

## Herring (*Clupea harengus*) in divisions 6.a and 7.b–c (West of Scotland, West of Ireland)

### ICES stock advice

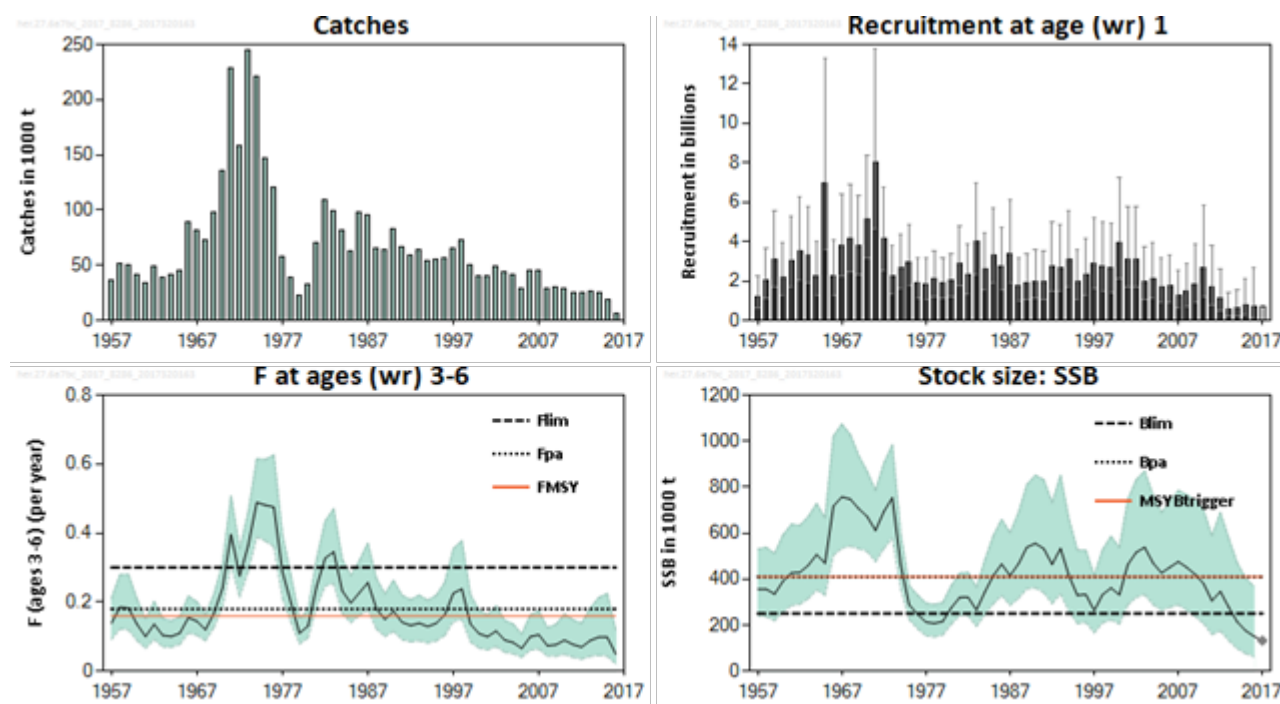
ICES advises that when the MSY approach is applied, there should be zero catch in 2018. ICES advises that a stock recovery plan be developed for this stock.

ICES advises, under precautionary considerations, that activities that have an impact on the spawning habitat of herring should not occur, unless the effects of these activities have been assessed and shown not to be detrimental.

### Stock development over time

The information presented here represents two stocks assessed as one.

The spawning-stock biomass (SSB) has been declining since 2004 and is estimated to be below  $B_{lim}$ . The fishing mortality (F) has been below  $F_{MSY}$  since the late 1990s and was estimated to be at a record low in 2016. Recruitment (R) since 2013 has been at an all-time low.



**Figure 1** Herring in divisions 6.a and 7.b–c. Summary of the stock assessment. R, F, and SSB from the stock assessment (weights in thousand tonnes). The assumed recruitment is unshaded and the forecast SSB value is designated by a grey diamond. The shaded areas on the F and SSB plots represent 95% confidence intervals.

### Stock and exploitation status

**Table 1** Herring in divisions 6.a and 7.b–c. State of the stock and fishery relative to reference points.

	Fishing pressure				Stock size		
		2014	2015	2016	2015	2016	2017
Maximum sustainable yield	$F_{MSY}$	✓	✓	✓ Below	$MSYB_{trigger}$	✗	✗ Below trigger
Precautionary approach	$F_{pa}, F_{lim}$	✓	✓	✓ Harvested sustainably	$B_{pa}, B_{lim}$	✗	✗ Reduced reproductive capacity
Management plan	$F_{MGT}$	—	—	— Not applicable	$S_{SBMGT}$	—	— Not applicable

## Catch options

**Table 2** Herring in divisions 6.a and 7.b–c. The basis for the catch options. All weights are in tonnes.

Variable	Value	Source	Notes
$F_{ages(wr) 3-6}$ (2017)	0.041	<a href="#">EC (2017/127)</a>	Catch constraint based on agreed scientific monitoring TAC of 5800t
$R_{age(wr) 1}$ (2017–2018)	733 366	ICES (2017b)	Geometric mean 2012–2016 (in thousands)
SSB (2017)	132 340	ICES (2017b)	Estimated from the intermediate year of the assessment for an autumn spawning stock (in tonnes)
Discards	Negligible		
Total catch (2017)	5800	<a href="#">EC (2017/127)</a>	Catch constraint based on agreed scientific monitoring TAC of 5800 t (in tonnes)

**Table 3** Herring in divisions 6.a and 7.b–c. Annual catch options. All weights are in tonnes.

Basis	Total catch (2018)	$F_{total}$ (2018)	SSB (2018)*	% SSB change **	% TAC change ***
ICES advice basis					
MSY approach^^ : zero catch	0	0	134 158	1.37%	-100%
Other options					
2017 Monitoring TAC	5800	0.042	131 063	-0.97%	0.00%
Advice for scientific monitoring (ICES 2016)	4840	0.035	131 577	-0.58%	-17% <sup>†</sup>
$F_{MSY}$	21 050	0.16	122 785	-7.2%	263%
$F=0.05^{^^^}$	6869	0.05	130 489	-1.40%	18%
$F_{pa}$	23 498	0.18	121 437	-8.3%	305%
$F_{lim}$	37 400	0.30	113 670	-14%	545%
$SSB(2019) = B_{lim}^{\wedge}$					
$SSB(2019) = B_{pa} = MSY B_{trigger}^{\wedge}$					
$F = F_{2017}$	5681	0.041	131126	-0.92%	-2.1%

\* For this autumn-spawning stock, the SSB is determined at spawning time and is influenced by fisheries between 1st January and spawning (September).

\*\* SSB 2018 relative to SSB 2017.

\*\*\* Catch 2018 relative to agreed scientific monitoring TAC of 5800 t (EC, 2016/0203).

<sup>^</sup> The  $B_{lim}$ ,  $B_{pa}$  and  $MSY B_{trigger}$  options were left blank because  $B_{lim}$  cannot be achieved in 2018 even with zero catch advice.

<sup>^^</sup> There is no catch option for 2018 that is consistent with the combined stocks recovering to above  $B_{lim}$ .

<sup>^^^</sup> Fishing mortality corresponding to low impact on stock status.

## Basis of the advice

**Table 4** Herring in divisions 6.a and 7.b–c. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for the combined herring stocks in this area.

<sup>†</sup> Version 2: Value of TAC change corrected

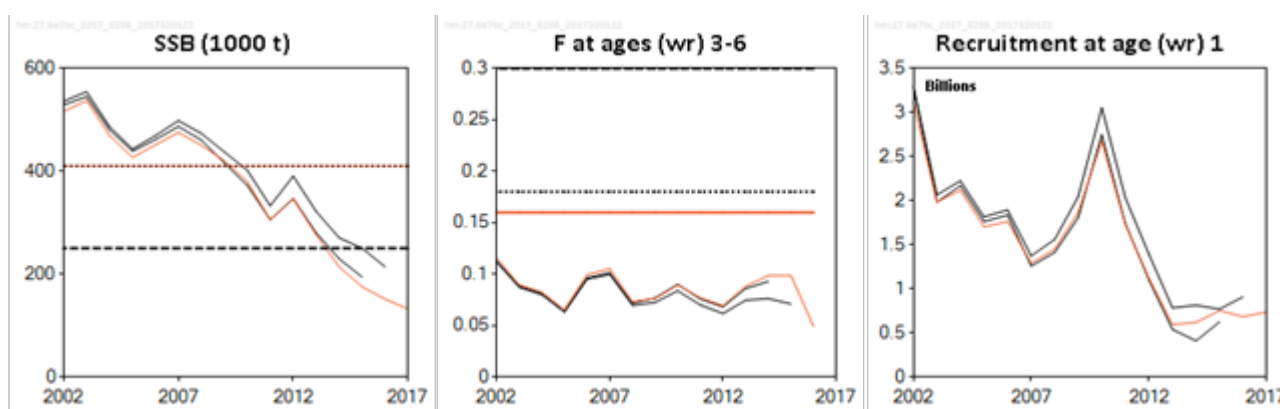
## Quality of the assessment

The 2015 benchmark concluded that a combined assessment of herring in Division 6.a North and herring in divisions 6.a South and 7.b–c should be the basis for the ICES advice (ICES, 2015a). The stocks were combined because it is not possible to segregate them in commercial catches or surveys. ICES still assumes that separate stocks exist.

There is uncertainty in the assessment due to a lack of information in the available data sources on recruitment and the abundance of fish of younger ages. The 2017 assessment resulted in a 30% downward revision of the 2015 SSB compared to the 2016 assessment estimate of the 2015 SSB.

The distribution of herring (both Division 6.a and North Sea herring) across the 4 degree west management line varies considerably among survey years. This may contribute to some of the high variability observed in the Malin Shelf acoustic survey series.

The assessment model tends to over-estimate older fish relative to that observed in the Malin shelf acoustic surveys and catches since 2013.



**Figure 2** Herring in divisions 6.a and 7.b–c. Historical assessment results.

## Issues relevant for the advice

In April 2016, ICES issued advice for a scientific monitoring fishery that could be obtained through a catch of 4840 t for herring in this area, at the request of the European Commission (ICES, 2016a). The EC established a monitoring TAC of 5800 t in 2016, which was maintained in 2017.

There is no catch option for 2018 that is consistent with the combined stocks recovering to above  $B_{lim}$ .

ICES advises that a stock recovery plan should be developed for herring in Division 6.a and 7.b–c. Such a plan should include rebuilding targets and time lines as well as protections for each stock. This would also imply including a research component to resolve the lack of information on stock mixing and recruitment.

There has been an increase in marine anthropogenic activity, especially in the area of marine renewable energy. Construction and development of, for example, wind farms results in disturbance to the seabed. Any activities that have a negative impact on the spawning habitat of herring, such as extraction of marine aggregates (e.g. gravel and sand) and construction in the vicinity of spawning grounds, require consideration (see for example, Groot, 1979, 1996; ICES 2003, 2015b). This is because a gravel substratum is an essential habitat for herring spawning.

## Reference points

**Table 5** Herring in divisions 6.a and 7.b–c. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	410000 t	$B_{pa}$	ICES (2015a)

	$F_{MSY}$	0.16	Stochastic simulations from segmented regression stock–recruitment relationship	ICES (2015a)
Precautionary approach	$B_{lim}$	250000 t	Breakpoint in segmented regression stock-recruitment relationship	ICES (2015a)
	$B_{pa}$	410000 t	$B_{pa}=B_{lim}*\exp(1.645\sigma_B)$ and the value of $\sigma_B=0.30$	ICES (2016b)
	$F_{lim}$	0.30	Equilibrium F maintaining SSB > $B_{lim}$ with a 50% probability.	ICES (2015a)
	$F_{pa}$	0.18	$F_{pa}=F_{lim}*\exp(-1.645\sigma_F)$ and the value of $\sigma_F = \sigma_B=0.30$ .	ICES (2016b)
Management plan	$SSB_{mgt}$	Not applicable		
	$F_{mgt}$	Not applicable		

## Basis of the assessment

**Table 6** Herring in divisions 6.a and 7.b–c. Basis of assessment and advice.

ICES stock data category	1 ( <a href="#">ICES, 2016c</a> )
Assessment type	Age-based analytical assessment (SAM; ICES, 2017) that uses catches in the model and in the forecast
Input data	Commercial catches, (weights, ages and length frequencies from catch sampling); Malin Shelf Herring Acoustic Survey data (MSHAS), west of Scotland herring acoustic survey (MSHAS_N), Scottish west coast IBTS surveys (quarters 1 and 4).
Discards and by-catch	Not included, considered negligible
Indicators	None
Other information	Benchmarked in WKWEST (ICES, 2015a), updated with corrected natural mortalities by ICES (2015c). This is an autumn/winter spawning stock. Age is given in winter rings (wr), so for example: a 2-year-old fish is termed “1-winter ring”.
Working group	Herring Assessment Working Group for the Area South of 62°N (HAWG).

## Information from stakeholders

The industry, in conjunction with the Pelagic Advisory Council (PELAC), initiated a major genetic research programme in 2016 that aims to provide new stock separation information and has made significant progress on the sequencing and sequence analysis. A panel of high-graded markers is expected to be available by October 2017.

In addition, the industry initiated an industry acoustic survey during 2016 which will be continued in 2017 so as to provide a minimum estimate of spawning stock size and to provide genetic and morphometric samples of the two separate spawning populations.

As advised by ICES in both 2016 and 2017, the PELAC has developed and sent a draft rebuilding plan for herring in divisions 6.a and 7.b–c to the Commission with the request to submit it to STECF for evaluation at the July 2017 meeting. The PELAC is also requesting that a benchmark should take place as soon as possible and is hoping that this will happen in 2018 when the new genetic information on stock separation is available.

## History of the advice, catch, and management

**Table 7** Herring in divisions 6.a and 7.b–c. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted catch corresponding to advice	Sum of agreed TACs	Discards / slippage	ICES estimated catches
2015*	Prior to the advice for 2016, ICES advised separately for herring in Division 6a North and herring in Division 6a South and 7b,c. See <a href="#">ICES 2014a</a> and <a href="#">2014b</a> for the history of ICES advice on these individual stocks	-	22690	0	19885
2016	MSY approach	0	5800**	0	6937^
2017	MSY approach	0	5800***		
2018	MSY approach	0			

\* See Table 5.3.12.1 [Herring in Division 6a \(North\)](#) and Table 5.3.13.1 in [Herring in Divisions 6.a South and 7.b–c](#) for the full histories of ICES advice, management, landings, and catches.

\*\* Agreed under the EC provision for a combined monitoring fishery TAC in 2016 of 5800 t (EU, 2016/0203).

\*\*\* Agreed by EC for a combined monitoring TAC in 2017 (EC, 2017/127).

^ Including catches from the carried-over 2015 TAC.

## History of the catch and landings

**Table 8** Herring in divisions 6.a and 7.b–c. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings		Discards
6937 tonnes	Pelagic trawl 100%	Ringnets (negligible)	negligible
	6937 tonnes		

**Table 9** Herring in divisions 6.a and 7.b–c. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0
Faroe Islands	0	0	274	0	0	0	0	0	0	0	800	400	228
France	119	818	5087	3672	2297	3093	1903	463	870	760	1855	1370	625
Germany	5890	4693	7938	3744	7836	8873	8253	6752	4615	3944	3810	2935	1046
Ireland	33985	35836	30493	28998	33521	26275	36399	24240	15005	15589	17311	16502	12844
Netherlands	8900	8632	10683	9015	11196	13273	10983	9112	5881	6622	4978	3609	8296
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	2389	7447	30676	4840	6223	4962	5317	2695	0	0	0	0	0
UK	32730	32802	4237	42685	46639	44273	42302	36446	22816	21862	20604	16947	17706
Total landings	84013	90228	80914	92954	107712	100749	105157	79708	49187	48777	49358	41763	40745
Discards*	300	250	700	0	0	112	90	0	0	0	0	0	123
Total catch	84313	90478	81614	92954	107712	100861	105247	79708	49187	48777	49358	41763	40868
Corrected for 6.a South/7.b-c unallocated/ area misreported	88913	96728	87864	94054	114612	101561	116447	87624	57635	50167	53231	45344	43681
Corrected for 6.a North unallocated	83428	92975	88564	89513	96859	93546	104699	79469	57635	50444	59475	48164	47171
Corrected for 6.a North area misreported	60835	68578	58330	57367	58605	63780	72253	55846	43008	40007	50740	44583	40286
ICES estimate	60835	68578	58330	57367	58605	63780	72253	55846	43008	40007	50740	44583	40286
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Denmark	0	0	0	0	0	0	0	0	0	0	0	23	
Faroe Islands	1810	570	484	927	1544	70	0	0	0	360	0	0	
France	613	701	703	564	1049	511	504	244	586	589	0	0	
Germany	2691	3152	1749	2526	27	3583	3518	1829	4025	3354	3292	1028	
Ireland	16231	19192	17791	13340	10468	10241	8203	7178	4584	5565	1872	1740	
Netherlands	5132	7361	8065	4133	5675	3600	1684	3523	1815	1641	956	372	
Lithuania	0	0	0	0	0	0	0	0	0	770	0	0	
Norway	0	0	0	0	0	0	0	0	0	0	1	0	
UK	17494	18290	17618	13963	11076	12018	11696	12249	15906	16769	15265	3254	
Total landings	43971	49266	46410	35453	29839	30023	25605	25023	26916	29048	21386	6417	
Discards*	772	163	0	0	0	95	0	0	30	0	0	0	
Total catch	44743	49429	46410	35453	29839	30118	25605	25023	26946	29048	21386	6417	
Corrected for 6.a South/7.b–c unallocated/ area misreported misreported	47623	54135	51552	38556	31774	32846	28277	27803	29414	31211	22386	7388	
Corrected for 6.a North unallocated	47623	54135	51552	38556	31774	32846	28277	27803	29414	31211	22386	7388	
Corrected for 6.a North area misreported	30360	47251	47433	29394	28976	30118	24678	25023	26946	27123	19880	6938	

ICES estimate	30360	47251	47433	29394	28976	30118	24678	25023	26946	27123	19880	6938
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\* Unraised discards

**Table 10** Herring in divisions 6.a and 7.b–c. The Division 6.a North component of the stock. History of commercial catch and landings, both official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0
Faroe Islands	0	0	274	0	0	0	0	0	0	0	800	400	228
France	119	818	5087	3672	2297	3093	1903	463	870	760	1340	1370	625
Germany	5640	4693	7938	3733	7836	8873	8253	6752	4615	3944	3810	2935	1046
Ireland	7985	8236	6093	3548	9721	1875	11 199	7915	4841	4311	4239	3581	1894
Netherlands	8000	6132	8183	7808	9396	9873	8483	7244	4647	4534	4612	3609	8232
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	2389	7447	30 676	4840	6223	4962	5317	2695	0	0	0	0	0
UK	32 730	32 602	-4287	42 661	46 639	44 273	42 302	36 446	22 816	21 862	20 604	16 947	17 706
Unallocated	-5485	-3753	700	-4541	-17 753	-8015	-11 748	-8155	0	277	6244	2820	3490
Discards*	200	0	0	0	0	62	90	0	0	0	0	0	123
Total	51 578	56 175	54 664	61 271	64 359	64 995	65 799	61 514	37 789	35 688	41 649	31 622	33 344
Area misreported	-22 593	-24 397	-30 234	-32 146	-38 254	-29 766	-32 446	-23 623	-14 627	-10 437	-8735	-3581	-6885
ICES estimate	28 985	31 778	24 430	29 575	26 105	35 233	33 353	29 736	23 162	25 251	32 914	28 081	26 459
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Denmark	0	0	0	0	0	0	0	0	0	0	0	23	
Faroe Islands	1810	570	484	927	1544	70	0	0	0	360	0	0	
France	613	701	703	564	1049	511	504	244	586	589	0	0	
Germany	2691	3152	1749	2526	27	3583	3518	1829	4025	3354	3292	1028	
Ireland	2880	4352	5129	3103	1935	2728	3956	3451	3124	2632	1799	569	
Netherlands	5132	7008	8052	4133	5675	3600	1684	3523	1775	1641	956	300	
Lithuania	0	0	0	0	0	0	0	0	0	770	0	0	
Norway	0	0	0	0	0	0	0	0	0	0	1	0	
UK	17 494	18 284	17 618	13 963	11 076	12 018	11 696	12 249	15 906	16 769	15 260	3254	
Unallocated	0	0	0	0	0	0	0	0	0	0	0	0	
Discards*	772	163	0	0	0	95	0	0	30	0	0	0	
Total	31 392	34 230	33 735	25 216	21 306	22 510	21 358	21 296	25 446	26 115	21 307	5174	
Area misreported	-17 263	-6884	-4119	-9162	-2798	-2728	-3599	-2780	-2468	-4088	-2506	-450	
ICES estimate	14 129	27 346	29 616	16 054	18508	19877	17 759	18 516	22 978	22 027	18 801	4724	

\* Unraised discards

**Table 11** Herring in divisions 6.a and 7.b–c. The divisions 6.a South/7.b-c component of the stock. History of commercial catch and landings, both official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
France	0	0	0	0	0	0	0	0	0	0	515	0	0	0
Germany	250	0	0	11	0	0	0	0	0	0	0	0	0	0
Ireland	26 000	27 600	24 400	25 450	23 800	24 400	25 200	16 325	10 164	11 278	13 072	12 921	10 950	13 351
Netherlands	900	2500	2500	1207	1800	3400	2500	1868	1234	2088	366	0	64	0
UK (Northern Ireland)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK (England & Wales)	0	0	50	24	0	0	0	0	0	0	0	0	0	0
UK Scotland	0	200	0	0	0	0	0	0	0	0	0	0	0	0
Total landings	27 150	30 300	26 950	26 692	25 600	27 800	27 700	18 193	11 398	13 366	13 953	12 921	11 014	13 351
Unallocated/ area misreported	4600	6250	6250	1100	6900	700	11 200	7916	8448	1390	3873	3581	2813	2880
Discards*	100	250	700	0	0	50	0	0	0	0	0	0	0	0
ICES estimated catch	31 850	36 800	33 900	27 792	32 500	28 550	38 900	26 109	19 846	14 756	17 826	16 502	13 827	16 231
Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016			
France	0	0	0	0	0	0	0	0	0	0	0			
Germany	0	0	0	0	0	0	0	0	0	0	0			
Ireland	14 840	12 662	10 237	8533	7513	4247	3727	1460	2933	73	1171			
Netherlands	353	13	0	0	0	0	0	40	0	0	72			
UK (Northern Ireland)	0	0	0	0	0	0	0	0	0	0	0			
UK (England & Wales)	0	0	0	0	0	0	0	0	0	0	0			
UK Scotland	6	0	0	0	0	0	0	0	0	5	0			
Total landings	15 199	12 675	10 237	8533	7513	4247	3791	1500	2933	78	1243			
Unallocated/ area misreported	4706	5142	3103	1935	2728	2672	2780	2468	2163	1000	971			
Discards*	0	0	0	0	0	0	0	0	0	0	0			
ICES estimate	19 193	17 791	13 340	10 468	10 241	6919	6571	3968	5096	1078	2214			

\* Unraised discards



## Summary of the assessment

**Table 12** Herring in divisions 6.a and 7.b–c. Assessment summary. Weights are in tonnes and recruitment in thousands. Highs and lows are 95% confidence intervals.

Year	Recruitment at age (wr) 1	High	Low	Stock size: SSB#	High	Low	Model catches	F ages (wr) 3-6 per year	High	Low	ICES estimated catch
1957	1215906	2267974	651871	356112	529498	239502	37049	0.139	0.21	0.091	48508
1958	2045187	3645142	1147497	356468	537813	236271	51175	0.185	0.28	0.122	66494
1959	3087894	5590318	1705644	334703	510630	219389	50111	0.183	0.28	0.119	70447
1960	2215525	3963235	1238521	390038	591236	257308	41940	0.136	0.21	0.088	69160
1961	3017683	5314399	1713536	426343	637637	285066	33423	0.100	0.151	0.066	52535
1962	3555478	6253651	2021447	428480	632734	290162	49365	0.136	0.20	0.091	65594
1963	3308482	5769472	1897236	459549	670928	314765	39498	0.103	0.153	0.070	54089
1964	2237792	4008955	1249131	506358	728281	352060	41606	0.100	0.145	0.069	70403
1965	6934365	13316356	3611004	468364	665354	329696	45752	0.110	0.157	0.077	76685
1966	2285282	4093311	1275865	717121	1021457	503460	89590	0.155	0.22	0.110	112834
1967	3786679	6394114	2242522	756910	1073199	533837	81227	0.145	0.20	0.104	109281
1968	4135009	6908244	2475057	747134	1028042	542983	72839	0.120	0.164	0.088	105345
1969	3817094	6303669	2311385	705738	936685	531733	98322	0.168	0.22	0.126	126777
1970	5142243	8388998	3152065	671991	867736	520402	136216	0.24	0.31	0.185	186236
1971	7992387	13758602	4642786	611090	785593	475350	228433	0.40	0.51	0.31	222211
1972	4139146	6724292	2547856	693842	903394	532898	158419	0.28	0.35	0.21	188230
1973	2280716	3789995	1372473	753135	983212	576898	244507	0.36	0.46	0.29	246989
1974	2681803	4352057	1652568	461390	595404	357541	221018	0.49	0.61	0.39	214749
1975	2937296	4840675	1782336	288370	371335	223942	147414	0.48	0.61	0.38	152765
1976	1891726	3177036	1126404	246225	330367	183513	120934	0.48	0.63	0.36	126409
1977	1861699	3158575	1097306	212564	294192	153585	58337	0.29	0.40	0.21	61908
1978	2094866	3555562	1234253	207316	289567	148429	38793	0.198	0.28	0.142	41871
1979	1880409	3169875	1115482	215993	297890	156611	22449	0.110	0.153	0.079	22668
1980	2026863	3377872	1216202	274581	370310	203598	32468	0.130	0.177	0.096	30430
1981	2887784	4810471	1733572	319656	424859	240503	70404	0.24	0.32	0.184	76342
1982	2299035	3874125	1364324	321258	429558	240263	109864	0.33	0.43	0.25	111569
1983	4016816	6957353	2319102	265667	363616	194103	98716	0.35	0.47	0.25	96511
1984	2605148	4452175	1524378	343520	482193	244727	81146	0.23	0.32	0.17	83462
1985	3308482	5670147	1930471	414157	588037	291692	62380	0.197	0.28	0.140	62485
1986	2744200	4741572	1588214	465096	659536	327980	98519	0.23	0.32	0.161	99549
1987	3395630	6110564	1886946	414571	600995	285975	95798	0.26	0.37	0.177	92960
1988	1769133	3169674	987430	466494	688989	315849	65775	0.181	0.27	0.122	64691
1989	1897409	3384741	1063645	538208	810435	357422	64216	0.149	0.22	0.100	63236
1990	1996687	3586289	1111667	554599	850895	361478	82785	0.174	0.26	0.115	88662
1991	1945442	3541407	1068712	532320	831444	340810	66836	0.141	0.22	0.091	66229
1992	2741457	4970040	1512178	463703	732694	293466	58513	0.132	0.21	0.085	60841
1993	2671098	4875818	1463295	532853	849332	334300	64667	0.139	0.22	0.088	68541
1994	3087894	5584733	1707350	413743	659518	259558	54122	0.129	0.21	0.081	58338
1995	1986729	3615359	1091756	329720	526573	206458	55381	0.139	0.22	0.087	57367
1996	2315185	4140537	1294537	333034	525318	211133	56670	0.163	0.26	0.103	58639
1997	2905163	5220372	1616738	263287	415456	166853	65973	0.23	0.36	0.143	62458

Year	Recruitment at age (wr) 1	High	Low	Stock size: SSB <sup>#</sup>	High	Low	Model catches	F ages (wr) 3-6 per year	High	Low	ICES estimated catch
1998	2725057	5010815	1481982	332369	527825	209291	72403	0.24	0.38	0.150	72248
1999	2652465	4959756	1418532	361132	585303	222819	50564	0.136	0.22	0.084	55845
2000	3933342	7275824	2126382	331042	536986	204081	40175	0.109	0.177	0.067	43008
2001	3131429	5769798	1699513	463703	746055	288210	40055	0.100	0.162	0.061	40007
2002	3122049	5772166	1688653	516071	831353	320357	49168	0.116	0.189	0.071	50740
2003	1984743	3713024	1060916	537670	869787	332367	43871	0.090	0.147	0.055	44583
2004	2118036	3936995	1139467	469771	764608	288624	41274	0.083	0.136	0.050	40186
2005	1701465	3160753	915915	426770	689789	264041	28912	0.065	0.107	0.040	30360
2006	1762070	3315112	936587	451351	735665	276916	44981	0.099	0.163	0.061	46539
2007	1289803	2531440	657172	475442	785098	287919	45116	0.105	0.175	0.064	47407
2008	1451343	2909655	723933	450449	766922	264570	29525	0.073	0.125	0.043	29394
2009	1867292	3869250	901152	420416	744726	237335	30424	0.076	0.135	0.043	28976
2010	2673770	5809831	1230508	380028	699793	206377	29144	0.089	0.165	0.048	30118
2011	1728907	3820525	782385	305590	587713	158896	24884	0.077	0.148	0.040	24678
2012	1123546	2574380	490353	346279	688907	174057	24785	0.069	0.138	0.035	25087
2013	593623	1437521	245136	276786	576746	132832	26503	0.088	0.183	0.043	26947
2014	617849	1571018	242988	214058	469945	97502	25848	0.098	0.21	0.045	27123
2015	751630	2112641	267413	175431	403963	76185	19293	0.099	0.22	0.043	19885
2016	684881	2665931	175947	151146	367943	62089	7053 <sup>†</sup>	0.049	0.118	0.020	6937
2017	733366*			132340**							

\* Geometric mean 2012-2016.

\*\* Output from short-term forecast.

<sup>#</sup> For this autumn-spawning stock, the SSB is determined at spawning time and is influenced by fisheries between 1 January and spawning (September).

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<sup>†</sup> Version 3: Model catches for 2016 updated

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