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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 2019 should be no more than 6896 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 stronger recruitment (R) since 2006, although the recruitment in 2017 is low.

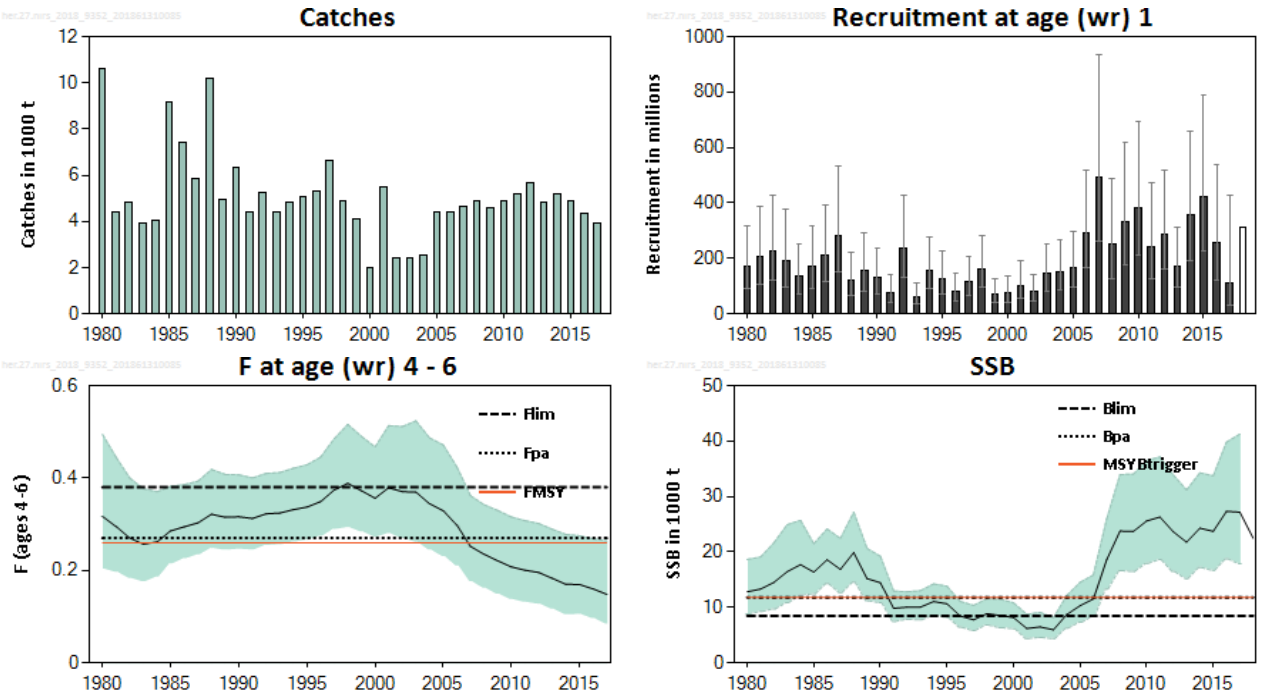

Figure 1 Herring in Division 7.a North of 52°30'N. Summary of the stock assessment. The assumed recruitment value is unshaded. The shaded areas on the F and SSB plots represent 95% confidence intervals.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is below F_{MSY}, F_{pa}, and F_{lim}; and 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			
		2015	2016	2017		2016	2017	2018	
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. The basis for the catch scenarios.

Variable	Value	Notes
$F_{ages\ (wr)\ 4–6}$ (2018)	0.27	F corresponding to the TAC in 2018.
SSB (2018)	22404	Calculated in the short-term forecast based on the assumptions for the intermediate year. In tonnes.
$R_{age\ (wr)\ 1}$ (2018-2019)	310240	Geometric mean over 2006–2015. In thousands.
Total catch (2018)	7016	TAC in 2018. 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 (2019)	F_{total} (2019)	SSB * (2019)	% SSB change **	SSB (2020) *^	% TAC change ***	% Advice change ^^
ICES advice basis							
MSY approach: F_{MSY}	6896	0.266	21760	−2.9	22110	−1.71	−1.71
Other scenarios							
F = 0	0	0	26736	19.3	32181	−100	−100
F_{pa}	7358	0.286	21428	−4.4	21508	4.9	4.9
F_{lim}	9791	0.397	19682	−12.2	18485	40	40
SSB (2019) = B_{lim}	25887	1.5	8500	−62	12404	269	269
SSB (2019) = B_{pa}	20935	1.05	11831	−47	15317	198	198
SSB (2019) = MSY $B_{trigger}$	20935	1.05	11831	−47	15317	198	198

* 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 2019 relative to SSB 2018.
*** Catch 2019 relative to the TAC for 2018 (7016 tonnes).
^ SSB on 1 January 2020.
^^ Advice value for 2019 relative to the advice value for 2018 (7016 tonnes).

The catch advice for 2019 is slightly lower than the advice for 2018 due to a decline in 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. A new acoustic survey was included as input to the model. Recruitment assumptions in the assessment were changed, which resulted in higher interannual variability. The revised assessment resulted in a revised perception of the stock, with significant upwards revisions of the SSB and recruitment and a downward revision of fishing mortality. In comparison to 2017 the current assessment shows a consistent perception of the SSB, recruitment, and fishing pressure.

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.

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.

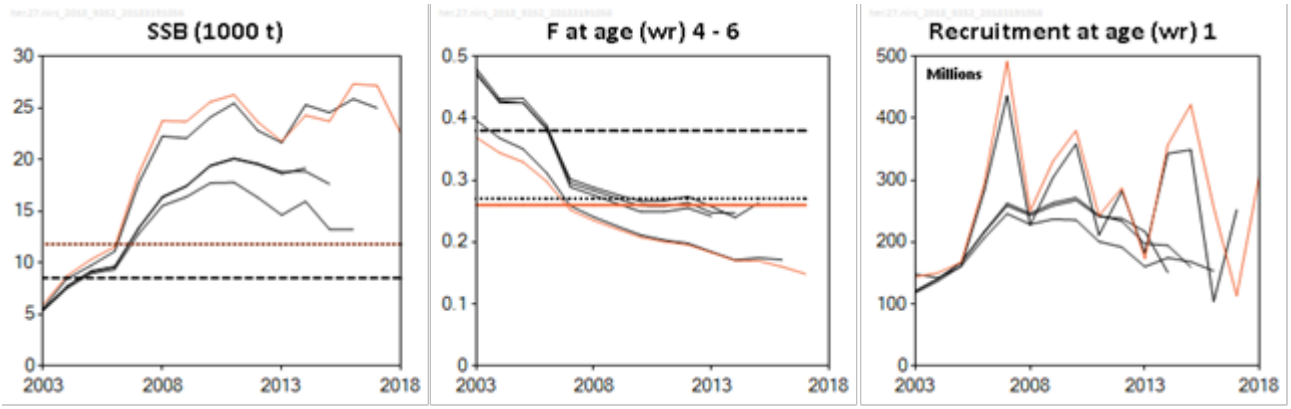

Figure 2 Herring in Division 7.a North of 52°30'N. Historical assessment results. The stock was benchmarked in 2017.

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 (ICES, 2003, 2015).

There has been an increase in marine anthropogenic activity, especially in the area of marine renewables. Construction and development of, for example wind farms, results in disturbance to the seabed. 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 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.

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	Equal to B_{pa}.	ICES (2017a)
	F_{MSY}	0.266	$F_{p0.5}$ based on stochastic simulations.	ICES (2017a)
Precautionary approach	B_{lim}	8500	Highest SSB producing above-average recruitment below highest value.	ICES (2017a)
	B_{pa}	11831	$B_{pa} = B_{lim} \times \exp(1.645 \times \sigma)$, with $\sigma \approx 0.201$, based on the average 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 $\sigma \approx 0.231$, based on the average 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, 2016)
Assessment type	Age-based analytical assessment (FLSAM; ICES, 2018) 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

There is no additional available information.

History of the advice, catch, and management

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

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES estimated catch
1987	TAC	4300	4500	5823
1988	TAC (Revised advice in 1988)	10500 (5600)	10500	10172
1989	TAC	5500	6000	4962
1990	Precautionary TAC	5700	7000	6312
1991	TAC	5600	6000	4398
1992	TAC	6600	7000	5270
1993	TAC	4900–7400	7000	4408
1994	Precautionary TAC	5300	7000	4828
1995	Precautionary TAC	5100	7000	5076
1996	If required, precautionary TAC	5000	7000	5302
1997	No advice given	-	9000	6651
1998	*Status quo* F	6500	9000	4905
1999	F = Proposed F_{pa} = 0.36	4900	6600	4127
2000	F = 90% F(98) = 0.31	3900	5400	2002
2001	*Status quo* F = 0.26	5100	6900	5461
2002	Average catch of 1996–2000	4800	4800	2393
2003	2002 TAC	4800	4800	2399
2004	Advice 2003 catch	4800	4800	2531
2005	*Status quo* TAC	4800	4800	4387
2006	*Status quo* TAC	4800	4800	4402
2007	*Status quo* TAC	4800	4800	4629
2008	Recent catches	4400	4800	4895
2009	Same advice as last year	4400	4800	4594
2010	Recent TAC	4800	4800	4894
2011	No increase in catch	< 4800	5200	5202
2012	No increase in catch	-	5280	5693
2013	MSY approach	< 5100	4993	4828
2014	MSY approach	< 5251	5251	5208
2015	MSY approach	< 4854	4854	4891
2016	MSY approach	≤ 4575	4575	4327
2017	MSY approach	≤ 4127	4127	3896
2018	MSY approach	≤ 7016	7016	
2019	MSY approach	≤ 6896		

History of the catch and landings

Table 8 Herring in Division 7.a North of 52°30'N. Catch distribution by fleet in 2017 as estimated by ICES. All weights are in tonnes.

Catch (2017)	Landings	Discards
3896	100 % pelagic trawlers	Discarding is negligible
	3896	

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	7156
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	4913
2016	82	4245	4327
2017*	200	3696	3896

*Preliminary

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	171099	317927	92081	12829	18656	8823	10613	0.32	0.49	0.20
1981	204434	386786	108053	13302	19089	9270	4377	0.29	0.44	0.196
1982	226160	427465	119656	14514	21644	9733	4855	0.27	0.40	0.183
1983	192144	378030	97662	16450	24916	10861	3933	0.26	0.38	0.175
1984	134323	249732	72248	17721	25701	12219	4066	0.26	0.37	0.185
1985	172301	317940	93375	16362	21489	12458	9187	0.29	0.38	0.21
1986	211928	390042	115150	18603	24153	14329	7440	0.29	0.39	0.22
1987	282095	531789	149642	16860	22447	12664	5823	0.30	0.39	0.23
1988	118658	221193	63654	19902	27165	14582	10172	0.32	0.42	0.25
1989	155593	290283	83399	15208	20639	11207	4949	0.32	0.41	0.24
1990	128669	235190	70393	14455	19230	10866	6312	0.32	0.41	0.25
1991	77653	141461	42626	9839	12956	7472	4398	0.31	0.40	0.24
1992	235626	427631	129830	10046	12826	7868	5270	0.32	0.41	0.25
1993	62630	111004	35337	10053	13005	7771	4409	0.32	0.41	0.26
1994	158578	278744	90215	11063	14236	8598	4828	0.33	0.42	0.26
1995	128027	225066	72828	10654	13832	8207	5076	0.34	0.43	0.27
1996	82125	145756	46273	8447	11081	6439	5301	0.35	0.45	0.27
1997	118421	206119	68036	7778	10361	5839	6651	0.37	0.48	0.29
1998	163081	283402	93843	8891	11545	6847	4905	0.39	0.52	0.29
1999	73130	128247	41701	8535	11461	6356	4127	0.37	0.49	0.28
2000	74982	134254	41878	8178	10838	6171	2002	0.36	0.47	0.27
2001	103363	189944	56248	6202	8757	4392	5461	0.38	0.51	0.28
2002	80660	143083	45470	6478	9119	4602	2393	0.37	0.51	0.27
2003	143774	251675	82134	5965	8133	4375	2399	0.37	0.52	0.26
2004	150392	267886	84430	8728	12158	6266	2531	0.34	0.49	0.24
2005	167376	297673	94113	10307	14525	7314	4387	0.33	0.47	0.23
2006	293314	518763	165843	11538	15849	8400	4402	0.30	0.42	0.21
2007	491885	932813	259378	18600	25950	13331	4629	0.25	0.36	0.175
2008	249946	486632	128378	23766	33951	16636	4895	0.23	0.34	0.161
2009	330711	620486	176265	23695	34030	16498	4594	0.22	0.33	0.148
2010	380408	691016	209417	25591	36487	17949	4894	0.21	0.32	0.137
2011	242559	474690	123944	26291	37133	18615	5202	0.20	0.31	0.131
2012	287506	519441	159132	23647	33896	16497	5693	0.196	0.30	0.127
2013	173338	310076	96899	21768	31182	15196	4828	0.183	0.29	0.116
2014	356825	657221	193731	24294	34275	17220	5202	0.170	0.28	0.104
2015	422101	789195	225761	23718	33721	16683	4891	0.170	0.28	0.105
2016	256273	538322	122001	27337	39811	18772	4327	0.160	0.27	0.095
2017	112984	425224	30020	27174	41256	17898	3896	0.148	0.26	0.083
2018	310240*			22489**						

* Geometric mean recruitment 2006–2015 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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