

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

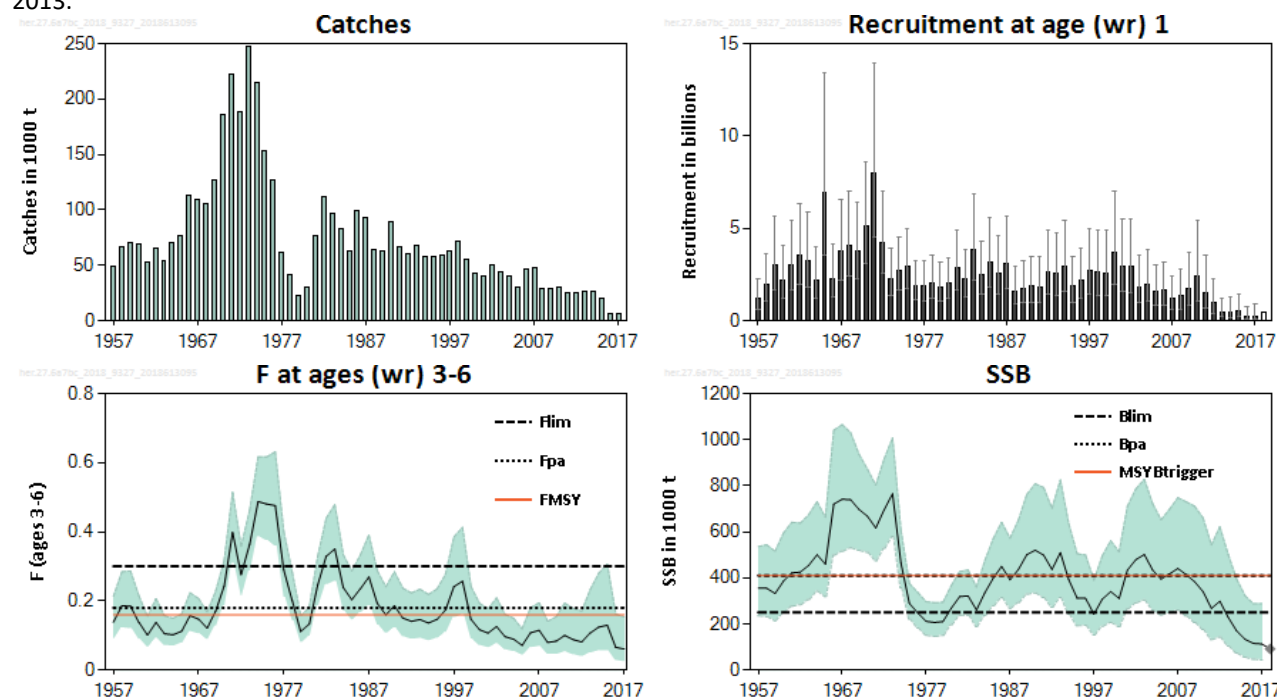
### ICES advice on fishing opportunities

ICES advises that when the ICES MSY approach is applied, there should be zero catch in 2019. ICES recommends that a stock recovery plan is implemented for these combined stocks.

### Stock development over time

The information presented here represents two stocks (divisions 6.a(N) and 6.a(S), and divisions 7.b–c) assessed as one.

The spawning-stock biomass (SSB) has been declining since 2004 and is estimated to have been below  $B_{lim}$  since 2013. The fishing mortality (F) has been below  $F_{MSY}$  since the late 1990s. Recruitment (R) has been at unprecedented low levels since 2013.



**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

ICES assesses that fishing pressure on the stock is below  $F_{MSY}$ ,  $F_{pa}$ , and  $F_{lim}$ , and that spawning stock size is below  $MSY B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .

**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			
		2015	2016	2017		2016	2017	2018	
Maximum sustainable yield	$F_{MSY}$	✓	✓	✓	Below	✗	✗	✗	Below trigger
Precautionary approach	$F_{pa}, F_{lim}$	✓	✓	✓	Harvested sustainably	✗	✗	✗	Reduced reproductive capacity
Management plan	$F_{MGT}$	—	—	—	Not applicable	—	—	—	Undefined

## Catch scenarios

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

Variable	Value	Notes
$F_{\text{ages (wr) 3-6}} (2018)$	0.064	Catch constraint based on agreed scientific monitoring TAC of 5800 tonnes.
$R_{\text{age (wr) 1}} (2018-2019)$	439524	Geometric mean 2013–2017 (in thousands)
SSB (2018)	91515	Calculated in the short-term forecast based on the assumptions for the intermediate year.
Unwanted catch	Negligible	
Total catch (2018)	5800	Catch constraint based on agreed scientific monitoring TAC of 5800 tonnes.

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

Basis	Total catch (2019)	$F_{\text{total}}$ (2019)	SSB * (2019)	SSB ** (2020)	% SSB change ***	% TAC change ^	% Advice change ^^
ICES advice basis							
MSY approach: zero catch	0	0	89089	89394	-2.7	-100	
Other scenarios							
2018 Monitoring TAC	5800	0.073	85558	81473	-6.5	0	
Advice for scientific monitoring (ICES, 2016 )	4840	0.061	86147	82120	-5.9	-16.6	
Proposed rebuilding plan: lower of $F_{2019} = \text{SSB}_{2018} / \text{MSY } B_{\text{trigger}} * F_{\text{MSY}}$ or $F_{2019} = F_{\text{catch}} : 5800 \text{ tonnes}$	2879	0.036	87344	83441	-4.6	-50	
$F_{\text{MSY}}$	12262	0.16	81552	77133	-10.9	111	
$F_{\text{pa}}$	13685	0.18	80660	76180	-11.9	136	
$F_{\text{lim}}$	21748	0.3	75521	70798	-17.5	275	
$\text{SSB} (2020) = B_{\text{lim}}^{\wedge}$							
$\text{SSB} (2020) = B_{\text{pa}} = \text{MSY } B_{\text{trigger}}^{\wedge\wedge}$							
$F_{2019} = F_{2018}$	5100	0.064	85988	81945	-6.0	-12.1	

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

\*\* SSB on 1st of January 2020.

\*\*\* SSB 2019 relative to SSB 2018.

$\wedge$  Catch 2019 relative to agreed scientific monitoring TAC of 5800 t (EU, 2018).

$\wedge\wedge$  Advice for 2018 was for zero catch.

$\wedge\wedge\wedge$  The  $B_{\text{lim}}$ ,  $B_{\text{pa}}$ , and  $\text{MSY } B_{\text{trigger}}$  options were left blank because  $B_{\text{lim}}$  cannot be achieved in 2020, even with zero catch advice.

The catch advice for 2019 is zero following the ICES MSY approach, as it was for 2018.

## Basis of the advice

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

Advice basis	ICES MSY approach
Management plan	There is a proposed rebuilding plan for these combined stocks that has not yet been evaluated by ICES.

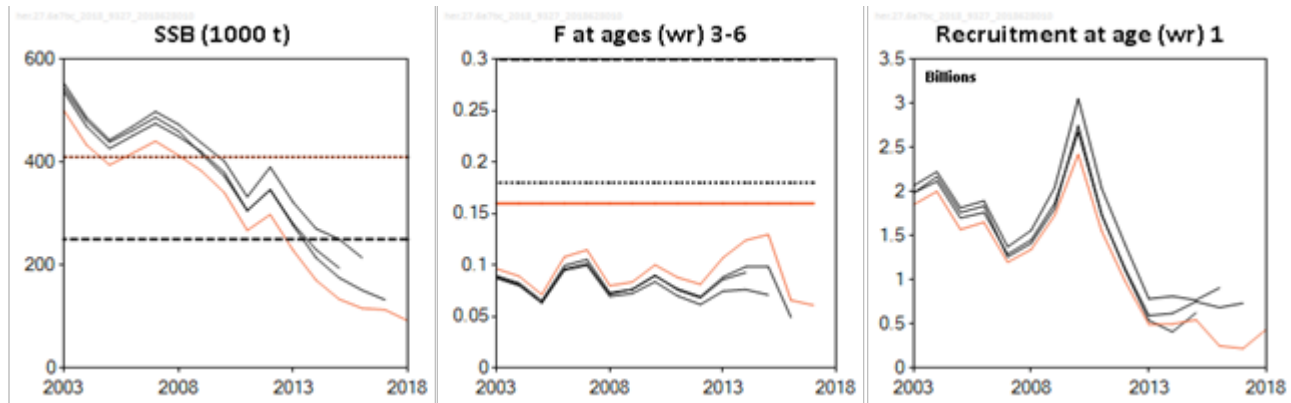
## Quality of the assessment

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.

The 2017 and the 2018 assessment have resulted in a historical downward revision of the stock size. Uncertainties affecting the quality of the assessment are a lack of information on recruitment and the abundance of fish of younger ages, sensitivity to assumptions of future recruitment and age-dependent catchabilities, and the model's apparent

overestimation of the abundance of older fish in the stock relative to that observed in the Malin shelf acoustic survey and catches since 2013.

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



**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 and 2018.

A rebuilding plan, which contains provisions for a monitoring TAC whilst the combined stocks remain below  $B_{lim}$ , was evaluated by ICES in 2017. A key aim of the plan is to provide for sampling opportunities for continuation of the assessment input catch-at-age information and sample collection for stock discrimination research, whilst ensuring that the stock can be rebuilt. However, the plan was found not to be precautionary (ICES, 2017). A revised version of the rebuilding plan was submitted to the European Commission in 2018 but has not been evaluated.

ICES still considers it important that development of a stock recovery plan continues for herring in divisions 6.a and 7.b–c. Such a plan should include rebuilding targets and timelines 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 is no catch option for 2019 that is consistent with these combined stocks recovering to above  $B_{lim}$ . Therefore, in accordance with the ICES MSY approach, catch advice is zero.

Activities that have a negative 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 (ICES, 2003, 2015b).

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. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	410000	$B_{pa}$	ICES (2015a)
	$F_{MSY}$	0.16	Stochastic simulations from a segmented regression stock–recruitment relationship	ICES (2015a)
Precautionary approach	$B_{lim}$	250000	Breakpoint in a segmented regression stock–recruitment relationship	ICES (2015a)
	$B_{pa}$	410000	$B_{pa} = B_{lim} \times \exp(1.645\sigma_B)$ , 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	$F_{pa} = F_{lim} \times \exp(-1.645\sigma_F)$ , 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 the assessment and advice.

ICES stock data category	1 ( <a href="#">ICES, 2016c</a> )
Assessment type	Age-based analytical assessment (FLSAM; ICES, 2018) 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 bycatch	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 ( <a href="#">HAWG</a> )

## Information from stakeholders

The fishing industry has recognised the scientific difficulty in separating the stocks of Division 6.a North and divisions 6.a South and 7.b-c that has led to the combined assessment. To remedy this situation the industry, in conjunction with the Pelagic Advisory Council (PelAC), initiated a major genetic research programme in 2016 that aimed to provide new stock separation information. Analyses of multiple year samples indicated that the divisions 6.aN and 6.aS/7.b–c herring stocks represent at least two genetically distinct populations. In 2018 the European Commission Executive Agency for Small and Medium-sized Enterprises (EASME) commissioned University College Dublin, the Irish Marine Institute, and Marine Scotland Science to undertake a three year project to develop this programme further. The primary objective is to enable accurate splitting of the Malin Shelf Herring Acoustic Survey (MSHAS) time-series into stock of origin in order to provide the data to support separate assessments for these stocks.

The industry initiated an industry acoustic survey which commenced in 2016 and was continued in 2017 and 2018 so as to provide an estimate of the minimum spawning stock size and to provide genetic and morphometric samples of the two separate spawning populations.

The PelAC sent a revised draft rebuilding plan for herring in divisions 6.a, 7.b, and 7.c in March 2018 to the European Commission.

## 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 ICES (2014a and 2014b) 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**	0	6428
2018	MSY approach	0	5800**		
2019	MSY approach	0			

\* See Table 5.3.12.1 in ICES (2014a) and Table 5.3.13.1 in ICES (2014b) for the full histories of ICES advice, management, landings, and catches.

\*\* Agreed under the EU provision for a combined monitoring fishery TAC (EU, 2016, 2017, 2018).

^ 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 2017 as estimated by ICES. All weights are in tonnes.

Catch (2017)	Landings		Discards
6428	Pelagic trawl 100%	Ringnets (negligible)	negligible
	6428		

**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 for each country. 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	2017
Denmark	0	0	0	0	0	0	0	0	0	0	0	23	0
Faroe Islands	1810	570	484	927	1544	70	0	0	0	360	0	0	0
France	613	701	703	564	1049	511	504	244	586	589	0	0	0
Germany	2691	3152	1749	2526	27	3583	3518	1829	4025	3354	3292	1028	0
Ireland	16231	19192	17791	13340	10468	10241	8203	7178	4584	5565	1872	1740	1717
Netherlands	5132	7361	8065	4133	5675	3600	1684	3523	1815	1641	956	372	835
Lithuania	0	0	0	0	0	0	0	0	0	770	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	1	0	0
UK	17494	18290	17618	13963	11076	12018	11696	12249	15906	16769	15265	3254	3356
Total landings	43971	49266	46410	35453	29839	30023	25605	25023	26916	29048	21386	6417	5908
Discards*	772	163	0	0	0	95	0	0	30	0	0	0	0
Total catch	44743	49429	46410	35453	29839	30118	25605	25023	26946	29048	21386	6417	5908
Corrected for 6.a South/7.b–c unallocated/ area misreported	47623	54135	51552	38556	31774	32846	28277	27803	29414	31211	22386	7388	6428
Corrected for 6.a North unallocated	47623	54135	51552	38556	31774	32846	28277	27803	29414	31211	22386	7388	6428
Corrected for 6.a North area misreported	30360	47251	47433	29394	28976	30118	24678	25023	26946	27123	19880	6938	6428
ICES estimate	30360	47251	47433	29394	28976	30118	24678	25023	26946	27123	19880	6938	6428

\* 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 the official and ICES estimated values are presented for each country. 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	11199	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	30676	4840	6223	4962	5317	2695	0	0	0	0	0
UK	32730	32602	-4287	42661	46639	44273	42302	36446	22816	21862	20604	16947	17706
Unallocated	-5485	-3753	700	-4541	-17753	-8015	-11748	-8155	0	277	6244	2820	3490
Discards*	200	0	0	0	0	62	90	0	0	0	0	0	123
Total	51578	56175	54664	61271	64359	64995	65799	61514	37789	35688	41649	31622	33344
Area misreported	-22593	-24397	-30234	-32146	-38254	-29766	-32446	-23623	-14627	-10437	-8735	-3581	-6885
ICES estimate	28985	31778	24430	29575	26105	35233	33353	29736	23162	25251	32914	28081	26459
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Denmark	0	0	0	0	0	0	0	0	0	0	0	23	0
Faroe Islands	1810	570	484	927	1544	70	0	0	0	360	0	0	0
France	613	701	703	564	1049	511	504	244	586	589	0	0	0
Germany	2691	3152	1749	2526	27	3583	3518	1829	4025	3354	3292	1028	0
Ireland	2880	4352	5129	3103	1935	2728	3956	3451	3124	2632	1799	569	10
Netherlands	5132	7008	8052	4133	5675	3600	1684	3523	1775	1641	956	300	835
Lithuania	0	0	0	0	0	0	0	0	0	770	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	1	0	0
UK	17494	18284	17618	13963	11076	12018	11696	12249	15906	16769	15260	3254	3356
Unallocated	0	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	0
Total	31392	34230	33735	25216	21306	22510	21358	21296	25446	26115	21307	5174	4201
Area misreported	-17263	-6884	-4119	-9162	-2798	-2728	-3599	-2780	-2468	-4088	-2506	-450	
ICES estimate	14129	27346	29616	16054	18508	19877	17759	18516	22978	22027	18801	4724	4201

\* 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 the official and ICES estimated values are presented for each country. 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	26000	27600	24400	25450	23800	24400	25200	16325	10164	11278	13072	12921	10950	13351
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	27150	30300	26950	26692	25600	27800	27700	18193	11398	13366	13953	12921	11014	13351
Unallocated/ area misreported	4600	6250	6250	1100	6900	700	11200	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	31850	36800	33900	27792	32500	28550	38900	26109	19846	14756	17826	16502	13827	16231
Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
France	0	0	0	0	0	0	0	0	0	0	0	0		
Germany	0	0	0	0	0	0	0	0	0	0	0	0		
Ireland	14840	12662	10237	8533	7513	4247	3727	1460	2933	73	1171	1707		
Netherlands	353	13	0	0	0	0	0	40	0	0	72	0		
UK (Northern Ireland)	0	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	0		
UK Scotland	6	0	0	0	0	0	0	0	0	5	0	0		
Total landings	15199	12675	10237	8533	7513	4247	3791	1500	2933	78	1243	1707		
Unallocated/ area misreported	4706	5142	3103	1935	2728	2672	2780	2468	2163	1000	971	520		
Discards*	0	0	0	0	0	0	0	0	0	0	0	0		
ICES estimate	19193	17791	13340	10468	10241	6919	6571	3968	5096	1078	2214	2227		

\* 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	SSB#	High	Low	Catches	F at ages (wr) 3–6	High	Low
thousands				tonnes						
1957	1186402	2273010	619245	354849	535506	235138	48508	0.139	0.21	0.090
1958	1994916	3645823	1091575	354784	543427	231625	66494	0.186	0.28	0.121
1959	3048474	5651833	1644280	332290	515289	214281	70447	0.185	0.29	0.119
1960	2227247	4081294	1215455	385816	594452	250405	69160	0.138	0.21	0.088
1961	3012555	5446407	1666326	421986	641283	277681	52535	0.101	0.155	0.066
1962	3524054	6359367	1952860	424850	637269	283236	65594	0.137	0.21	0.091
1963	3268128	5847618	1826498	454335	673824	306342	54089	0.105	0.157	0.070
1964	2197297	4023703	1199918	500010	730341	342319	70403	0.102	0.150	0.069
1965	6901819	13436244	3545270	459499	662700	318604	76685	0.112	0.162	0.078
1966	2290304	4175095	1256377	720540	1040955	498752	112834	0.157	0.22	0.111
1967	3805703	6589790	2197851	741156	1064974	515799	109281	0.147	0.21	0.105
1968	4084903	6987894	2387905	739269	1030318	530437	105345	0.121	0.168	0.088
1969	3773148	6378232	2232068	697105	936549	518879	126777	0.170	0.23	0.127
1970	5150959	8597093	3086204	667524	871854	511081	186236	0.24	0.32	0.185
1971	7967050	13927594	4557419	616371	802082	473658	222211	0.40	0.51	0.31
1972	4213807	6999392	2536816	695865	915766	528769	188230	0.28	0.36	0.21
1973	2297791	3891737	1356681	764755	1007607	580434	246989	0.36	0.46	0.29
1974	2715844	4501952	1638358	464771	605836	356551	214749	0.49	0.62	0.38
1975	2965938	4992841	1761881	288863	376000	221920	152765	0.48	0.62	0.37
1976	1892463	3248135	1102607	247983	336693	182645	126409	0.48	0.63	0.36
1977	1866253	3239132	1075258	211420	296259	150877	61908	0.29	0.40	0.21
1978	2053573	3569154	1181558	206311	291987	145774	41871	0.20	0.28	0.142
1979	1817794	3139115	1052645	210061	293559	150313	22668	0.111	0.157	0.079
1980	2004869	3415101	1176978	268529	366378	196813	30430	0.133	0.181	0.097
1981	2880961	4904553	1692292	318558	427565	237342	76342	0.25	0.33	0.185
1982	2254394	3873810	1311962	321798	434035	238585	111569	0.33	0.44	0.25
1983	3878372	6830162	2202257	260801	359959	188957	96511	0.35	0.48	0.26
1984	2487970	4338534	1426748	335645	474771	237289	83462	0.24	0.33	0.170
1985	3188944	5571431	1825269	398501	569792	278703	62485	0.20	0.29	0.145
1986	2593730	4566481	1473221	449575	641380	315129	99549	0.24	0.33	0.166
1987	3119890	5688513	1711117	391533	571939	268032	92960	0.27	0.39	0.185
1988	1626246	2974253	889190	436496	650430	292927	64691	0.192	0.29	0.129
1989	1762710	3212151	967310	500664	761797	329044	63236	0.160	0.24	0.106
1990	1874744	3445366	1020114	520025	808272	334572	88662	0.186	0.28	0.122
1991	1849237	3440345	993992	498775	792025	314102	66229	0.150	0.24	0.095
1992	2628655	4874865	1417440	436663	701445	271832	60841	0.141	0.22	0.089
1993	2562246	4785584	1371850	509657	824383	315085	68541	0.146	0.23	0.091
1994	2947115	5450515	1593516	392078	634095	242433	58338	0.136	0.22	0.085
1995	1860539	3462525	999735	311343	504723	192055	57367	0.146	0.23	0.091
1996	2159788	3950191	1180875	311301	498882	194251	58639	0.173	0.28	0.109
1997	2708408	4972410	1475236	243124	390110	151520	62458	0.24	0.39	0.152
1998	2612542	4910934	1389833	307236	495720	190418	72248	0.26	0.41	0.160
1999	2554264	4880668	1336756	340326	561324	206337	55845	0.146	0.24	0.089

Year	Recruitment at age (wr) 1	High	Low	SSB <sup>#</sup>	High	Low	Catches	F at ages (wr) 3–6	High	Low
	thousands			tonnes						
2000	3720058	7039043	1966011	310298	512544	187857	43008	0.117	0.193	0.070
2001	2933409	5537439	1553947	434097	711063	265011	40007	0.107	0.177	0.065
2002	2919175	5524518	1542502	478917	786300	291697	50740	0.126	0.21	0.076
2003	1850091	3550043	964168	501451	827259	303960	44583	0.096	0.161	0.058
2004	2001622	3812905	1050772	433457	721633	260361	40186	0.089	0.150	0.053
2005	1569508	2992043	823302	394728	652140	238921	30360	0.071	0.119	0.043
2006	1652276	3191316	855451	417401	696951	249980	46539	0.108	0.180	0.065
2007	1199509	2429143	592317	440825	748000	259796	47407	0.115	0.195	0.068
2008	1343328	2788411	647153	413431	729766	234219	29394	0.080	0.141	0.045
2009	1731750	3718891	806412	383402	710820	206800	28976	0.083	0.154	0.045
2010	2421630	5415122	1082947	340696	660324	175783	30118	0.100	0.194	0.052
2011	1549703	3531193	680105	267337	542515	131736	24678	0.088	0.178	0.043
2012	980721	2301786	417855	298252	621416	143147	25087	0.081	0.170	0.039
2013	493869	1216090	200566	228528	501494	104139	26947	0.107	0.23	0.049
2014	496919	1262135	195644	170418	395424	73446	27123	0.124	0.28	0.055
2015	545533	1477312	201451	133578	322940	55252	19885	0.130	0.31	0.055
2016	248922	733061	84525	115875	287646	46679	6937	0.066	0.162	0.027
2017	219969	909860	53180	112934	288139	44264	6424	0.061	0.153	0.024
2018	439524*			91515**						

\* Geometric mean 2013–2017.

\*\* Output from short-term forecast.

# 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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