

Herring (*Clupea harengus*) in subdivisions 20–24, spring spawners (Skagerrak, Kattegat, and western Baltic)

ICES advice on fishing opportunities

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2023.

This advice applies to the catch of western Baltic spring-spawning herring (WBSS) in subdivisions 20–24 and the eastern part of Subarea 4.

Stock development over time

Fishing pressure on the stock is below F_{MSY} ; spawning-stock size is below MSY $B_{trigger}$, B_{pa} , and B_{lim} .

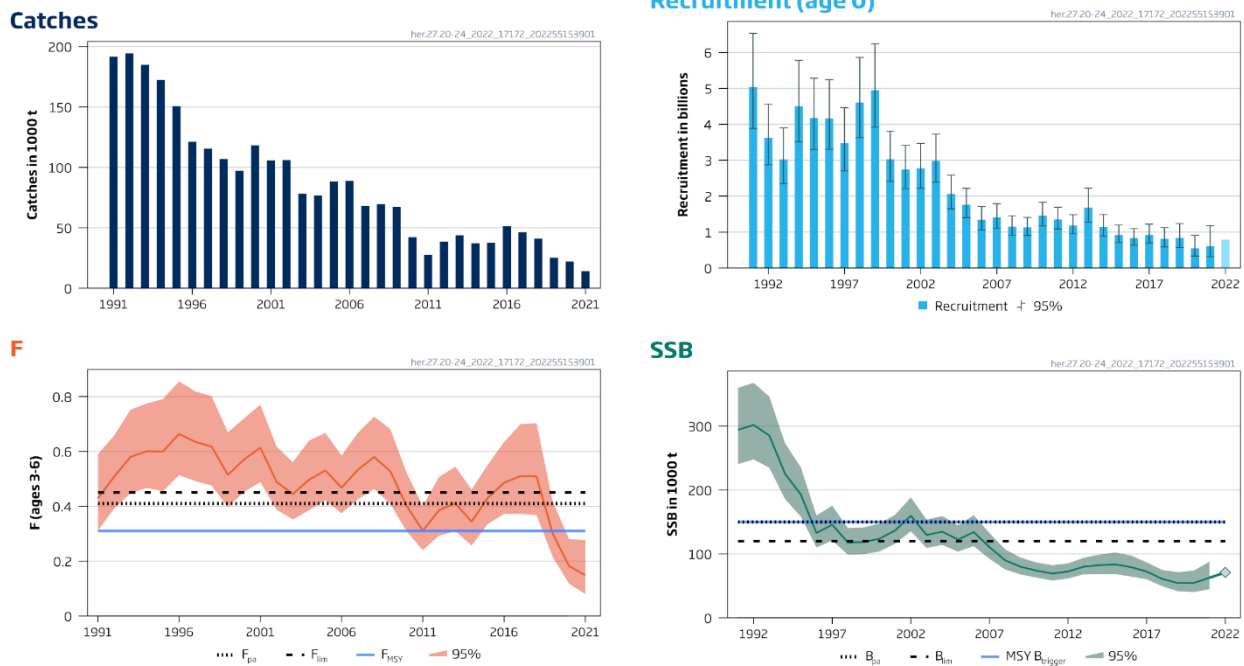


Figure 1 Herring in subdivisions 20–24, spring spawners. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour and the grey diamond in the SSB plot is a predicted number for 2022 at spawning time.

Catch scenarios

Table 1 Herring in subdivisions 20–24, spring spawners. Values in the forecast and for the interim year. All weights are in tonnes and recruitment (R) is in thousands.

Variable	Value	Notes
$F_{ages\ 3-6}$ (2022)	0.064	Based on catch constraint in 2022
SSB (2022)	71 011	Short term forecast
$R_{age\ 0}$ (2022 and 2023)	792 293	Average 2016–2020
Total catch (2022)	7662	See Table 8 and issues relevant to the advice for the fleet descriptions. <ul style="list-style-type: none"> A-fleet: 6 142 t corresponding to the A-fleet TAC (427 628 t) plus what is transferred from the C-fleet in Division 3.a to the North Sea (23 885 t) scaled by the 3-year average proportion of WBSS in A-fleet catch (1.36%, 2019–2021) C-fleet: 733 t corresponding to 1136 t catch in Division 3.a (based on 167 t agreed maximum Norwegian catch and 969 t agreed maximum EU catch) scaled by the 3-year average proportion of WBSS in the C-fleet catch (64.5%, 2019–2021) D-fleet: 0 t because considered negligible compared to the other fleets F-fleet: 788 t (TAC*)

* Council Regulation (EU) 2021/1888

Table 2 Herring in subdivisions 20–24, spring spawners. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	F _{3–6} (2023)	SSB* (2023)	SSB* (2024)	% SSB change **	% advice change ***
ICES advice basis						
MSY approach: zero catch	0	0	80 978	95 882	18	0
Other scenarios						
EU Baltic Sea multiannual plan (MAP) [^] : $F = F_{MSY} \times \frac{SSB_{2022}}{MSY B_{trigger}}$	19 391	0.147	79 256	79 224	0	
MAP [^] : $F = F_{MSY lower} \times \frac{SSB_{2022}}{MSY B_{trigger}}$	14 025	0.102	79 772	83 745	5	
$F = F_{MSY}$	36 088	0.310	77 401	65 861	–15	
$F = F_{pa}$	44 481	0.410	76 296	59 278	–22	
$F = F_{lim}$	47 526	0.450	75 860	56 930	–25	
SSB (2024) = $B_{lim}^{^^}$						
SSB (2024) = $B_{pa}^{^^}$						
SSB (2024) = $MSY B_{trigger}^{^^}$						
$F = F_{2022}$	9073	0.064	80 221	88 093	10	
Catch for bycatch fleets only ^{^^^}	6142	0.039	80 475	90 852	13	

* For spring-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries and natural mortality between 1 January and spawning time (April).

** SSB (2024) relative to SSB (2023).

*** The advised catch in 2021 was 0 tonnes.

[^] Because SSB_{2022} is below $MSY B_{trigger}$, the F_{MSY} and $F_{MSY lower}$ values in the MAP are adjusted by the $SSB_{2022}/MSY B_{trigger}$ ratio.

^{^^} B_{lim} and B_{pa} cannot be achieved in 2024, even with zero catch.

^{^^^} Only the A-fleet that targets North Sea autumn-spawning (NSAS) herring and therefore catches WBSS herring as bycatch in the eastern part of the North Sea, assuming the same catch as in the intermediate year 2022. The D-fleet that is bycatch fleet has zero catch because of the intermediate year assumption (C- and F-fleets are directed WBSS fisheries so have zero catch in this scenario).

Table 3 Herring in subdivisions 20–24, spring spawners. Medium-term catch scenarios. Different low F scenarios are provided, where $F_{2024} = F_{2023}$. All weights are in tonnes.

Basis	Total catch (2023)	Total catch (2024)	F _{3–6} (2023)	SSB* (2023)	SSB* (2024)	SSB* (2025)	% SSB change (2023–2024)	% SSB change (2024–2025)
Medium-term catch scenarios								
$F = 0$	0	0	0	80 978	95 882	111 989	18	17
$F = 0.01$	1488	1856	0.010	80 859	94 594	109 348	17	16
$F = 0.025$	3670	4466	0.025	80 681	92 713	105 581	15	14
$F = 0.05$	7177	8395	0.050	80 385	89 708	99 777	12	11
$F = 0.1$	13 742	14 913	0.100	79 799	84 145	89 698	5	7
$F = 0.15$	19 767	20 008	0.150	79 218	79 114	81 275	0	3
Constant catch 2022–2024 **	7662	7662	0.054	80 345	89 405	100 170	11	12

* For spring-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries and natural mortality between 1 January and spawning time (April).

** It is assumed that the fleets' 2022 catches (as defined in Table 1) are kept constant for 2023–2024.

The stock is estimated to be below B_{lim} . There are no catch scenarios that will rebuild the stock above B_{lim} by 2025. ICES continues to advise zero catch.

Basis of the advice

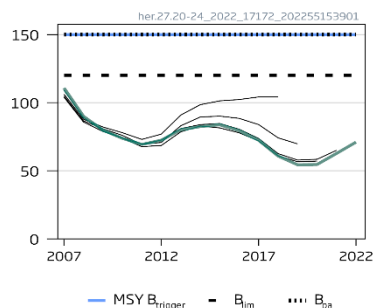
Table 4 Herring in subdivisions 20–24, spring spawners. The basis of the advice.

Advice basis	MSY approach
Management plan	An EU Baltic Sea multiannual plan (MAP; EU, 2016) was established in 2016 and updated in 2019 (MAP; EU, 2019). It applies to herring in subdivisions 22–24, which is part of the distribution area of the WBSS stock. This plan is not adopted by Norway and thus not used as basis of the advice for this shared stock.

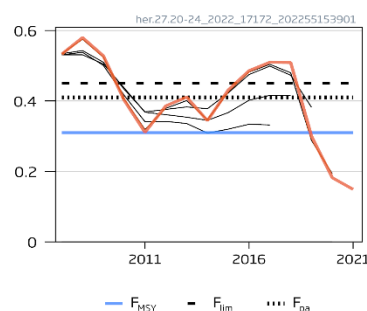
Quality of the assessment

The 2022 assessment gives consistent estimates of SSB and fishing mortality compared to the 2021 assessment. The final (intermediate) year assumption for recruitment is consistently higher than the estimated recruitment the following year. If this pattern continues the SSB predicted for 2025 (Table 3) will be lower.

SSB (1000 t)



F (ages 3-6)



Rec (age 0; Billions)

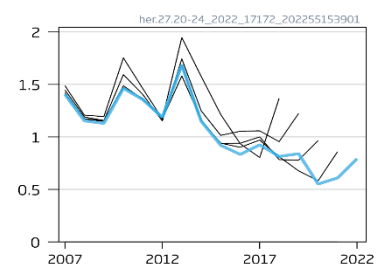


Figure 2 Herring in subdivisions 20–24, spring spawners. Historical assessment results (final-year recruitment included for each line, corresponding to the recruitment assumption in the intermediate year. Final-year SSB prediction is included for each line).

Issues relevant for the advice

ICES MSY approach stipulates that F is reduced proportionally to SSB when the spawning-stock size falls below $MSY B_{trigger}$. When SSB is below B_{lim} , measures should be taken so that it can be brought above B_{lim} in the short term. All catch scenarios, including zero catch, result in SSB remaining below B_{lim} in 2024 (Table 2), therefore zero catch is advised for 2023.

The input catch data are disaggregated in these different fleets based on assumptions which deviate from the definition of those fleets for management purposes (based on TAC settings). In the context of this advice, the fleets are currently described as follows:

Fleet A: Directed fishery for herring for human consumption in the North Sea and division 7.d, but includes herring bycatches in the Norwegian industrial fishery. The catch of herring is almost exclusively NSAS herring, with some bycatch of WBSS herring in the eastern part of the Division 4.

Fleet C: Directed fishery for herring for human consumption in Kattegat and Skagerrak (Division 3.a). This fleet also includes catches from the small meshed Swedish fishery. The catch of herring consists of a mixture of NSAS and WBSS herring.

Fleet D: Bycatch of herring in Kattegat and Skagerrak (Division 3.a) in the Danish small-meshed industrial fleet for sprat and Norway pout and sandeel. The catch of herring consists of a mixture of NSAS and WBSS herring.

Fleet F: Catches from subdivisions 22–24. Most of the catches are taken in a directed fishery for herring and some as bycatch in a directed sprat fishery. The catch of herring consists exclusively of WBSS herring.

This stock is caught across three different management areas, and recovery will be impaired if catches of this stock are not minimized in all areas. Based on agreed catches for 2022 and assumptions on stock mixing, it is predicted that around 80%

of the total WBSS catches will be taken in Division 4.a in 2022. For the other two areas, catch shares in 2022 are predicted to be around 10% for subdivisions 20–21 and 10% for subdivisions 22–24.

The catch of WBSS in the North Sea in recent years has been substantial but variable. The expected catches of WBSS in 2022 will be larger in the North Sea than in subdivisions 20–24. Without additional area and seasonal restrictions on the herring fishery in the North Sea in 2023, the catch of WBSS in the North Sea could be of a similar magnitude to previous years (estimated at 5688 t based on the average over the 2019–2021 period). ICES assumes in the forecast that fishery in the eastern part of the North Sea will continue even though there is likely to be a considerable catch of WBSS for which a zero catch is advised by ICES.

Reference points

Table 5 Herring in subdivisions 20–24, spring spawners. Reference points, values, and their technical basis. Weights in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B_{trigger}	150 000	B_{pa}	ICES (2018)
	F_{MSY}	0.31	Stochastic simulations (EqSim) with Beverton-Holt, Ricker, and segmented regression stock–recruitment curve from the full time-series (1991–2016)	ICES (2018)
Precautionary approach	B_{lim}	120 000	Chosen as the mean of the two lowest SSB (1998, 1999) values with above average recruitment	ICES (2018)
	B_{pa}	150 000	Upper 95% confidence limit of B_{lim} with $\sigma \approx 0.136$, using the CV from the final-year SSB estimate in the assessment	ICES (2018)
	F_{lim}	0.45	$F_{\text{P50\%}}$ leading to 50% probability of SSB > B_{lim} under stochastic simulations with Beverton-Holt, Ricker, and segmented stock–recruitment from the full time-series (1991–2016)	ICES (2018)
	F_{pa}	0.41	The maximum F that provides a 95% probability for SSB to be above B_{lim} ($F_{\text{P.05}}$ with advice rule)	ICES (2018)
Management plan (2018) *	MAP (2018) MSY B_{trigger}	150 000	B_{pa} equal to the upper 95% confidence limit of B_{lim}	ICES (2018)
	MAP (2018) B_{lim}	120 000	Chosen as the mean of the two lowest SSB (1998, 1999) values with above average recruitment	ICES (2018)
	MAP (2018) F_{MSY}	0.31	Stochastic simulations (EqSim) with Beverton-Holt, Ricker, and segmented regression stock–recruitment curve from the full time-series (1991–2016)	ICES (2018)
	MAP (2018) target range F_{lower}	0.216–0.310	Consistent with the ranges, resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2018)
	MAP (2018) target range F_{upper}	0.310–0.379	Consistent with the ranges, resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2018)

*Revised Baltic MAP (EU, 2016, 2019) which refers to most recent reference points (ICES, 2018).

Basis of the assessment

Table 6 Herring in subdivisions 20–24, spring spawners. Basis of assessment and advice.

ICES stock data category	1(ICES, 2022a)
Assessment type	Age-based analytical assessment, multi-fleet SAM (ICES, 2022b) that uses catches by fleet in the model and in the forecast
Input data	Two acoustic, two trawl, and indices from one larval survey (HERAS [A5092], GerAS/BIAS [A1588], IBTS/BITS Q1 [G1022/G2916], IBTS/BITS Q3–4 [G2829/G8863], and N20 [I2308, I7165]); catch statistics and corrections for historical area misreporting; including split for North Sea herring (NSAS)/WBSS in catches, HERAS, and IBTS, and split for Central Baltic Herring (CBH)/WBSS in GerAS
Discards and bycatch	Discarding is considered to be negligible. The amount of slippage in Division 3.a is unknown.
Indicators	None
Other information	Last benchmarked in 2018 (ICES, 2018)
Working group	Herring Assessment Working Group for the Area South of 62°N (HAWG)

History of the advice, catch, and management

Table 7 Herring in subdivisions 20–24, spring spawners. ICES advice, TACs, and ICES estimated catch. All weights are in tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC Division 3.a ***	Agreed TAC subdivisions 22–24	ICES estimated catch ^			
					Subdiv. 22–24	Division 3.a	Subarea 4	Total
1987	Reduction in F	224 000	218 000		102 000	59 000	14 000	175 000
1988	No increase in F	196 000	218 000		99 000	129 000	23 000	251 000
1989	TAC	174 000	218 000		95 000	71 000	20 000	186 000
1990	TAC	131 000	185 000		78 000	118 000	8000	204 000
1991	TAC	180 000	155 000		70 000	112 000	10 000	192 000
1992	TAC	180 000	174 000		85 000	101 000	9000	195 000
1993	Increased yield from reduction in F; reduction in juvenile catches	188 000	210 000		81 000	95 000	10 000	186 000
1994	TAC	130 000– 180 000	191 000		66 000	92 000	14 000	172 000
1995	If required, TAC not exceeding recent catches	168 000– 192 000	183 000		74 000	80 000	10 000	164 000
1996	If required, TAC not exceeding recent catches	164 000– 171 000	163 000		58 000	71 000	1000	130 000
1997	3.a: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	66 000–85 000*	100 000		68 000	55 000	1000	124 000
1998	Should be managed in accordance with NSAS	-	97 000		51 000	53 000	8000	112 000
1999	3.a: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	-	99 000		50 000	43 000	5000	98 000
2000	3.a: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	~60 000 for SDs 22–24	101000		54000	57000	7000	118000
2001	3.a: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	~50 000 for SDs 22–24	101000		64000	42000	6000	112000
2002	3.a: managed together with autumn spawners 22–24: if required, TAC not exceeding recent catches	~50 000 for SDs 22–24	101000		53000	47000	7000	107000
2003	Reduce F	< 80 000	101 000		40 000	36 000	2000	78 000
2004	Separate management regime; reduce F	< 92 000	91 000		42 000	28 000	7000	77 000
2005	Separate management regime; <i>status quo</i> F	95 000	120 000		44 000	38 000	7000	89 000
2006	Separate management regime; <i>status quo</i> F	95 000	102 000	47 500	42 000	36 000	11 000	89 000
2007	Separate management regime; <i>status quo</i> F	99 000	69 000	49 500	40 000	28 000	1000	69 000
2008	Separate management regime; reduce F 20% towards $F_{0.1}$	71 000	51 700	45 000	44 000	25 000	0	69 000
2009	Separate management regime. Reduce F to $F = 0.25$	< 32 800	37 700	27 200	31 000	32 000	4000	67 000
2010	Separate management regime; reduce F to $F = 0.25$	< 39 800	33 900	22 700	18 000	24 000	1000	42 000

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC Division 3.a ***	Agreed TAC subdivisions 22–24	ICES estimated catch ^			
					Subdiv. 22–24	Division 3.a	Subarea 4	Total
2011	MSY transition in 1–5 years and no increase in catches of WBSS herring in the North Sea	26 500–53 600	30 000	15 800	16 000	12 000	300	28 000
2012	$F_{MSY} = 0.25$ and no increase in catches of WBSS herring in the North Sea	< 42 700	45 000	20 900	21 000	15 000	2000	39 000
2013	$F_{MSY} = 0.25$ and no optional transfer of catch scenarios to the North Sea	< 51 900	55 000	25 800	26 000	17 000	500	44 000
2014	Transition to MSY approach	< 41 602	46 800	19 800	18 000	16 000	3000	37 000
2015	MSY approach ($F_{MSY} = 0.28$) **	< 44 439	43 600	22 200	22 000	13 000	2000	37 000
2016	MSY approach ($F_{MSY} = 0.32$)	< 52 547	51 048	26 274	25 000	24 000	2000	51 000
2017	MSY approach ($F_{MSY} = 0.32$)	< 56 802	50 740	28 401	26 513	19 195	632	46 340
2018	MSY approach ($F = 0.295$)	< 34 618	48 427	17 309	18 992	19 902	2164	41 058
2019	MSY approach	0	29 326	9 001	9831	8832	6757	25 420
2020	MSY approach	0	24 528	3 150	3966	11 361	6802	22 130
2021	MSY approach	0	21 604	1 575	1601	9074	3505	14 180
2022	MSY approach	0	25 021#	788				
2023	MSY approach	0						

* Catch in subdivisions 22–24.

** Advice for 2015 was for wanted catch.

*** Including mixed clupeid TAC and a bycatch ceiling in the small-meshed fisheries until 2005 and for 2007. For 2006, and from 2008, human consumption only, not including industrial bycatch or mixed clupeids but including North Sea autumn-spawners catch in fleet C, with an optional 50% transfer from Division 3.a to Subarea 4 since 2011 and 100% in 2022.

Agreed to be limited to 1136 t.

^ WBSS only.

History of the catch and landings

Table 8 Herring in subdivisions 20–24, spring spawners. Catch distribution, by stock and by fleet, of WBSS and NSAS herring in 2021 as estimated by ICES.

WBSS catch area	Fleet	Fisheries	WBSS 2021 catch (t)	NSAS 2021 catch (t)
Division 3.a	C	Directed herring fisheries with purse-seiners and trawlers	9039	4140
	D	Bycatches of herring caught in the small-meshed fisheries	35	103
Subdivisions 22–24	F	All herring fisheries in subdivisions 22–24.	1601	0
Subarea 4	A	Directed herring fisheries with purse-seiners and trawlers	3505	-
Total area	C,D,F,A	All	14 180	4244

Table 9 Herring in subdivisions 20–24, spring spawners. Catch distribution of WBSS in 2021 as estimated by ICES.

Total catch (2021)	Landings		Discards
14 180 tonnes	75% directed fishery	25% bycatch*	Negligible
	14 180 tonnes		

* of WBSS by the A-fleet and bycatch by the D-fleet

Table 10 Herring in subdivisions 20–24. History of commercial catch by area and country as estimated by ICES for all herring stocks caught within the management area for subdivisions 20–24. Values prior to 2002 are rounded. Weights are in tonnes.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Skagerrak														
Denmark	47 400	62 300	58 700	64 700	87 800	44 900	43 700	28 700	14 300	10 300	10 100	16 000	16 200	25 968
Norway	1600	5600	8100	13 900	24 200	17 700	16 700	9400	8800	8000	7400	9 700	0	0
Sweden	47 900	56 500	54 700	88 000	56 400	66 400	48 500	32 700	32 900	46 900	36 400	45 800	30 800	26 354
Total	96 900	124 400	121 500	166 600	168 400	129 000	108 900	70 800	56 000	65 200	53 900	71 500	47 000	52 322
Kattegat														
Denmark	57 100	32 200	29 700	33 500	28 700	23 600	16 900	17 200	8800	23 700	17 900	18 900	18 800	18 609
Sweden	37 900	45 200	36 700	26 400	16 700	15 400	30 800	27 000	18 000	29 900	14 600	17 300	16 200	7 246
Total	95 000	77 400	66 400	59 900	45 400	39 000	47 700	44 200	26 800	53 600	32 500	36 200	35 000	25 855
Subdivisions 22 and 24														
Denmark	21 700	13 600	25 200	26 900	38 000	39 500	36 800	34 400	30 500	30 100	32 500	32 600	28 300	13 066
Germany	56 400	45 500	15 800	15 600	11 100	11 400	13 400	7300	12 800	9000	9800	9 300	11 400	22 400
Poland	8500	9700	5600	15 500	11 800	6300	7300	6000	6900	6500	5300	6 600	9 300	0
Sweden	6300	8100	19 300	22 300	16 200	7400	15 800	9000	14 500	4300	2600	4 800	13 900	10 717
Total	92 900	76 900	65 900	80 300	77 100	64 600	73 300	56 700	64 700	49 900	50 200	53 300	62 900	46 184
Subdivision 23														
Denmark	1500	1100	1700	2900	3300	1500	900	700	2200	400	500	900	600	4 572
Sweden	100	100	2300	1700	700	300	200	300	100	300	100	100	200	0
Total	1600	1200	4000	4600	4000	1800	1100	1000	2300	700	600	1 000	800	4 572
Grand total	286 400	279 900	257 800	311 400	294 900	234 400	231 000	172 700	149 800	169 400	137 200	162 000	145 700	128 932
Year	2003	2004	2005	2006**	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Skagerrak														
Denmark	15 477	11 782	14 768	5156	3595	3867	12 720	5309	3577	3244	4886	6 449	4 137	3 554
Faroe Islands	0	0	440	0	0	0	552	447	0	0	0	0	480	318
Netherlands	725	484	751	600	454	1566	255	145	54	629	194	84	128	125
Germany	0	0	0	0	0	0	0	395	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	30	0
Norway	0	0	0	0	3466	4024	3295	3281	116	446	3019	2 048	2 475	3 924
Sweden	25 830	21 806	32 545	26 000	19 422	16 501	12 869	17 445	9458	16 210	16 677	12 594	12 857	13 321
Total	42 032	34 073	48 504	31 756	26 937	25 958	29 691	27 023	13 205	20 530	24 776	21 175	20 107	21 242
Kattegat														
Denmark	15 952	7563	11 109	8617	9181	7020	4896	7567	5155	6 26	3877	4 266	3 976	2 448
Sweden	10 236	9626	9986	10 800	11 153	5213	3612	2693	1661	800	2586	3 412	3 752	6 206
Germany	0	0	0	0	0	0	631	0	0	0	0	0	0	0
Total	26 188	17 189	21 095	19 417	20 334	12 234	9140	10 260	6800	7126	6464	7 678	7 728	8 653
Subdivisions 22 and 24														
Denmark	6143	7305	5311	1405	2839	3073	2146	762	3089	4105	5060	4 283	4 487	5 714
Germany	18 776	18 493	21 040	22 870	24 583	22 823	15 981	12 239	8187	11 170	14 591	10 241	13 289	14 427
Poland	4398	5512	6292	5504	2945	5535	5232	1799	1803	2394	3110	2 381	2 648	2 918
Sweden	9379	9865	9171	9604	7220	7024	4050	2034	2179	2706	2067	1 078	1 497	1 659
Total	38 696	41 175	41 814	39 383	37 587	38 456	27 409	16 833	15 258	20 400	24 800	17 983	21 922	24 718
Subdivision 23														
Denmark	2315	94	1779	1827	2871	5324	2817	1***	26	38	44	47	30	26
Sweden	243	317	384	652	0	327	807	934	544	681	632	319	192	332
Total	2558	411	2163	2479	2871	5651	3623	1000	600	700	700	366	222	359
Grand total	109 473	92 848	113 576	93 035	87 729	82 298	69 863	55 200	35 863	48 755	56 740	47 202	49 978	54 972

Year	2017	2018	2019	2020	2021*
Skagerrak					
Denmark	2699	858	593	3189	2865
Faroe Islands	400	149			
Netherlands					
Germany	85	205	121	155	143
Lithuania					
Norway	3337	3411	2472	2119	1122
Sweden	11 936	11 332	8509	9073	6133
Total	18 458	15 956	11 695	14 537	10 263
Kattegat					
Denmark	912	1258	1499	672	210
Sweden	7426	6044	1725	2570	2845
Germany					
Total	8338	7302	3224	3242	3055
Subdivisions 22 and 24					
Denmark	5586	4487	2041	586	147
Finland		1			
Germany	14 694	11 304	5571	2069	843
Poland	3330	1773	1130	596	249
Sweden	2287	943	729	233	75
Total	25 898	18 507	9470	3484	1315
Subdivision 23					
Denmark	260	69	9	1	5
Sweden	356	416	351	481	281
Total	616	485	360	482	286
Grand total	53 309	42 250	24 750	21 745	14 918

* Preliminary data.

** 2000 t of Danish catches are missing (ICES, 2007).

*** 3103 t officially reported catches (ICES, 2011).

Summary of the assessment

Table 11 Herring in subdivisions 20–24, spring spawners. Assessment summary. High and low refer to the 95% confidence intervals.

Year	Recruitment			Spawning-stock biomass			Catches	Fishing mortality		
	Recruitment (age 0)	High	Low	SSB*	High	Low		F (ages 3–6)	High	Low
	thousands			tonnes						
1991	5 037 767	6 534 448	3 883 893	294 145	359 778	240 485	191 573	0.43	0.59	0.31
1992	3 616 981	4 557 363	2 870 641	301 866	367 698	247 819	194 408	0.51	0.66	0.39
1993	3 024 804	3 903 383	2 343 977	285 247	346 314	234 948	185 010	0.58	0.75	0.45
1994	4 505 757	5 780 695	3 512 008	225 394	273 322	185 870	172 439	0.60	0.78	0.47
1995	4 177 252	5 281 963	3 303 589	193 228	235 693	158 414	150 820	0.60	0.79	0.46
1996	4 163 472	5 242 679	3 306 420	132 731	160 086	110 050	121 260	0.66	0.86	0.51
1997	3 473 011	4 462 194	2 703 111	145 701	175 493	120 967	115 585	0.64	0.82	0.49
1998	4 610 783	5 862 794	3 626 141	117 839	140 632	98 741	107 033	0.62	0.80	0.48
1999	4 948 162	6 242 272	3 922 340	118 531	141 503	99 288	97 234	0.52	0.67	0.40
2000	3 027 959	3 806 967	2 408 357	123 786	147 458	103 914	118 277	0.57	0.72	0.45
2001	2 746 047	3 414 180	2 208 664	136 674	161 213	115 870	105 803	0.61	0.77	0.49
2002	2 775 373	3 470 312	2 219 597	159 829	188 518	135 505	106 189	0.49	0.62	0.39
2003	2 983 774	3 730 129	2 386 756	129 623	153 743	109 287	78 310	0.45	0.56	0.35
2004	2 064 899	2 585 285	1 649 260	134 779	159 255	114 065	76 814	0.50	0.64	0.39
2005	1 762 657	2 217 260	1 401 261	122 478	144 795	103 601	88 404	0.53	0.67	0.42
2006	1 345 815	1 712 435	1 057 685	134 187	160 501	112 186	88 931	0.47	0.59	0.38
2007	1 404 787	1 790 437	1 102 204	110 775	132 817	92 390	68 180	0.53	0.67	0.43
2008	1 152 732	1 453 199	914 390	89 997	107 095	75 629	69 576	0.58	0.73	0.46
2009	1 129 287	1 409 059	905 064	79 847	94 129	67 731	67 261	0.53	0.68	0.41
2010	1 462 341	1 828 742	1 169 351	73 802	86 589	62 903	42 214	0.40	0.52	0.31
2011	1 354 293	1 692 610	1 083 599	69 344	82 333	58 404	27 771	0.31	0.40	0.24
2012	1 187 034	1 482 334	950 561	72 453	85 242	61 583	38 648	0.39	0.51	0.29
2013	1 683 600	2 220 223	1 276 677	80 066	94 057	68 156	43 829	0.41	0.55	0.31
2014	1 146 962	1 488 703	883 669	82 432	99 011	68 629	37 358	0.34	0.46	0.26
2015	919 966	1 196 150	707 551	83 726	102 309	68 518	37 491	0.43	0.55	0.34
2016	832 966	1 097 055	632 450	79 359	97 558	64 556	51 298	0.49	0.63	0.37
2017	924 380	1 220 799	699 933	72 396	86 973	60 263	46 340	0.51	0.70	0.37
2018	813 549	1 124 615	588 524	60 775	74 869	49 335	41 058	0.51	0.70	0.37
2019	839 747	1 236 763	570 178	54 388	71 476	41 386	25 420	0.30	0.42	0.22
2020	550 822	912 136	332 631	54 606	73 964	40 314	22 130	0.182	0.28	0.118
2021	609 230	1 178 016	315 073	62 765	88 002	44 766	14 180	0.149	0.28	0.080
2022	792 293**			71 011***						

* SSB at spawning time (April).

** Recruitment is the average of 2016–2020.

*** SSB is predicted.

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