

Herring (*Clupea harengus*) in Division 5.a, summer-spawning herring (Iceland grounds)

ICES advice on fishing opportunities

ICES advises that when the Icelandic management plan is applied, catches in the fishing year 2022/2023 should be no more than 66 195 tonnes.

Stock development over time

Fishing pressure on the stock is above HR_{mgt} . Spawning-stock size is above $MSY B_{trigger}$, B_{pa} , and B_{lim} .

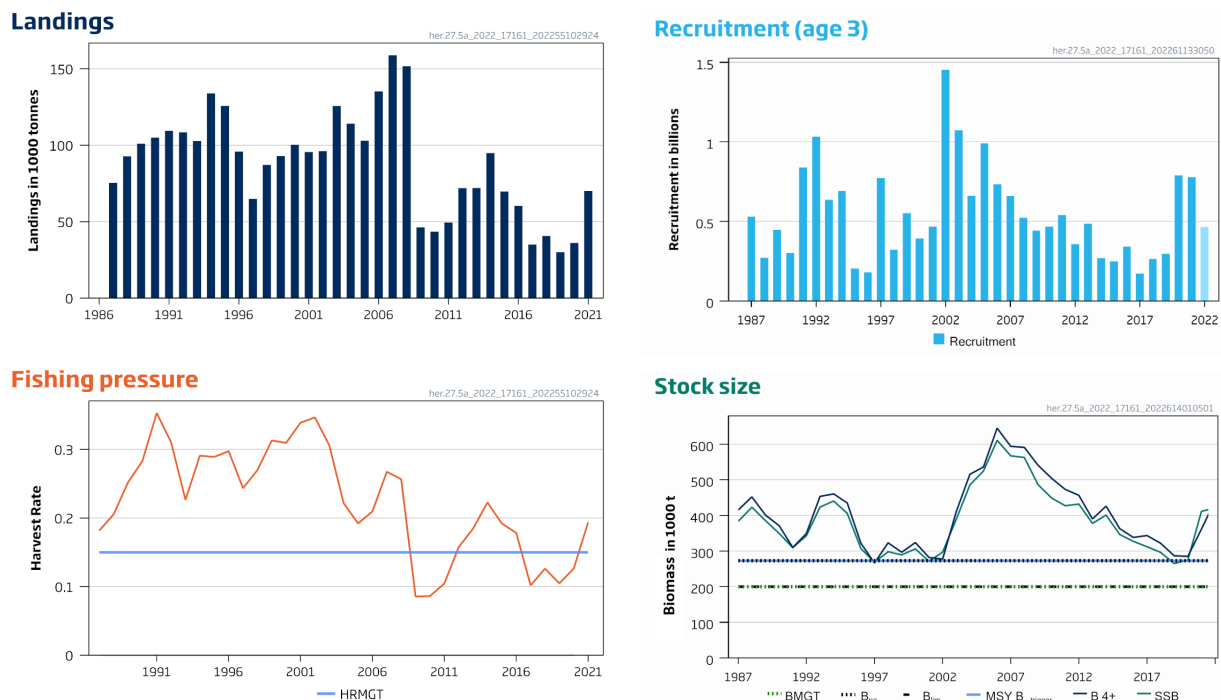


Figure 1 Herring in Division 5.a, summer-spawning herring. Summary of stock assessment. Harvest rates are calculated based on biomass age 4+. All biomass reference points refer to SSB levels. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Herring in Division 5.a, summer-spawning herring. Values in the forecast and for the interim year.

Variable	Value	Notes
HR (2021/2022)	0.19	Harvest rate based on catch constraint
SSB (2022)	421 132	Predicted (1 July 2022) after accounting for <i>Ichthyophonus</i> infection in 2022; tonnes
$B_{age 4+}$ (2022)	441 299	Estimated by the assessment (1 January 2022); tonnes
$R_{age 3}$ (2022)	464 740	Based on geometric mean for 1987–2019; thousands
$R_{age 3}$ (2023)	464 740	Based on geometric mean for 1987–2019; thousands
Total catch (2021/2022)	70 084	Reported catch from June 2021 to the end of April 2022; tonnes

Table 2 Herring in Division 5.a, summer-spawning herring. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022/2023)	HR (2022/2023)	Biomass of age 4+ (2023)	SSB (2023)	% SSB change*	% advice change**
ICES advice basis						
Management plan	66 195	0.15	422 801	403 999	-4	-8

* SSB 2023 relative to SSB 2022.

** Advised catches for 2022/2023 relative to advised catch for 2021/2022 (72 239 tonnes).

Basis of the advice

Table 3 Herring in Division 5.a, summer-spawning herring. The basis of the advice.

Advice basis	Iceland management plan Rule 5 (ICES, 2017a; 2017b)
Management plan	<p>The Icelandic Ministry of Industries and Innovation fisheries management plan has been implemented since 2017. The rule has been evaluated by ICES (ICES, 2017b) and is considered to be precautionary and conforms to ICES MSY approach. According to the rule, the TAC for the fishing year Y/Y+1 (1 September of year Y to 31 August of year Y+1) is calculated as follows:</p> $\text{When } SSB_Y \text{ is equal to or above } MGT B_{trigger}: TAC_{Y/Y+1} = HR_{mgt} \times B_{ref,Y}$ $\text{When } SSB_Y \text{ is below } MGT B_{trigger}: TAC_{Y/Y+1} = HR_{mgt} \times \left(\frac{SSB_Y}{MGT B_{trigger}} \right) \times B_{ref,Y}$ <p>The spawning-stock biomass trigger ($MGT B_{trigger}$) is defined as 200 000 tonnes; the reference biomass is defined as the biomass of herring of ages 4 and older, and the target harvest rate (HR_{mgt}) is set to 0.15.</p>

Quality of the assessment

The assessment shows consistency with previous years.

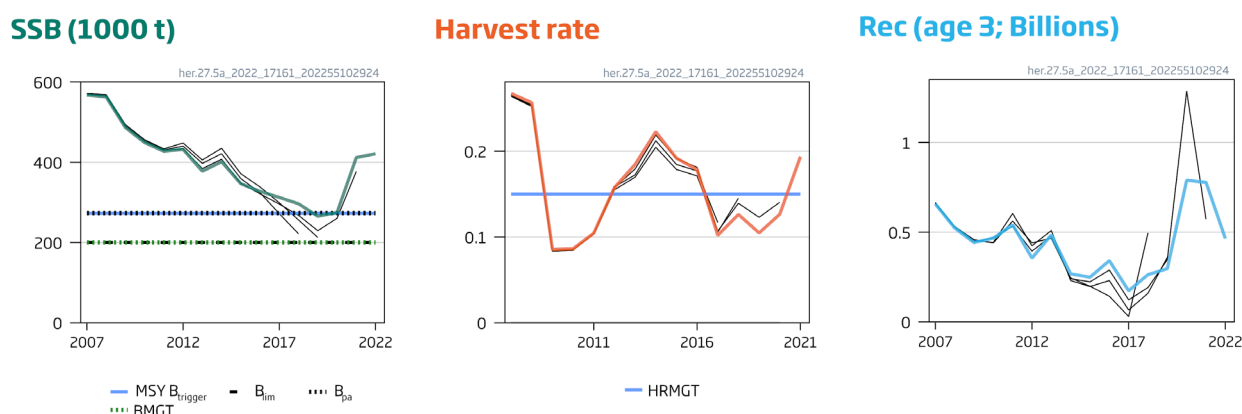


Figure 2 Herring in Division 5.a, summer-spawning herring. Historical assessment results. The final-year recruitment estimates derive from survey indices and not from model estimates. There was no ICES assessment in 2020.

Issues relevant for the advice

Infection rates of *Ichthyophonus* remain high, and this is taken into account in both the assessment and management plan.

Reference points

Table 4 Herring in Division 5.a, summer-spawning herring. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	273 000	B_{pa}	ICES (2016, 2017a)
	F_{MSY}	0.22	Stochastic simulations	ICES (2016, 2017a)
Precautionary approach	B_{pa}	200 000	SSB with a high probability of impaired recruitment	ICES (2016)
	B_{lim}	273 000	$B_{pa} = B_{lim} \times \exp(1.645 \times \sigma)$, where $\sigma = 0.19$	ICES (2016)
	F_{lim}	0.61	The F that leads to $SSB = B_{lim}$	ICES (2016)
Management plan	F_{pa}	0.45	$F_{pa} = F_{lim} \times \exp(-1.645 \times \sigma)$, where $\sigma = 0.18$	ICES (2016)
	$MGT B_{trigger}$	200 000	Stochastic simulations	ICES (2017a)
	HR_{mgt}	0.15	Management plan	ICES (2017a)

Basis of the assessment

Table 5 Herring in Division 5.a, summer-spawning herring. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical (NFT-ADAPT) that uses catches in the model and in the forecast (ICES, 2022b)
Input data	The data used in the assessment are catch-at-age and one age-structured acoustic survey index (Icelandic herring acoustic survey - Juveniles [A5718]). Natural mortality is assumed to be 0.1, except for 2009–2011 and 2017–2021, for which higher values are used to reflect mortality from <i>Ichthyophonus</i> infection.
Discards and bycatch	Discarding is considered negligible and is not included. Industrial bycatch is included.
Indicators	None
Other information	The stock was benchmarked in 2011 (ICES, 2011) and a management strategy evaluation took place in 2017 (ICES, 2017a, 2017b)
Working group	Northwestern Working Group (NWWG)

History of the advice, catch, and management

Table 6 Herring in Division 5.a, summer-spawning herring. ICES advice, agreed TACs and ICES catches. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES landings	ICES discards
1984		50 000	-	50 304	-
1985		50 000	-	49 368	-
1986		65 000	-	65 500	-
1987	$F_{0.1}$	70 000	72 900	75 439	-
1988	$F_{0.1}$	~ 100 000	90 000	92 828	-
1989	$F_{0.1}$	95 000	90 000	97 270	3700
1990/1991**	<i>Status quo</i> F	90 000	100 000	101 632	3500
1991/1992**	$F_{0.1}$	79 000	110 000	98 538	11 000
1992/1993**	$F_{0.1}$	86 000	110 000	106 653	1800
1993/1994**	No gain in yield by fishing higher than $F_{0.1}$	110 000*	110 000	101 496	1200
1994/1995**	No gain in yield by fishing higher than $F_{0.1}$	83 000*	130 000	131 994	2000
1995/1996**	No gain in yield by fishing higher than $F_{0.1}$	120 000*	110 000	124 963	900
1996/1997**	No gain in yield by fishing higher than $F_{0.1}$	97 000*	110 000	95 882	-
1997/1998	No gain in yield by fishing higher than $F_{0.1}$	90 000*	100 000	64 931	-
1998/1999	No gain in yield by fishing higher than $F_{0.1}$	90 000*	90 000	87 238	-
1999/2000	Current F is sustainable	100 000*	100 000	92 896	-
2000/2001	Current F is sustainable	110 000*	110 000	100 332	-
2001/2002	Current F is sustainable	125 000*	125 000	95 675	-
2002/2003	Current F is sustainable	113 000*	105 000	96 208	-
2003/2004	Current F is sustainable	113 000*	110 000	125 717	-
2004/2005	$F = 0.22$	106 000	110 000	114 237	-
2005/2006	<i>Status quo</i> catch	110 000	110 000	103 043	-
2006/2007	<i>Status quo</i> catch	110 000	130 000	135 303	-
2007/2008	Average of the last three years' catch	117 000	150 000	158 917	-
2008/2009	$F_{pa} = 0.22$	131 000	130 000	151 780	-
2009/2010	$F_{pa} = 0.22$	75 000	40 000	46 332	-
2010/2011 ***	Domestic advice autumn 2010	40 000	40 000	43 533	-
2011/2012 ***	Domestic advice autumn 2011, no fishery until then	40 000	45 000	49 446	-
2012/2013	$F_{MSY} = 0.22$	67 000	68 500	71 976	-
2013/2014	$F_{MSY} = 0.22$	87 000	87 000	72 058	-
2014/2015	$F_{MSY} = 0.22$	83 000	83 000	94 975	-
2015/2016	$F_{MSY} = 0.22$	71 000	71 000	69 729	-
2016/2017	$F_{MSY} = 0.22$	63 000	63 000	60 403	-
2017/2018	$HR_{mgt} = 0.15$	38 712	39 000	35 034	-
2018/2019	Management plan	35 186	35 186	40 683	-

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES landings	ICES discards
2019/2020	Management plan	≤ 34 572	34 572	30 038	-
2020/2021	No advice requested^	-	35 490	36 100	-
2021/2022	Management plan	≤ 72 239	72 239	70 084	-
2022/2023	Management plan	≤ 66 195			

* Catch at $F_{0.1}$.

** Season starting in October of first year.

*** No advice was given by ICES until new information on *Ichthyophonus* infection was available from survey monitoring in the following autumn.

^ Advice for 2020/2021 was issued by MFRI based on the same method agreed by ICES (35 490 tonnes).

History of the catch and landings

Table 7 Herring in Division 5.a, summer-spawning herring. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch (2021)	Landings	Discards
70 084	Pelagic trawl 100% 70 084	Discarding is considered negligible

Summary of the assessment

Table 8 Herring in Division 5.a, summer-spawning herring. Assessment summary. Weights are in tonnes, recruitment in thousands. 'Year' refers to fishing year, starting 1 September each year; 1987 corresponds, therefore, to the fishing year 1987/1988.

Year	Recruitment (age 3)	SSB†	Biomass age 4+	F (ages 5–10)	Harvest rate	Total catch
1987	529825	383813	415358	0.347	0.182	75439
1988	270993	423298	452286	0.266	0.205	92828
1989	447320	385511	401083	0.322	0.252	101000
1990	300814	349850	371472	0.400	0.283	105097
1991	840512	309707	310169	0.436	0.353	109489
1992	1033058	343166	349456	0.415	0.310	108504
1993	635381	423555	453578	0.248	0.227	102741
1994	691671	440681	460605	0.312	0.291	134003
1995	202671	406112	435339	0.343	0.289	125851
1996	181359	307399	322236	0.361	0.298	95882
1997	772436	268791	266602	0.250	0.244	64931
1998	320393	298255	323322	0.280	0.270	87238
1999	552379	289535	296796	0.377	0.313	92896
2000	391053	306206	323997	0.335	0.310	100332
2001	468220	271730	282257	0.415	0.339	95675
2002	1454523	297001	277532	0.418	0.347	96208
2003	1074133	389080	410650	0.280	0.306	125717
2004	662188	485787	515601	0.245	0.222	114237
2005	989930	524868	536229	0.253	0.192	103043
2006	734927	611136	645260	0.144	0.210	135303
2007	657500	567531	594216	0.322	0.267	158917
2008	523716	562979	591228	0.311	0.257	151780
2009	442152	486770	541289	0.089	0.086	46332
2010	466510	449113	504467	0.101	0.086	43533
2011	541370	427443	473266	0.127	0.104	49446
2012*	355611	432102	456683	0.209	0.158	71976
2013	484745	377760	390368	0.175	0.185	72058
2014	267525	401277	426353	0.307	0.223	94975
2015	249091	346662	363238	0.247	0.192	69729
2016	341300	327485	338460	0.215	0.178	60403
2017	173248	312435	343762	0.112	0.102	35034

Year	Recruitment (age 3)	SSB†	Biomass age 4+	F (ages 5–10)	Harvest rate	Total catch
2018	263290	296468	322136	0.154	0.126	40683
2019	296860	265396	286885	0.125	0.105	30038
2020	789257	274733	285242	0.165	0.127	36100
2021	778097	411769	361768	0.288	0.194	70084
2022	464740‡	421132	441299			

* The mass mortality of 52 000 tonnes in Kolgrafafjörður in the winter 2012/2013 is not included in the landings, yield/SSB, or weighted F but is included in the analytical assessment.

† SSB calculated at spawning time (1 July) after accounting for infection mortality.

‡ Predicted from a survey index of numbers at age 1 in 2020.

Sources and references

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[Download the stock assessment data and figures.](#)

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