonia, regulations have been in force since 2011 to relocate the coastal fisheries away from river mouth areas where these fisheries are likely to catch GoF wild salmon. The closed area at the river mouth was extended to 1500 m during the main spawning migration period in all wild and most mixed rivers. Extra effort has also been directed towards protecting wild salmon from poaching in the rivers when they return to spawn. These measures may have contributed to the recent positive trend in smolt production.

The major commercial salmon fishery in the area is the trapnet fishery at the Finnish coast. The Finnish salmon fisheries have caught about 90% of the commercial landings in SD 32 in the years

2010–2015. The fishing effort has been decreasing since 2013. The coastal fishery with trapnets has moved from the outer archipelago to areas closer to the coast and river mouths.

Off the Estonian coast salmon are caught as bycatch (mainly in gillnet fisheries), where the share of salmon forms less than 1% (by weight) of the total annual catches. In 2017, the salmon catch reported by commercial fishers represented about 67% of all salmon caught in Estonia. The major part of the recreational salmon catch is taken at sea using gillnets. Mainly rod fishing takes place in the Finnish and Estonian rivers.

A previously negotiated TAC sharing agreement with Russia provides their salmon fisheries with 9.3% of the total TAC so this is deducted to calculate potential EU TAC.

Salmon in SD 32, Gulf of Finland: ICES advises that catches in 2019 should be no more than 11 800 individual salmon. The 15% unwanted catch (1 770) and 3% unreported catch (354) are deducted. This corresponds to commercial landings, the 82% reported wanted catch of 9 676 salmon. Taking into account the Russian share (9.3 % of 9 676 salmon = 900 salmon) the EU TAC would be 8 776 salmon.

Sea trout in SDs 22–32 (Baltic Sea)

ICES advises that new data (landings and surveys) do not change the perception of the stock status and that the advice for this stock is valid for 2018 and 2019.

ICES advises that when the precautionary approach is applied, commercial and recreational fisheries in the Gulf of Bothnia (SDs 30 and 31) should be reduced to safeguard the remaining wild sea trout populations in the region, both locally and on their migration routes. Commercial and recreational fishing should also be reduced in the eastern part of SD26 and in the southern parts of SDs 22 and 24 to protect weak wild populations in these areas. Reductions should include fisheries that target other species, but where sea trout are caught as bycatch.

Management measures to help achieve exploitation reductions include minimum mesh size for gillnets, minimum landing sizes, effort reductions, size restrictions, temporal and spatial fishing closures in the river mouths and certain coastal areas.
Existing fishing restrictions in other Baltic Sea areas (SDs 25, 27–29, and 32) should be maintained.
Habitat improvement by restoration, as well as improved accessibility to spawning and rearing areas in many Baltic Sea rivers is needed to allow for recovery of sea trout populations.

There is no specific sea trout fishery in the Gulf of Bothnia and the Gulf of Finland, but sea trout are caught as bycatch in fisheries targeting whitefish, pikeperch, and perch. A significant part of this fishery is recreational.

Sea trout in SDs 22–32 (Baltic Sea): ICES advises that all fishery should be reduced and that existing fishing restrictions in other Baltic Sea areas (SDs 25, 27–29, and 32) should be maintained.

Flounder in SDs 22 and 23 (Belt Seas and the Sound)

ICES advises that catches in each of the years 2018 and 2019 should be no more than 4 030 tonnes. If discard rates do not change from the average of the last three years (2014–2016), this implies landings of no more than 2 913 tonnes.

Catches are mainly taken as bycatch. This stock is currently not regulated by a TAC.
The ICES framework for category 3 stocks was applied. The stock size relative to reference points is unknown. The discard ratio in both subdivisions varies between countries, gear types, and quarters. Discarding practices are controlled by factors such as market price and cod catches.

Flounder in SDs 24 and 25 (west of Bornholm and SW central Baltic)

ICES advises that catches in each of the years 2018 and 2019 should be no more than 41 628 tonnes. If discard rates do not change from the average of the last three years (2014–2016), this implies landings of no more than 29 556 tonnes.

Catches are mainly taken as bycatch. This stock is currently not regulated by a TAC.
The discard ratio in both subdivisions varies between countries, gear types, and quarters. Discarding practices are controlled by factors such as market price and cod catches. After an increase in the quality of discard data, ICES has provided catch advice on this stock since 2014.

Flounder in SDs 26 and 28 (east of Gotland and Gulf of Gdansk)

ICES advises that catches in each of the years 2018 and 2019 should be no more than 1617 tonnes. If discard rates do not change from the average of the last two years (2015–2016), this implies landings of no more than 1439 tonnes.

Catchs are mainly taken as bycatch, while specialized flounder fishery was observed in Latvia, Russia, and Lithuania. This stock is currently not regulated by a TAC. The discard ratio in both subdivisions varies between countries, fleets, vessels, and even individual hauls of the same vessel and trip. Discard estimates from the last two years (2015–2016) were used in this year's advice.

Flounder in SDs 27 & 29–32 (northern central and northern Baltic Sea)

ICES advises that commercial landings in each of the years 2018 and 2019 should be no more than 395 tonnes. ICES cannot quantify the corresponding total catches.

This is the only flounder stock where the majority of the catches result from a direct flounder fishery; however, this stock is currently not regulated by a TAC. In the northern Baltic Sea the importance of recreational fishery is substantial. In Sweden and Finland, the flatfish catch from the recreational fishery probably equals or even exceeds that from the commercial catch. In Estonia, the reported recreational catch is on average estimated to be 20–30% of the commercial landings. The quality of these estimates is, however, too low to be included in quantitative advice.

Brill in SDs 22–32 (Baltic Sea)

ICES advises that catches in each of the years 2018 and 2019 should be no more than 11.5 tonnes. If discard rates do not change from last year (2016), this implies landings of no more than 11.4 tonnes.

Catches are mainly taken as bycatch, and this stock is currently not regulated by a TAC. The ICES framework for category 3 stocks was applied. No reference points are defined for this stock. Fishing effort of active and passive gears of Denmark and Germany has been stable in later years.

Turbot in SDs 22–32 (Baltic Sea): No ICES advice for 2019

ICES has been requested to provide information on stock status but has not been requested to provide advice on fishing opportunities for this stock. Catches are mainly taken as bycatch, and this stock is currently not regulated by a TAC.

No reference points are defined for this stock. An attempt has been made in 2017 and 2018 to calculate MSY proxy reference points for this stock. However, there were concerns on the quality of the input data and parameters for the analysis and further investigations are needed (ICES, 2018). Landings across the Baltic increased from several dozen tonnes in the 1960s to over 1000 tonnes in the mid-1990s, then declined steadily to a few hundred tonnes. In 2018 ICES advised that turbot landings should not exceed 186 tonnes. No advice was requested or is given for 2019.

Dab, 22-32 (Baltic Sea): No ICES advice for 2019

No ICES advice for 2019. In 2018 ICES advised that when the precautionary approach is applied catches should be no more than 2762 tonnes. If discard rates do not change from the average of the last three years (2014–2016), this implied landings of no more than 1607 tonnes. Catches are mainly taken as bycatch, and this stock is currently not regulated by a TAC.