

Herring (*Clupea harengus*) in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k (Irish Sea, Celtic Sea, and southwest of Ireland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 4742 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has been decreasing significantly since its peak in 2011, and is now below MSY $B_{trigger}$ at B_{lim} . The fishing mortality (F) has increased since 2008 and has been above F_{MSY} since 2015. Recruitment has been below average since 2013.

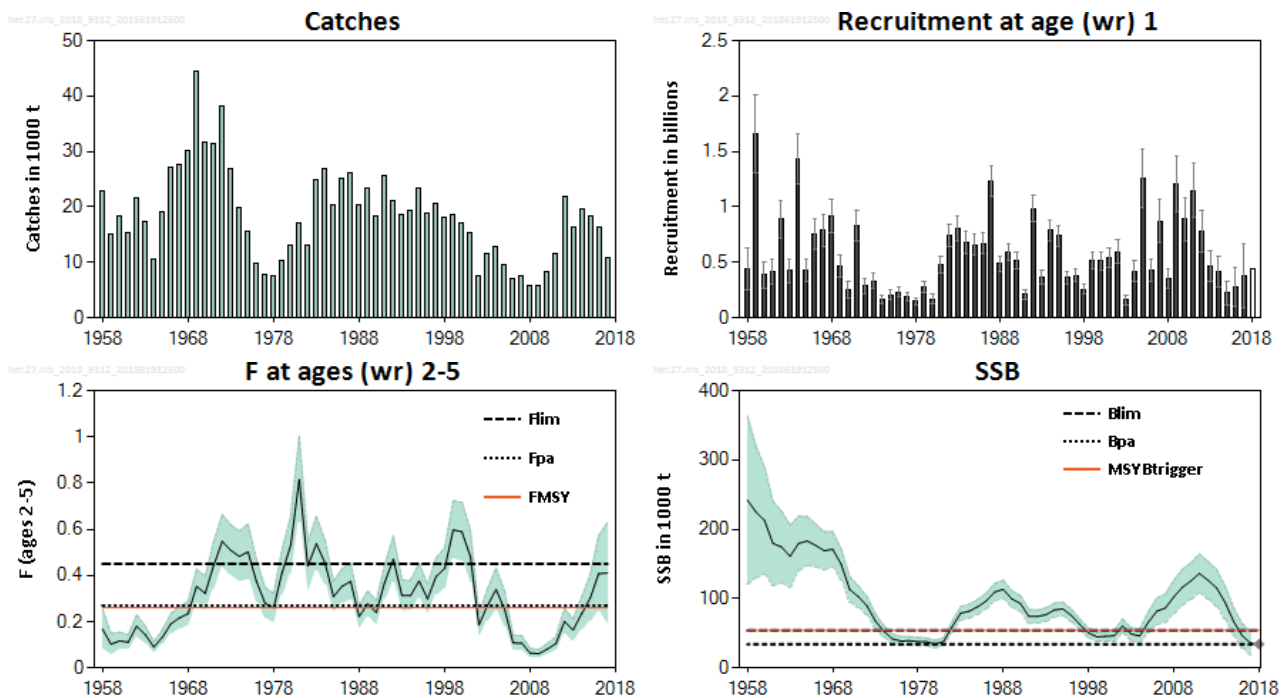


Figure 1 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Summary of the stock assessment. The assumed recruitment is unshaded and the forecast SSB value is designated by a grey diamond. The shaded areas on the F and SSB plots represent 95% confidence intervals.

Stock and exploitation status

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

Table 1 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. 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}	✘	✘	✘ Above	$MSY B_{trigger}$	✘	✘ Below trigger
Precautionary approach	F_{pa}, F_{lim}	○	○	○ Increased risk	B_{pa}, B_{lim}	○	○ Increased risk
Management plan	F_{MGT}	—	—	— Not applicable	B_{MGT}	—	— Not applicable

Catch scenarios

Table 2 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. The basis for the catch scenarios. All weights are in tonnes.

Variable	Value	Notes
$F_{\text{ages (wr) } 2-5}$ (2018)	0.44	F corresponding to the assumed total catch for 2018.
$R_{\text{age (wr) } 1}$ (2018-2019)	437926	Stock–recruitment relationship based on SSB_{2016} from the assessment output (in thousands).
SSB (2018)	36139	Calculated in the short-term forecast based on the assumptions for the intermediate year.
Total catch (2018)	10887	TAC adjusted for estimated uptake, carry-over of national quota, and estimated unwanted catch.

Table 3 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2019)	F_{2-5} (2019)	SSB (2019) *	% SSB change **	SSB (2020) *	% TAC change ***	% Advice change ^
ICES advice basis							
MSY approach: $F_{\text{MSY}} \times SSB_{2018} / \text{MSY } B_{\text{trigger}}$	4742	0.17	39558	9.5	41070	-53	-12.9
Other scenarios							
F_{MSY}	7000	0.26	38395	6.2	39607	-31	29
F = 0	0	0	41887	15.9	50670	-100	-100
F_{pa}	7241	0.27	38269	5.9	39451	-29	33
F_{lim}	11264	0.45	36088	-0.141	36864	11.2	107
SSB (2019) = B_{lim}	14847	0.635	34020	-5.9	34584	47	173
SSB (2019) = B_{pa} ^^							
SSB (2019) = $\text{MSY } B_{\text{trigger}}$ ^^							
F = F_{2018}	11055	0.44	36205	0.183	36998	9.2	103

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

** SSB 2019 relative to SSB 2018.

*** Total catch in 2019 relative to TAC in 2018 (10 127 tonnes).

^ Advice value for 2019 relative to the advice value for 2018 (5445 tonnes).

^^ These catch options are left blank because the stated SSB cannot be achieved, even with F = 0.

The advice for 2019 is lower than the advice for 2018. This is due to the current status of the stock which shows a downward trend in SSB and an increasing trend in F.

Basis of the advice

Table 4 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. The basis of the advice.

Advice basis	MSY approach
Management plan	The long-term management strategy for Celtic Sea herring that was proposed by the Pelagic AC in 2011 (Pelagic AC, 2011) was evaluated by ICES in 2018. ICES advises that the harvest control rule is no longer consistent with the precautionary approach. The management strategy results in a greater than 5% probability of the stock falling below B_{lim} in several years throughout the 20-year simulated period (ICES, 2018a).

Quality of the assessment

An inter-benchmark was carried out on this stock in 2018. The survey estimates were revised, the range of age classes in the survey was reduced, and assumptions regarding selectivity at older ages were revised. These changes improved diagnostics and reduced retrospective patterns, although there was little change in the perception of current stock status.

The 2017 acoustic survey estimate was not used in the assessment (ICES, 2018b) as the survey collected only one biological sample which was not considered representative. The survey time-series used in the assessment includes data from 2002–2016. Since 2014, herring have been observed close to the bottom, and less reliably estimated by the acoustic survey, adding uncertainty to the assessment.

Recruitment estimates are uncertain due to a lack of recruitment indices. In the Irish Sea, mixing occurs between juvenile Celtic Sea fish and Irish Sea fish, but the level of mixing is unknown.

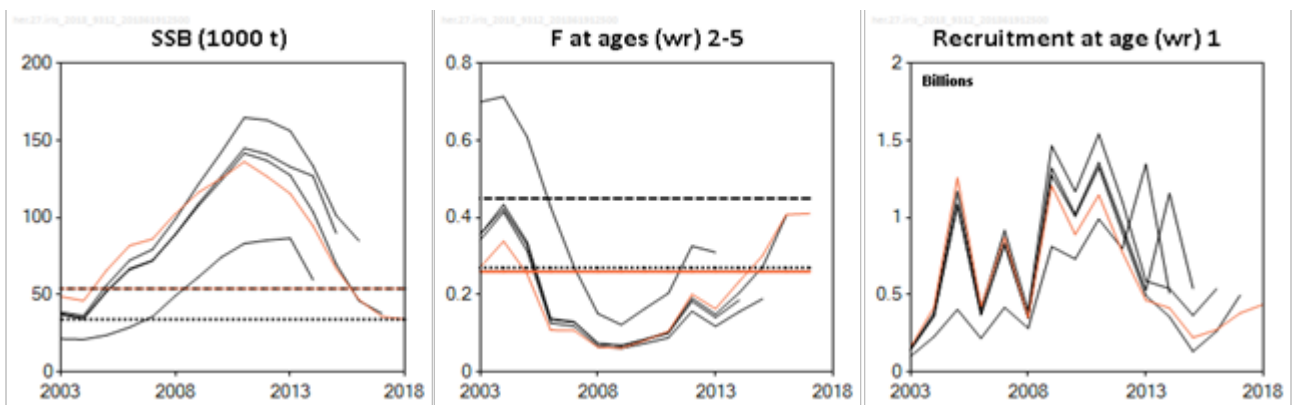


Figure 2 Herring in divisions 7.a South of 52°30'N, 7.g-h, and 7.j-k. Historical assessment results.

Issues relevant for the advice

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, 2013, 2015a).

There has been an increase in marine anthropogenic activity. Activities that have a negative impact on the spawning habitat of herring, such as dumping of dredge spoil, extraction of marine aggregates (e.g. gravel and sand), and erection of structures in the vicinity of spawning grounds are a cause for concern (see for example Groot, 1979, 1996; ICES, 2003, 2015a). This is because a gravel substratum is an essential habitat for herring spawning.

Evaluations conducted in 2018 by ICES (ICES, 2018a) show that the management strategy is no longer precautionary. The management strategy results in a greater than 5% probability of the stock falling below B_{lim} in several years throughout the 20 year simulated period. The TAC has been set in accordance with the management strategy for the years 2013–2018. The TAC set for 2018 is much higher than ICES advice for 2018.

Reference points

Table 5 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	54000	B_{pa}	ICES (2018c)
	F_{MSY}	0.26	Stochastic simulations using a segmented regression stock–recruitment relationship from 1970–2014.	ICES (2018c)
Precautionary approach	B_{lim}	34000	B_{loss} = the lowest observed SSB (1980).	ICES (2018c)
	B_{pa}	54000	$B_{pa} = B_{lim} \times \exp(1.645 \times \sigma_B)$, with $\sigma_B = 0.29$ from assessment uncertainty in the terminal year.	ICES (2018c)
	F_{lim}	0.45	Equilibrium F maintaining SSB > B_{lim} with 50% probability.	ICES (2018c)
	F_{pa}	0.27	$F_{pa} = F_{lim} \times \exp(-1.645 \times \sigma_F)$, where $\sigma_F = 0.30$ from assessment uncertainty (capped) in the terminal year.	ICES (2018c)

Basis of the assessment

Table 6 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016)
Assessment type	Age-based analytical assessment (ASAP; ICES, 2018b) that uses catches in the model and in the forecast.
Input data	Commercial catches (weights, ages, and length frequencies from catch sampling); Acoustic survey index (CSHAS) (excluding 2017); annual weights in the stock; fixed maturity ogive; natural mortality assumed constant.
Discards and bycatch	Included in the assessment.
Indicators	None
Other information	Benchmarked in WKWEST (ICES, 2015b) and inter-benchmarked in 2018 (ICES, 2018c). Assessed on a seasonal basis, 1 April–31 March, to allow for the inclusion of the spawning cycle in the assessment period. 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” as fish do not lay down a ring in their first winter.
Working group	Herring Assessment Working Group for the Area South of 62°N (HAWG)

Information from stakeholders

Celtic Sea Herring Management Advisory Committee (CSHMAC), was established in 2005 to provide management advice to the Irish administration in relation to the fishery. The CSHMAC is aware that ICES has evaluated the Celtic Sea management strategy in March 2018 to be no longer consistent with the precautionary approach and is working closely with the Marine Institute on a rebuilding plan that should be ready for submission to the Pelagic AC in October.

History of the advice, catch, and management

Table 7 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. ICES advice, official landings, and ICES estimated catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official landings	Discards	ICES estimated catch [^]
1987	Precautionary TAC	18000	18000	18000	4200	27300
1988	TAC	13000	18000	16800	2400	19200
1989	TAC	20000	20000	19200	3500	22700
1990	TAC	15000	17500	17700	2500	20200
1991	TAC (TAC excluding discards)	15000 (12500)	21000	21700	1900	23600
1992	TAC	27000	21000	20900	2100	23000
1993	Precautionary TAC (including discards)	20000–24000	21000	19200	1900	21100
1994	Precautionary TAC (including discards)	20000–24000	21000	17400	1700	19100
1995	No specific advice		21000	18300	700	19000

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official landings	Discards	ICES estimated catch [^]
1996	TAC	9800	16500–21000**	18800	3000	21800
1997	If required, precautionary TAC	< 25000	22000	18100	700	18800
1998	Catches below 25	< 25000	22000	20300	0	20300
1999	F = 0.4	19000	21000	18100	0	18100
2000	F < 0.3	20000	21000	18267	0	18267
2001	F < 0.34	17900	20000	17729	0	17729
2002	F < 0.35	11000	11000	10550	0	10550
2003	Substantially less than recent catches	-	13000	10875	0	10875
2004	60% of average catch 1997–2000	11000	13000	11065	0	11065
2005	60% of average catch 1997–2000	11000	13000	8452	0	8452
2006	Further reduction 60% avg. catch 2002–2004	6700	11000	8530	0	8530
2007	No fishing without rebuilding plan		9400	8268	0	8268
2008	No targeted fishing without rebuilding plan		7900	6853	0	6853
2009	No targeted fishing without rebuilding plan		5900	5760	0	5760
2010	F _{mgt} = 0.19	10150	10150	8406	0	8406
2011	See scenarios		13200	11503	0	11503
2012	MSY approach	< 26900	21100	21604	161	21765
2013	MSY approach	< 18500	17200	16067	118	16185
2014	MSY approach	< 35942	22300	18930	644	19574
2015	MSY approach	< 15140	*15700	17579	247	17826
2016	MSY approach	< 23164	*15400	16136	182	16318
2017	MSY approach	< 16145	*14500	10637	130	10767
2018	MSY approach	≤ 5445	*10100			
2019	MSY approach	≤ 4742				

*Initial TAC before carry-over of unused quota from previous year.

** Revised in 1996 after the ACFM May meeting.

[^] By calendar year.

History of the catch and landings

Table 8 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Catch distribution by fleet in 2017 as estimated by ICES. All weights are in tonnes.

Catch (2017)	Landings		Discards
	Pelagic trawlers 100%	Driftnets (negligible)	
10767	10637		130

Table 9 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. History of commercial catch and landings; both the official and ICES estimated values are presented for each country. All weights are in tonnes.

Year	France	Germany	Ireland	Netherlands	U.K.	Unallocated	Discards	Total
1988			16800				2400	19200
1989	+		16000	1900		1300	3500	22700
1990	+		15800	1000	200	700	2500	20200
1991	+	100	19400	1600		600	1900	23600
1992	500		18000	100	+	2300	2100	23000
1993			19000	1300	+	-1100	1900	21100
1994	+	200	17400	1300	+	-1500	1700	19100
1995	200	200	18000	100	+	-200	700	19000
1996	1000	0	18600	1000		-1800	3000	21800
1997	1300	0	18000	1400		-2600	700	18800
1998	+		19300	1200		-200	na	20300
1999		200	17900	1300	+	-1300	na	18100
2000	573	228	18038	44	1	-617	na	18267
2001	1359	219	17729			-1578	na	17729
2002	734		10550	257		-991	na	10550
2003	800		10875	692	14	-1506	na	10875
2004	801	41	11024			-801	na	11065
2005	821	150	8452	799		-1770	na	8452
2006			8530	518	5	-523	na	8530
2007	581	248	8268	463	63	-1355	na	8268
2008	503	191	6853	291		-985	na	6853
2009	364	135	5760			-499	na	5760
2010	636	278	8406	325		-1239	na	8406
2011	241		11503	7		-248	na	11503
2012	3	230	16132	3135		2104	161*	21765
2013		450	14785	832			118	16185
2014	244	578	17287	821			644	19574
2015		477	15798	1304	+		247	17825
2016		419	14584	1025	559	-451	182	16318
2017		298	9627	648	64		130	10767

* Added in 2014 after report of 1% discarding.

+ Designates catch of less than 0.5 tonnes.

na = not available.

Summary of the assessment

Table 10 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Assessment summary. All weights are in tonnes and recruitment is in thousands. High and Low refers to 95% confidence intervals.

Year [^]	Recruitment at age (wr) 1	High	Low	SSB**	High	Low	Catches	F at ages (wr) 2–5	High	Low
	thousands	thousands	thousands	tonnes	tonnes	tonnes	tonnes			
1958	444688	632400	256980	242016	363210	120830	22978	0.167	0.25	0.080
1959	1659130	2010440	1307760	224732	319435	130025	15086	0.103	0.148	0.057
1960	386998	507470	266530	212734	289922	135538	18283	0.116	0.154	0.079
1961	417831	527820	307840	179427	239993	118867	15372	0.112	0.143	0.080
1962	887316	1061710	712930	174324	226050	122590	21552	0.180	0.23	0.131
1963	422436	525410	319470	160996	205662	116338	17349	0.143	0.182	0.104
1964	1428660	1654070	1203330	179556	218864	140256	10599	0.090	0.114	0.067
1965	431089	533490	328690	182988	218185	147795	19126	0.133	0.165	0.101
1966	754255	893010	615510	176646	207425	145875	27030	0.191	0.24	0.147
1967	786034	926010	646050	169038	196309	141771	27658	0.22	0.27	0.167
1968	917327	1068920	765740	171084	196109	146051	30236	0.23	0.29	0.182
1969	470963	572120	369800	149237	171210	127270	44389	0.35	0.43	0.28
1970	255151	329399	180901	113042	131389	94691	31727	0.32	0.40	0.25
1971	829723	968850	690590	102814	118157	87463	31396	0.44	0.55	0.34

Year [^]	Recruitment at age (wr) 1	High	Low	SSB**	High	Low	Catches	F at ages (wr) 2–5	High	Low
	thousands			tonnes			tonnes			
1972	285712	357561	213859	89765	102915	76615	38203	0.55	0.66	0.43
1973	332104	400670	263530	67697	78082	57312	26936	0.51	0.62	0.40
1974	164140	206230	122050	52595	61163	44027	19940	0.48	0.59	0.37
1975	206393	252132	160648	41796	48957	34635	15588	0.50	0.62	0.38
1976	231424	276667	186173	38733	45007	32460	9771	0.37	0.47	0.28
1977	189220	226677	151763	39214	45248	33180	7833	0.28	0.35	0.21
1978	148806	180676	116944	37857	43777	31937	7559	0.26	0.32	0.196
1979	283391	333261	233519	37515	43107	31923	10321	0.41	0.51	0.31
1980	170614	209503	131717	34345	39730	28960	13130	0.53	0.65	0.40
1981	474657	548673	400647	37944	43523	32365	17103	0.81	1.00	0.63
1982	740675	844250	637090	59274	66910	51638	13000	0.44	0.55	0.33
1983	802364	913030	691690	78846	88410	69282	24981	0.54	0.65	0.42
1984	683048	781708	584392	81711	91584	71838	26779	0.46	0.55	0.36
1985	659369	751392	567348	88153	98553	77753	20426	0.31	0.37	0.24
1986	672361	762076	582644	96614	107800	85428	25024	0.35	0.43	0.28
1987	1231990	1369460	1094540	109572	121882	97258	26200	0.37	0.45	0.29
1988	488000	557284	418716	113280	126441	100119	20447	0.22	0.27	0.174
1989	590800	670823	510777	99593	111338	87848	23254	0.28	0.33	0.22
1990	515953	589718	442182	92943	104302	81584	18404	0.24	0.29	0.188
1991	213179	255494	170866	74330	84232	64428	25562	0.37	0.45	0.29
1992	985081	1101830	868330	74086	83309	64863	21127	0.47	0.57	0.37
1993	368564	429571	307549	76787	86420	67154	18618	0.31	0.38	0.25
1994	786168	885570	686770	83630	93506	73754	19300	0.31	0.38	0.25
1995	738739	833256	644224	85066	94696	75436	23305	0.38	0.45	0.30
1996	360980	419499	302461	75320	84205	66435	18816	0.30	0.36	0.24
1997	383439	444918	321962	62511	70205	54817	20496	0.40	0.48	0.32
1998	257411	305068	209752	50436	57206	43666	18041	0.43	0.52	0.34
1999	512151	588192	436108	44700	50916	38484	18485	0.60	0.72	0.47
2000	512489	593016	431964	45630	52488	38772	17191	0.59	0.72	0.46
2001	539529	630617	448443	46287	54040	38534	15269	0.48	0.60	0.37
2002	594106	698140	490080	60238	70405	50071	7465	0.186	0.23	0.138
2003	160420	202767	118073	48816	57933	39699	11536	0.27	0.34	0.20
2004	418095	509983	326217	46103	56176	36030	12743	0.34	0.43	0.25
2005	1257320	1523500	991100	65794	80680	50908	9494	0.25	0.33	0.176
2006	424982	528250	321710	81827	100715	62939	6944	0.108	0.142	0.075
2007	871441	1067800	675080	86121	106356	65886	7636	0.107	0.139	0.075
2008	351292	442944	259636	102516	126599	78441	5872	0.064	0.084	0.045
2009	1206530	1457370	955630	116303	142018	90582	5745	0.062	0.080	0.043
2010	890411	1084540	696280	125488	151690	99290	8370	0.082	0.105	0.058
2011	1146660	1389830	903570	136256	164092	108428	11470	0.105	0.134	0.076
2012	776809	963680	589940	126599	153601	99599	21820	0.20	0.26	0.145
2013	464189	602350	326030	115580	142216	88944	16247	0.163	0.21	0.115
2014	414165	556340	271980	94637	118538	70736	19574	0.23	0.31	0.162
2015	221985	325400	118580	67008	86739	47277	18355	0.30	0.40	0.20
2016	273292	450220	96360	46734	64174	29294	16318	0.41	0.57	0.24
2017	380546	671170	89930	35738	52402	19074	10767	0.41	0.63	0.193
2018	437926***			34154*						

* From the short-term forecast.

** The SSB is set at spawning time (1 October).

*** Stock-recruitment relationship based on SSB₂₀₁₆ from the assessment output.

[^] Assessment year (1 April–31 March).

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