Herring (*Clupea harengus*) in Division 7.a North of 52°30'N (Irish Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2020 should be no more than 8064 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has been above MSY $B_{trigger}$ since 2007. Fishing mortality (F) has decreased since 2003 and has been below F_{MSY} since 2007. There has been above average recruitment (R) since 2006.

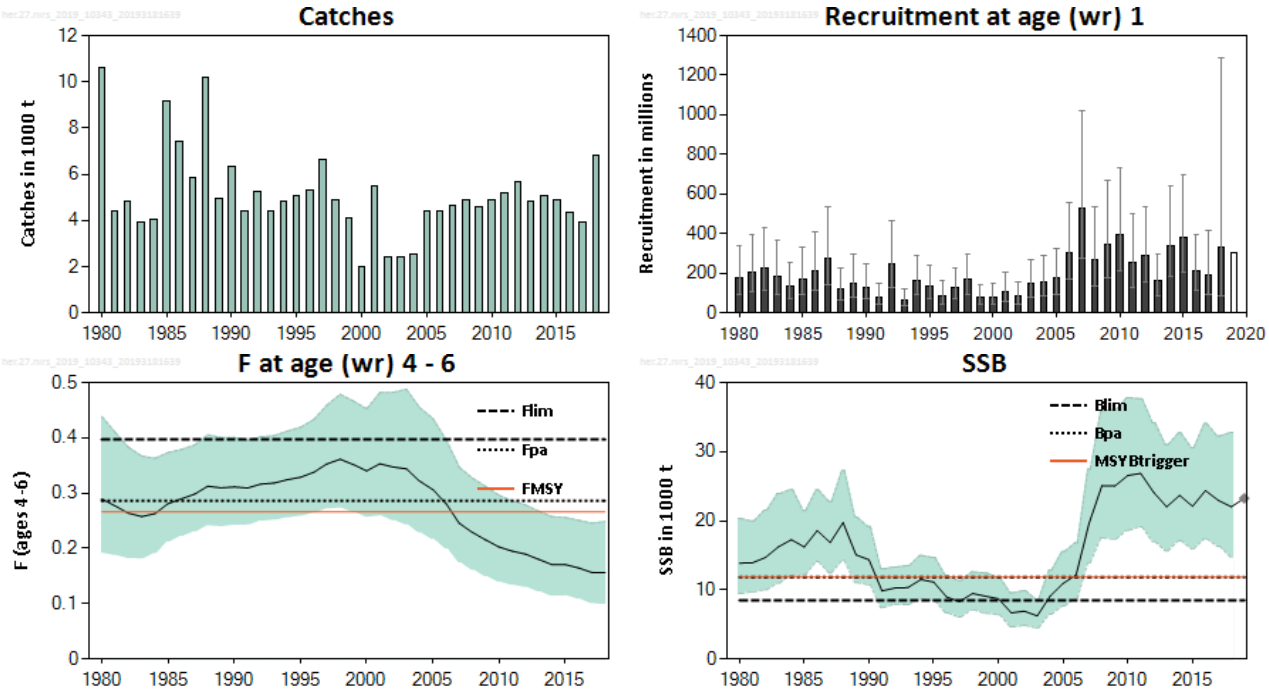

Figure 1 Herring in Division 7.a North of 52°30'N. Summary of the stock assessment. The shaded areas on F and SSB and error bars on recruitment represent 95% confidence intervals. The assumed final year recruitment value is unshaded and predicted SSB is shown with a diamond shape.

Stock and exploitation status

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

Table 1 Herring in Division 7.a North of 52°30'N. State of the stock and fishery relative to reference points.

		Fishing pressure					Stock size			
		2016	2017	2018			2017	2018	2019	
Maximum sustainable yield	F_{MSY}	✓	✓	✓	Below	MSY $B_{trigger}$	✓	✓	✓	Above trigger
Precautionary approach	F_{pa},F_{lim}	✓	✓	✓	Harvested sustainably	B_{pa},B_{lim}	✓	✓	✓	Full reproductive capacity
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	–	Not applicable

Catch scenarios

Table 2 Herring in Division 7.a North of 52°30'N. Basis for the catch scenarios. Assumptions made for the interim year and the forecast.

Variable	Value	Notes
$F_{ages\ (wr)\ 4–6}$ (2019)	0.22	F based on TAC in 2019.
SSB (2019)	23 247	Calculated in the short-term forecast based on the assumptions for the intermediate year. In tonnes.
$R_{age\ (wr)\ 1}$ (2019–2020)	300 740	Geometric mean over 2007–2016. In thousands.
Total catch (2019)	6896	TAC 2019. In tonnes.

Table 3 Herring in Division 7.a North of 52°30'N. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2020)	F_{total} (2020)	SSB * (2020)	% SSB * change **	SSB * ^ (2021)	% TAC change ***	% Advice change ^^
ICES advice basis							
MSY approach: F_{MSY}	8064	0.266	22005	−5.3	21013	16.9	16.9
Other scenarios							
F = 0	0	0	27726	19.3	32288	−100.0	−100.0
F_{pa}	8595	0.286	21629	−7.0	20360	24.6	24.6
F_{lim}	11372	0.397	19664	−15.4	17122	64.9	64.9
SSB (2020) = B_{lim}	27521	1.414	8500	−63.4	11316	299.1	299.1
SSB (2020) = B_{pa}	22578	1.003	11831	−49.1	14160	227.4	227.4
SSB (2020) = MSY $B_{trigger}$	22578	1.003	11831	−49.1	14160	227.4	227.4

* For autumn-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries between 1 January and spawning (set for September).
** SSB 2020 relative to SSB 2019.
*** Catch 2020 relative to the TAC for 2019 (6896 tonnes).
^ Assuming same catch scenario in 2020 as in 2019.
^^ Advice value for 2020 relative to the advice value for 2019 (6896 tonnes).

There is an increase in catch advice for 2020, as a result of a forecast growth in the SSB.

Basis of the advice

Table 4 Herring in Division 7.a North of 52°30'N. The basis of the advice.

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

Quality of the assessment

The stock was benchmarked in 2017 (ICES, 2017a). In comparison to 2018, the current assessment shows a consistent perception of fishing pressure.

The assessment is performed on a mixed stock (including juveniles from the Celtic Sea), which affects the estimates of the younger ages. Both the catches and acoustic survey indices contain an unknown amount of fish from other stocks. Due to the presence of herring from other stocks, the assessment may overestimate the Irish Sea stock. There is interannual variation in the proportion of juvenile Celtic Sea herring present in the Irish Sea, as well as variation in the distribution patterns.

The interannual variation in herring migration patterns affects the quality of the assessment. The timing of the acoustic survey is occasionally mismatched with the migration pattern of the spawning-stock into the Irish Sea from the Malin Shelf.

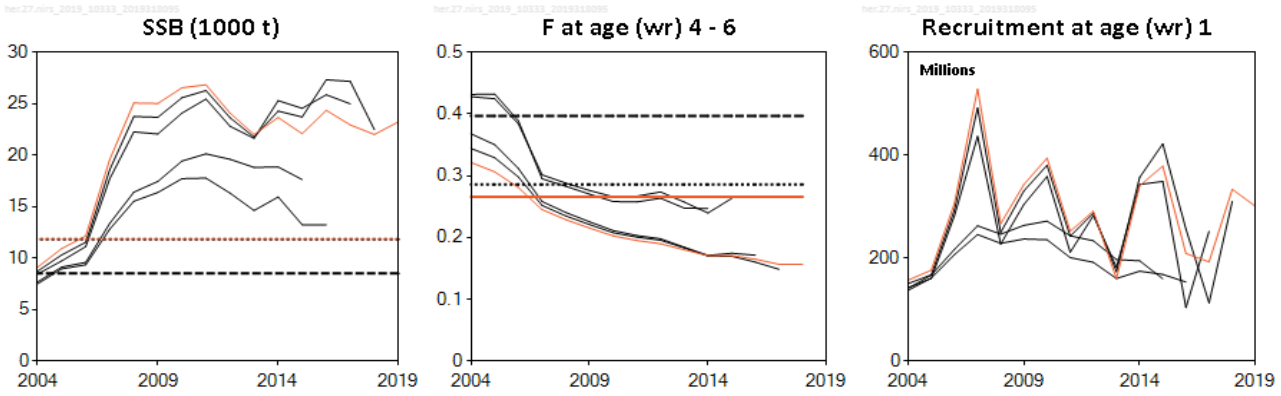

Figure 2 Herring in Division 7.a North of 52°30'N. Historical assessment results. Final-year recruitment estimates are included. The stock was benchmarked in 2017.

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 to the stock (ICES, 2003, 2015).

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

It is known that juvenile Celtic Sea herring mix with the Irish Sea stock. This stock should be considered as part of a metapopulation. The consequence of this needs to be further evaluated for management and advice.

Reference points

Table 5 Herring in Division 7.a North of 52°30'N. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	11831	MSY $B_{trigger}$ = B_{pa}.	ICES (2017a)
	F_{MSY}	0.266	$F_{p0.5}$ based on stochastic simulations.	ICES (2017a)
Precautionary approach	B_{lim}	8500	Lowest SSB producing above average recruitment.	ICES (2017a)
	B_{pa}	11831	$B_{pa} = B_{lim} \times \exp(1.645 \times \sigma)$, with $\sigma = 0.201$, based on the estimated CV from the terminal assessment year.	ICES (2017a)
	F_{lim}	0.397	Equilibrium F maintaining SSB > B_{lim} with 50% probability.	ICES (2017a)
	F_{pa}	0.286	$F_{pa} = F_{lim} \times \exp(-1.645 \times \sigma)$, with $\sigma = 0.231$, based on the estimated CV from the terminal assessment year.	ICES (2017a)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 6 Herring in Division 7.a North of 52°30'N. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018)
Assessment type	Age-based analytical assessment (FLSAM; ICES, 2019) that uses catches in the model and in the forecast.
Input data	Two survey indices (Northern Ireland Acoustic Surveys: AC (Division 7.a North) and SSB acoustic survey included as an absolute index); commercial catch-at-age data and annual maturity ogives; annual stock weights from AC (Division 7.a North).
Discards and bycatch	Discarding is considered to be negligible.
Indicators	None
Other information	Benchmarked in WKIRISH3 and HAWG (ICES, 2017a, 2017b). 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

The Pelagic AC still has an aspiration to develop a long term management strategy for this stock.

History of the advice, catch, and management

Table 7 Herring in Division 7.a North of 52°30'N. ICES advice, ICES estimates of catch and official landings from Division 7a . All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES estimated catch	Official landings
1987	TAC	4300	4500	5823	11177
1988	TAC (Revised advice in 1988)	10500 (5600)	10500	10172	18770
1989	TAC	5500	6000	4962	11453
1990	Precautionary TAC	5700	7000	6312	6410
1991	TAC	5600	6000	4398	8185
1992	TAC	6600	7000	5270	8697
1993	TAC	4900–7400	7000	4408	11577
1994	Precautionary TAC	5300	7000	4828	5211
1995	Precautionary TAC	5100	7000	5076	7482
1996	If required, precautionary TAC	5000	7000	5302	13614
1997	No advice given	-	9000	6651	11244
1998	Status quo F	6500	9000	4905	10278
1999	F = Proposed F_{pa} = 0.36	4900	6600	4127	9832
2000	F = 90% F(98) = 0.31	3900	5400	2002	6309
2001	Status quo F = 0.26	5100	6900	5461	8689
2002	Average catch of 1996–2000	4800	4800	2393	3882
2003	2002 TAC	4800	4800	2399	4212
2004	Advice 2003 catch	4800	4800	2531	8220
2005	Status quo TAC	4800	4800	4387	9533
2006	Status quo TAC	4800	4800	4402	4403
2007	Status quo TAC	4800	4800	4629	4635
2008	Recent catches	4400	4800	4895	5534
2009	Same advice as last year	4400	4800	4594	5035
2010	Recent TAC	4800	4800	4894	5545
2011	No increase in catch	< 4800	5200	5202	5882
2012	No increase in catch	-	5280	5693	7454
2013	MSY approach	< 5100	4993	4828	6738
2014	MSY approach	< 5251	5251	5208	7003
2015	MSY approach	< 4854	4854	4891	5736
2016	MSY approach	≤ 4575	4575	4327	6565
2017	MSY approach	≤ 4127	4127	3896	5594 *
2018	MSY approach	≤ 7016	7016	6804	7411 *
2019	MSY approach	≤ 6896	6896		
2020	MSY approach	≤8064			

* Preliminary.

History of the catch and landings

Table 8 Herring in Division 7.a North of 52°30'N. Catch by fleet in 2018 as estimated by ICES. All weights are in tonnes.

Catch (2018)	Landings	Discards
6804	> 99% pelagic trawlers	Negligible
	6804	

Table 9 Herring in Division 7.a North of 52°30'N. History of commercial catch and landings; ICES estimated values presented for each country. All weights are in tonnes.

Year	Country		Total
	Ireland	UK	
1987	1200	3290	5823
1988	2579	7593	10172
1989	1430	3532	4962
1990	1699	4613	6312
1991	80	4318	4398
1992	406	4864	5270
1993	0	4408	4408
1994	0	4828	4828
1995	0	5076	5076
1996	100	5180	5324
1997	0	6651	6651
1998	0	4905	4905
1999	0	4127	4127
2000	0	2002	2002
2001	862	4599	5461
2002	286	2107	2393
2003	0	2399	2399
2004	749	1782	2531
2005	1153	3234	4387
2006	581	3821	4402
2007	0	4629	4629
2008	0	4895	4895
2009	0	4594	4594
2010	0	4894	4894
2011	0	5202	5202
2012	18	5675	5693
2013	0	4828	4828
2014	119	5089	5208
2015	0	4868	4891
2016	82	4245	4327
2017	200	3696	3896
2018	1299	5504	6804

Summary of the assessment

Table 10 Herring in Division 7.a North of 52°30'N. Assessment summary. Weights are in tonnes, recruitment in thousands. Highs and lows refer to 95% confidence intervals.

Year	Recruitment at age (wr) 1	High	Low	SSB **	High	Low	Catches	F at age (wr) 4–6	High	Low
1980	174556	336695	90497	13874	20321	9473	10613	0.29	0.44	0.191
1981	203414	395145	104714	13924	19958	9715	4377	0.28	0.41	0.187
1982	222348	432053	114428	14691	21538	10021	4855	0.26	0.38	0.182
1983	183506	368563	91366	16217	23927	10991	3933	0.26	0.37	0.181
1984	131006	253026	67830	17257	24509	12152	4066	0.26	0.36	0.190
1985	171099	328293	89174	16205	21460	12237	9187	0.28	0.37	0.21
1986	211928	405827	110671	18574	24464	14102	7440	0.29	0.38	0.22
1987	273484	532408	140482	16850	22765	12472	5823	0.30	0.39	0.23
1988	117360	226008	60942	19732	27281	14272	10172	0.31	0.41	0.24
1989	151600	292714	78515	15060	20507	11060	4949	0.31	0.40	0.24
1990	128927	244886	67877	14357	19181	10746	6312	0.31	0.40	0.24
1991	78905	149633	41609	9860	13044	7453	4398	0.31	0.40	0.24
1992	244019	461979	128891	10267	13311	7919	5270	0.32	0.40	0.25
1993	63704	117062	34667	10331	13515	7897	4409	0.32	0.40	0.25
1994	161458	290572	89715	11485	14982	8804	4828	0.32	0.41	0.26
1995	132588	242548	72479	11133	14693	8436	5076	0.33	0.42	0.26
1996	85991	159468	46370	8962	12034	6675	5301	0.34	0.43	0.26
1997	124991	227084	68798	8309	11342	6087	6651	0.35	0.46	0.27
1998	166875	298321	93347	9477	12585	7136	4905	0.36	0.48	0.27
1999	77111	140416	42346	9085	12458	6625	4127	0.35	0.47	0.27
2000	78669	145960	42400	8718	11825	6427	2002	0.34	0.45	0.26
2001	109098	206877	57533	6683	9573	4665	5461	0.35	0.48	0.26
2002	82619	152099	44879	6926	9886	4852	2393	0.35	0.48	0.25
2003	146825	265693	81138	6243	8622	4520	2399	0.34	0.49	0.24
2004	157000	289449	85158	9118	12864	6463	2531	0.32	0.45	0.23
2005	176487	325656	95645	10918	15555	7664	4387	0.31	0.44	0.22
2006	306202	558711	167814	12150	16798	8789	4402	0.28	0.40	0.199
2007	528607	1020772	273739	19585	27456	13970	4629	0.25	0.35	0.174
2008	266999	534358	133410	25084	35919	17518	4895	0.23	0.33	0.160
2009	343176	666107	176804	25034	36077	17371	4594	0.22	0.31	0.149
2010	394352	734199	211814	26556	37819	18647	4894	0.20	0.30	0.139
2011	252206	498156	127686	26849	37651	19147	5202	0.195	0.29	0.133
2012	291268	535131	158535	24101	34170	16999	5693	0.190	0.28	0.129
2013	160011	296247	86427	22018	30998	15639	4828	0.180	0.27	0.121
2014	340783	642334	180798	23671	32709	17130	5083	0.171	0.26	0.113
2015	378890	699299	205288	22093	30583	15960	4891	0.171	0.26	0.114
2016	208772	395607	110175	24367	34067	17429	4327	0.165	0.25	0.108
2017	192529	413406	89663	22948	32263	16323	3896	0.157	0.25	0.100
2018	333701	1289560	86352	22020	32763	14800	6804	0.156	0.25	0.098
2019	300740 *			23247						

* Geometric mean recruitment 2007–2016 and SSB from assessment model.

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

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