

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 2021/2022 should be no more than 72 239 tonnes.

Stock development over time

ICES assesses that fishing pressure on the stock is at is below HR_{MGT} . Spawning stock size is above $MSY B_{trigger}$, B_{pa} and B_{lim} .

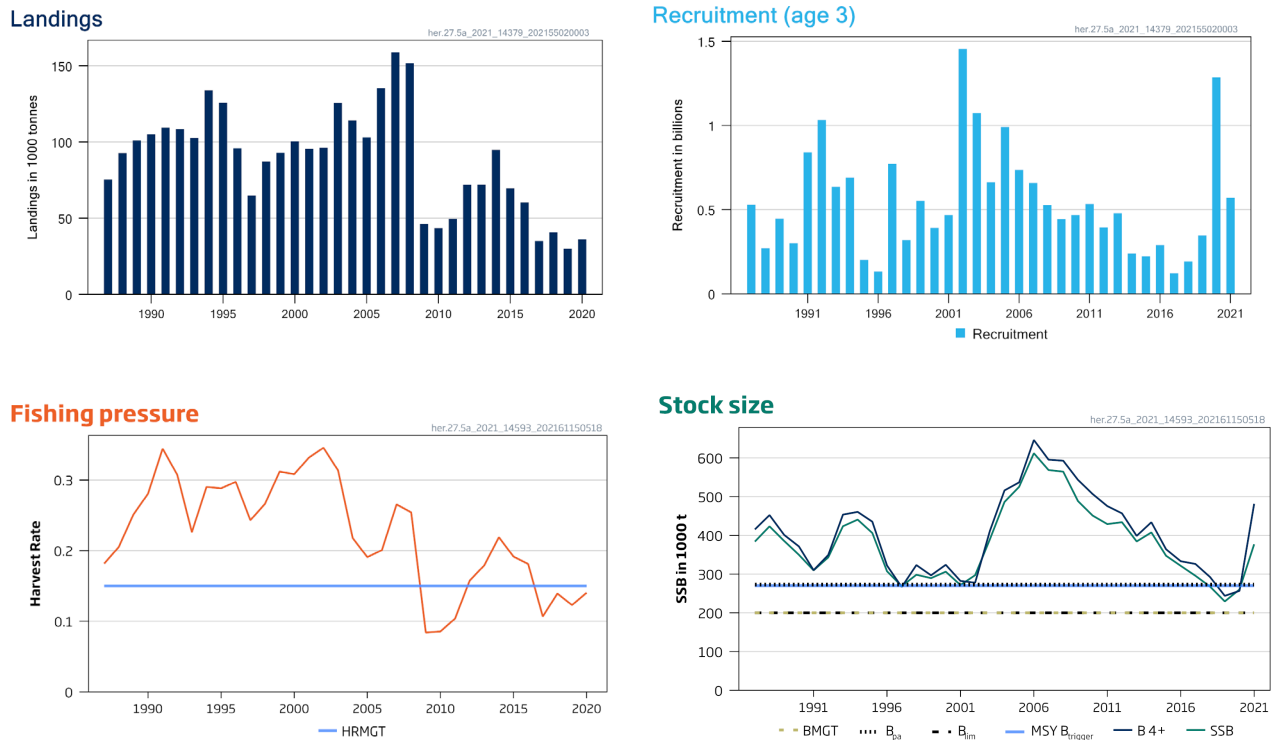


Figure 1 Herring in Division 5.a. summer-spawning herring. Summary of stock assessment. Harvest rates are calculated based on biomass age 4+. All biomass reference points refer to SSB levels.

Catch scenarios

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

Variable	Value	Notes
HR (2020/2021)	0.14	Harvest rate based on catches.
SSB (2021)	377 115	Estimated by the assessment after accounting for <i>Ichthyophonus</i> infection in 2021 (1 July 2021); tonnes.
$B_{age\ 4+}$ (2021)	481 594	Estimated by the assessment (1 January 2021); tonnes.
$R_{age\ 3}$ (2021)	571 995	Based on prediction from a survey estimate in 2019 at age 1; thousands.
$R_{age\ 3}$ (2022)	470 596	Based on geometric mean for 1987–2017; thousands.
Total catch (2020/2021)	36 100	Catch from June 2020 to the end of April 2021; tonnes.

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

Basis	Total catch (2021/2022)	HR (2021/2022)	Biomass of age 4+ (2022)	SSB (2022)	% SSB change *	% TAC change **	% Advice change ***
ICES advice basis							
Management plan	72 239	0.15	441 544	421 132	12	104	-

* SSB 2022 relative to SSB 2021.

** Advised catches for 2021/2022 relative to TAC for 2020/2021 (35 490 tonnes).

*** No advice was requested for 2020/2021. Advice for 2020/2021 was issued by MFRI based the same method agreed by ICES (35 490 tonnes).

Advice has increased as a result of the upward revision in the stock size, due to a large 2017 year class entering the fishery at age 4.

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 the 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> <p>When SSB_Y is equal to or above $MGT B_{trigger}$: $TAC_{Y/Y+1} = HR_{MGT} \times B_{ref,Y}$</p> <p>When SSB_Y 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> <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

Recruitment in the final year of the assessment is consistently overestimated but has no impact on the resulting advice.

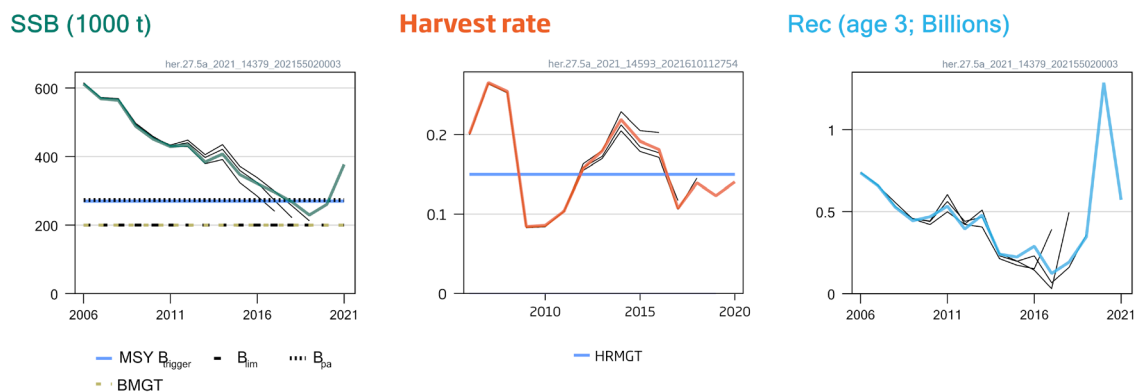


Figure 2 Herring in Division 5.a, summer-spawning herring. Historical assessment results. The final-year recruitment estimates derive from survey indices and not from model estimates. There was no ICES assessment in 2020.

Issues relevant for the advice

The infection rates of *Ichthyophonus* remain high, and this is taken into account in the assessment and in the management plan rule.

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_{lim}	200 000	SSB with a high probability of impaired recruitment	ICES (2016)
	B_{pa}	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} , given mean recruitment	ICES (2016)
	F_{pa}	0.45	$F_{pa} = F_{lim} \times \exp(-1.645 \times \sigma)$, where $\sigma = 0.18$	ICES (2016)
Management plan	MGT $B_{trigger}$	200 000	Stochastic simulations	ICES (2017a)
	HR _{MGT}	0.15	Management plan, independent of <i>Ichthyophonus</i> infection in the assessment year	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, 2021a).
Assessment type	Age-based analytical (NFT-ADAPT) that uses catches in the model and in the forecast (ICES, 2021b).
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, with the exception of 2009–2011 and 2017–2020, 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	North-Western 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 **	Status quo 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	Status quo catch	110 000	110 000	103 043	-

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES landings	ICES discards
2006/2007	Status quo catch	110 000	130 000	135 303	-
2007/2008	Average of the last 3 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	$H_{MGT} = 0.15$	38 712	39 000	35 034	-
2018/2019	Management plan	35 186	35 186	40 683	-
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			

* 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 2020 as estimated by ICES. All weights are in tonnes.

Catch (2020)	Landings	Discards
36 100	Pelagic trawl 100%	Discarding is considered negligible
	36 100	

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. Catch includes only age groups used in the assessment (ages 3+).

Year	Recruitment (age 3)	SSB [†]	Biomass age 4+	F (ages 5–10)	Harvest rate	Total catch
1987	529 826	383 813	415 358	0.347	0.182	75 439
1988	270 994	423 300	452 286	0.266	0.205	92 828
1989	447 323	385 511	401 085	0.322	0.251	101 000
1990	300 817	349 852	371 473	0.4	0.281	105 097
1991	840 526	309 707	310 169	0.436	0.344	109 489
1992	1 033 074	343 171	349 462	0.415	0.307	108 504
1993	635 401	423 563	453 585	0.248	0.226	102 741
1994	691 691	440 691	460 617	0.312	0.29	134 003
1995	202 685	406 130	435 353	0.343	0.288	125 851
1996	181 370	307 415	322 252	0.361	0.297	95 882
1997	772 482	268 810	266 621	0.25	0.243	64 931
1998	320 427	298 282	323 347	0.28	0.266	87 238
1999	552 469	289 567	296 830	0.377	0.312	92 896
2000	391 176	306 259	324 051	0.335	0.308	100 332
2001	468 427	271 805	282 333	0.415	0.332	95 675
2002	1 455 459	297 139	277 647	0.418	0.346	96 208
2003	1 074 872	389 334	410 920	0.28	0.313	125 717
2004	663 282	486 223	516 049	0.244	0.218	114 237

Year	Recruitment (age 3)	SSB†	Biomass age 4+	F (ages 5–10)	Harvest rate	Total catch
2005	991 082	525 516	536 907	0.253	0.191	103 043
2006	736 809	612 062	646 197	0.144	0.201	135 303
2007	658 324	568 650	595 421	0.322	0.265	158 917
2008	526 782	564 453	592 696	0.31	0.254	151 780
2009	444 698	488 656	543 393	0.088	0.084	46 332
2010	468 500	451 143	506 777	0.101	0.086	43 533
2011	532 877	429 167	475 606	0.126	0.104	49 446
2012 *	394 177	433 957	456 770	0.207	0.158	71 976
2013	478 673	384 251	398 658	0.175	0.179	72 058
2014	240 452	407 597	433 879	0.296	0.219	94 975
2015	223 088	347 379	364 131	0.24	0.192	69 729
2016	288 877	321 353	333 279	0.216	0.181	60 403
2017	122 792	295 711	326 178	0.116	0.107	35 034
2018	191 513	267 619	292 279	0.171	0.139	40 683
2019	346 725	229 399	243 846	0.151	0.123	30 038
2020	1 286 453	260 281	256 697	0.228	0.14	36 100
2021	571 995‡	377 115	481 594			

* The mass mortality of 52 000 tonnes in Kolgrafafjörður in the winter 2012/2013 is not included in the landings, yield/SSB, and 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 2019.

Sources and references

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

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