Herring (*Clupea harengus*) in Division 6.a (North), autumn spawners (West of Scotland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1212 tonnes.

Stock development over time

Fishing pressure on the stock is at or below $F_{MSY\ proxy}$ (figures 1 and 2). No reference points for stock size have been defined for this stock.

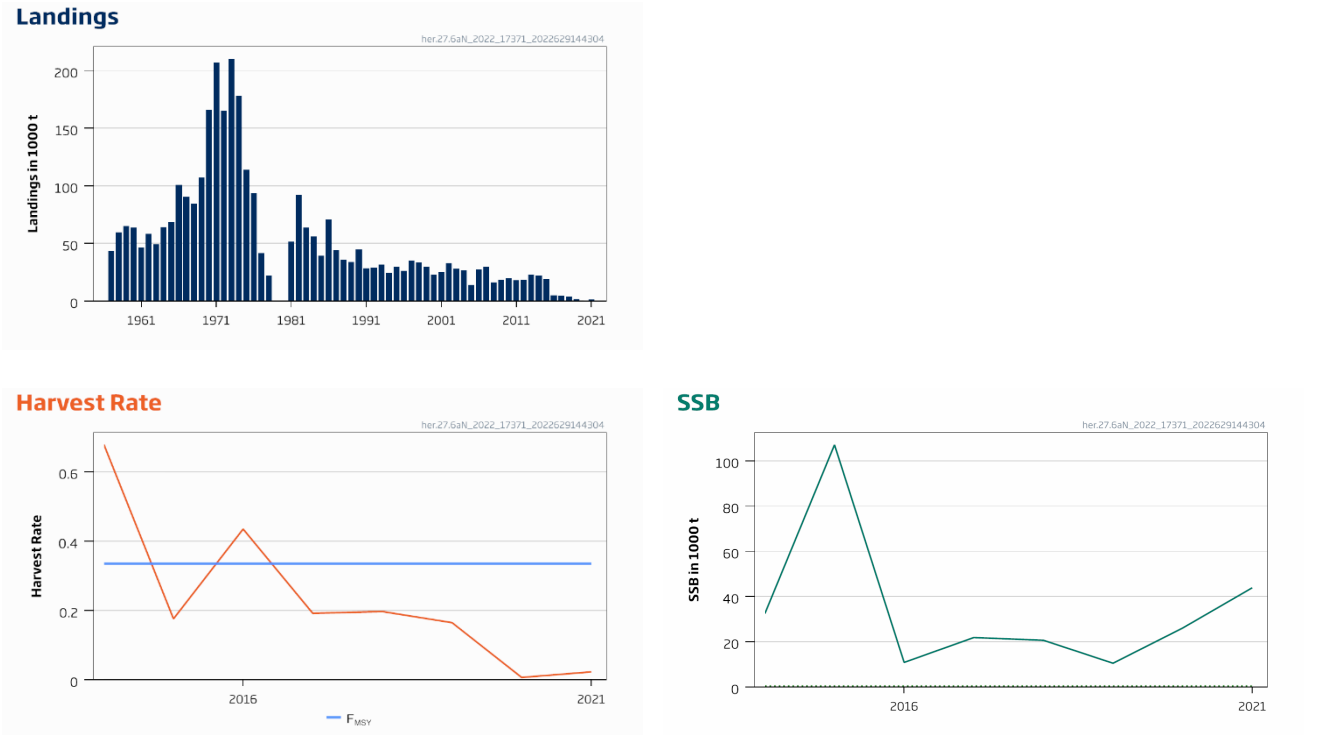

Figure 1 Herring in Division 6.a North. Summary of the stock assessment. Upper left: ICES estimated catches (in tonnes). Lower left: harvest rate (ratio between landings and acoustic survey SSB estimate). Lower right: spawning-stock biomass index of genetically split Malin Shelf Herring Acoustic Survey (tonnes) for Division 6.a (North).

Catch scenarios

ICES framework for category 3 stocks was applied (ICES, 2022a). The advice is based on the *chr* rule to provide MSY advice (ICES, 2022a, 2022b). A biomass index from the genetically split Malin Shelf Herring Acoustic Survey (MSHAS) was used as an indicator of stock development (ICES, 2022c). The advice is based on the stock indicator for 2021, multiplied by a constant harvest rate, a biomass safeguard, and a precautionary multiplier. As this is the first advice using this method for this stock, the harvest rate calculation was initialized using the average of the previous three years' catch (ICES 2022d). The stability clause was considered and applied since the change from the previous catches is greater than +20%. The discard rate is considered negligible.

Table 1 Herring in Division 6.a North. The basis for the catch scenarios.*

Average of the previous three years of catch^		1010 tonnes
Biomass index		
I: most recent biomass index (I_{2021})		43 886 tonnes
MSY proxy harvest rate		
$F_{MSY\ proxy}$: MSY proxy harvest rate (average of the ratio of catch to biomass index for the years for which f > 1, where f = $L_{F=\gamma M,K=\Theta M}$ [ICES, 2022e])		0.335
Biomass safeguard		
Index trigger value ($I_{trigge\ r}$ = 1.4×I_{loss})		14 711 tonnes
b: index relative to trigger value, min{$I_{2021}/I_{trigger}$, 1}		1
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability		
m: multiplier (generic multiplier based on life history)		0.5
CHR calculation**		7362 tonnes
Stability clause (+20%/−30% compared to A_y, only considered if b = 1)	Applied	+20%
Discard rate		Negligible
Catch advice A_{y+1} for 2023		1212 tonnes
% advice change***		-

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.
** Formula: $C_{y+1} = I_{y-1} \times F_{MSY\ proxy} \times b \times m$, limited by stability clause if applicable.
*** No advice for 2022 is available
^ As no advice value for 2022 is available, the average of the previous three years of catch has been used (ICES, 2022d).

This is the first year ICES has provided advice for this stock since 2014.

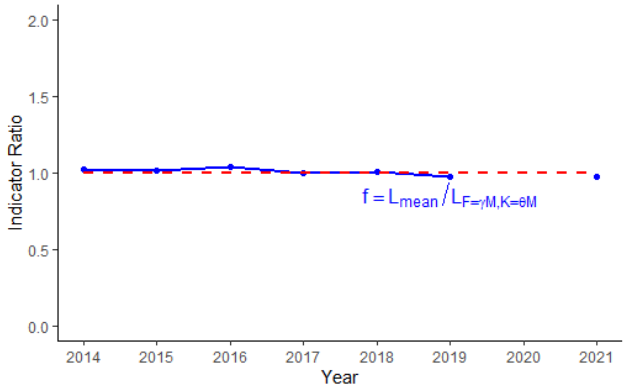

Figure 2 Herring in Division 6.a North. Indicator ratio $L_{mean}/L_{F=\gamma M,K=\Theta M}$ from the length-based indicator (LBI) method is used for the evaluation of the exploitation status. The exploitation status is below the $F_{MSY\ proxy}$ when the indicator ratio value is higher than 1 (shown by a dashed red line).

Basis of the advice

Table 2 Herring in division 6.a North. The basis of the advice.

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

Quality of the assessment

Herring in Division 6.a North have been part of a combined assessment with Division 6.a South and divisions 7.b–c since 2015 (ICES, 2015a). Following a benchmark meeting in 2022 (ICES, 2022b), these two stocks are now assessed separately. This was made possible by the development of a genetically split acoustic survey index (MSHAS; ICES, 2022c).

A proportion of the acoustic survey biomass remains unassigned to a specific stock. Continued genetic work will aim to reduce the portion of this unassigned biomass in future years.

The calculation of the length based indicator (LBI) portion of the constant harvest rate (chr) requires adequate length frequency data from the commercial catch.

The time series of biomass index is very short comparing to the catch series for this stock covering only the recent period when catches have been low. The available time series for length data is very short and shows little contrast across years. Both of these factors increase the uncertainty in the assessment and the reference points. However, the advice rule partially addresses this with the inclusion of the stability clause.

Issues relevant for the advice

This is the first year ICES has provided advice for this stock since 2014. From 2015 to 2021 it was jointly assessed with herring in divisions 6.a South and 7.b–c. Zero catch advice was given for the joint stock, and a monitoring TAC [4170 tonnes 2016–2019, 3480 tonnes 2020–2022] was agreed for the 6.a North component.

The information presented here represents autumn-spawning herring in Division 6.a North. Spring-spawning herring in this area are currently not assessed, although historical estimates of catches in 6.a North will include fish from other populations. This is a mismatch with the survey index, which has been genetically split from 2014–present. Catches are still apportioned geographically (north of 56°N). Genetic sampling to split the commercial catches is required, particularly as the stocks recover and fishing expands.

There is evidence that autumn-spawning herring in 6.a North are genetically the same population as the North Sea autumn-spawning stock (NSAS). Further work should be carried out to evaluate the current view that NSAS and 6.a North herring stocks should continue to be assessed separately.

The length at first capture (L_c) and the target reference length were calculated independently for every year of data in order to be more responsive to changes in the stock and/or fishery selectivity as the stock rebuilds. As such, the $F_{MSY\ proxy}$ reference point may change in subsequent years.

The catches in 2020 and 2021 were considerably lower than the monitoring TAC, but this was due to a change in the management measures that prevented the use of the monitoring TAC in 6.a North. As a result, sampling levels are low for these years.

The average of the past three years' catch has been used as the basis for the catch advice. The low uptake of the monitoring TAC in 2020 and 2021 should be noted for the advice given for this stock. The low uptake of the monitoring TAC in 2020 and 2021 should be noted for the advice given for this stock.

There has been an increase in marine anthropogenic activity. Activities that have a negative impact on the spawning habitat of herring – such as the dumping of dredge spoil, the extraction of marine aggregates (e.g. gravel and sand), and the erection of structures such as wind turbines in the vicinity of spawning grounds – are a cause for concern (see for example de Groot, 1979, 1996; ICES, 2003, 2015b). This is because a gravel substratum is an essential habitat for herring spawning. Activities that have a negative impact on the spawning of herring should not occur, unless the effects of these activities have been assessed and shown not to be detrimental to the productivity of the stock (ICES, 2003, 2015b).

Reference points

Table 3 Herring in Division 6.a North. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger\ proxy}$	Not defined		
	$F_{MSY\ proxy}$	0.335	Average of the ratio of catch to biomass index for the years for which the fishing pressure proxy relative to MSY proxy (f) > 1, where f = $L_{mean}/L_{F=yM,K=\Theta M}$ is based on L_c (length at 50% of modal abundance), which varies each year	ICES (2022e)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 4 Herring in division 6.a North. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2022d)
Assessment type	Survey biomass trend applying the *chr* rule for advice (ICES, 2022e)
Input data	Commercial catches (international landings and length frequencies from catch sampling), fixed natural mortality estimates, fixed life history parameters, 6.a.N autumn spawners genetic split from the Malin Shelf Herring Acoustic Survey data (MSHAS 2014–2021 [A9481])
Discards and bycatch	Considered negligible
Indicators	LBI based on lengths from commercial catch data (2014–2021)
Other information	This stock was benchmarked in 2022 (ICES, 2022b).
Working group	Herring Assessment Working Group for the Area South of 62°N (HAWG)

History of the advice, catch, and management

Table 5 Herring in Division 6.a North. ICES advice and ICES estimated catches. All weights are in tonnes.*

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Discards	ICES estimated catches
2023	MSY Approach	≤ 1212			

* Prior to the advice for 2023, ICES advised jointly for herring in Division 6.a North and herring in Division 6.a South, 7.b–c. See ICES Advice 2021 – her.27.6a7bc (https://doi.org/10.17895/ices.advice.7772) for the full histories of ICES advice, management, landings, and catches.

History of the catch and landings

Table 6 Herring in Sivision 6.a North. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings		Discards
1115 tonnes	Pelagic trawl 100%	Ringnets (negligible)	Negligible
	1115 tonnes		

Table 7 Herring in division 6.a North. The Division 6.a North component of the stock. ICES estimates of catch by country and ICES estimates of total annual misreportings, discards, and catch. All weights are in tonnes.

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Denmark	0	0	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	1810	570
France	119	818	5087	3672	2297	3093	1903	463	870	760	1340	1370	625	613	701
Germany	5640	4693	7938	3733	7836	8873	8253	6752	4615	3944	3810	2935	1046	2691	3152
Ireland	7985	8236	6093	3548	9721	1875	11199	7915	4841	4311	4239	3581	1894	2880	4352
Netherlands	8000	6132	8183	7808	9396	9873	8483	7244	4647	4534	4612	3609	8232	5132	7008
Lithuania	0	0	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	0	0
UK	32730	32602	-4287	42661	46639	44273	42302	36446	22816	21862	20604	16947	17706	17494	18284
Unallocated	−5485	−3753	700	−4541	−17753	−8015	−11748	−8155	0	277	6244	2820	3490	0	0
Discards*	200	0	0	0	0	62	90	0	0	0	0	0	123	772	163
Total	51578	56175	54664	61271	64359	64995	65799	61514	37789	35688	41649	31622	33344	31392	34230
Area misreported	−22593	−24397	−30234	−32146	−38254	−29766	−32446	−23623	−14627	−10437	−8735	−3581	−6885	−17263	−6884
ICES estimate	28985	31778	24430	29575	26105	35233	33353	29736	23162	25251	32914	28081	26459	14129	27346
Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021**
Denmark	0	0	0	0	0	0	0	0	0	23	0	39	71	0	0
Faroe Islands	484	927	1544	70	0	0	0	360	0	0	0	0	0	4	0
France	703	564	1049	511	504	244	586	589	0	0	0	7	46	0	0
Germany	1749	2526	27	3583	3518	1829	4025	3354	3292	1028	0	17	2	0	0
Ireland	5129	3103	1935	2728	3956	3451	3124	2632	1799	569	10	84	37	116	242
Netherlands	8052	4133	5675	3600	1684	3523	1775	1641	956	300	835	1000	653	85	5
Lithuania	0	0	0	0	0	0	0	770	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	1	0	0	4	3	0	0
UK	17618	13963	11076	12018	11696	12249	15906	16769	15260	3254	3356	2911	928	51	974
Unallocated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Discards *	0	0	0	95	0	0	30	0	0	0	0	0	0	0	0
Total	33735	25216	21306	22510	21358	21296	25446	26115	21307	5174	4200	4063	1739	256	1221
Area misreported	−4119	−9162	−2798	−2728	−3599	−2780	−2468	−4088	−2506	−450	0	0	0	−79	−106
ICES estimate	29616	16054	18508	19877	17759	18516	22978	22027	18801	4724	4200	4063	1739	177	1115

* Unraised discards.

** Preliminary

Summary of the assessment

Table 8 Herring in division 6.a North. Assessment summary. Weights are in tonnes. Catch (C), spawning-stock biomass index (I), harvest rate (C/I) and fishing pressure proxy relative to $F_{MSY\ proxy}$ ($L_{mean}/L_{F=\gamma M,K=\Theta M}$) are given for the years used in the application of the *chr* rule (ICES, 2022e). L_{mean} refers to the mean length above length at first capture and $L_{F=\gamma M,K=\Theta M}$ refers to the target reference length.

Year	Catch C_y	Biomass index I_y	Harvest rate C_y/I_y	Mean > L_c, L_{mean}	Target Ref Length, $L_{F=\gamma M,K=\Theta M}$	f*= L_{mean}/ $L_{F=\gamma M,K=\Theta M}$
2014	22027	32460	0.679	29.448	28.801	1.022
2015	18801	107113	0.176	29.208	28.801	1.014
2016	4724	10870	0.435	28.691	27.666	1.037
2017	4200	21863	0.192	27.702	27.666	1.001
2018	4063	20663	0.197	27.595	27.382	1.008
2019	1739	10508	0.165	23.982	24.543	0.977
2020	177	26070	0.007	NA	NA	NA**
2021	1115	43886	0.025	26.084	26.814	0.973

*Only harvest rates in years where f ratio is above 1 are included in the calculation of $F_{MSY\ proxy}$
**Length data missing for 2020

Sources and references

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Download the stock assessment data and figures.

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