Greenland halibut (*Reinhardtius hippoglossoides*) in subareas 1 and 2 (Northeast Arctic)

ICES advice on fishing opportunities

ICES advises that when the precautionary considerations are applied, catches in 2020 should be no more than 23 000 tonnes.

Stock development over time

The fishable biomass (length ≥ 45 cm) increased from 2007 to 2014 and has started to decline since then but remains above B_{pa}. The harvest rate has been increasing since 2008 and is at the highest in the time-series. Recruitment (age 1) is sporadic and the last strong year class was in 2013.

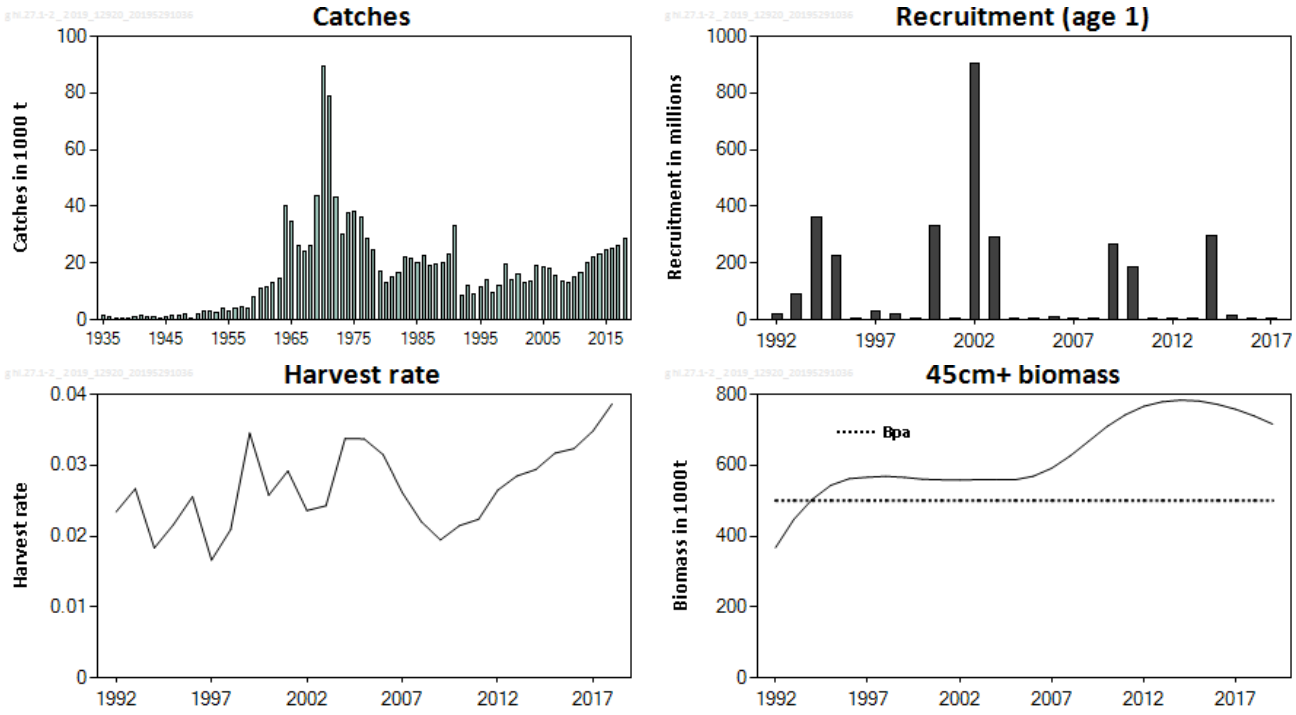

Figure 1 Greenland halibut in subareas 1 and 2. Summary of the stock assessment. Catches (thousand tonnes), harvest rate (defined as catch in a year divided by biomass at the start of the year), recruitment at age 1 (millions), and fishable (length ≥ 45 cm) biomass (thousand tonnes).

Stock and exploitation status

No reference points for fishing pressure have been defined for this stock. Stock size is above B_{pa}.

Table 1 Greenland halibut in subareas 1 and 2. State of the stock and fishery relative to reference points.

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

Catch scenarios

Table 2 Greenland halibut in subareas 1 and 2. The basis for the catch scenarios.

Variable	Value	Notes
Harvest rate (2019)	0.040	Based on catch constraint
Biomass ≥ 45 cm (2020)	715 671 tonnes	At 1 January 2020
R (2019)	-	R (2019) does not influence the short-term forecast
Expected catch (2019)	28 500 tonnes	Based on catch in 2018

Table 3 Greenland halibut in subareas 1 and 2. The catch scenarios. Weights are in tonnes.

Basis	Catches (2020)	Harvest rate 2020–2024	Mean catch 2020–2024	Biomass 45cm+ 1st January 2025	% 45cm+ Biomass change *
ICES advice basis					
Same advice as last year	23000	0.036	23000	574000	−20%
Other scenarios					
HR = 0	0	0	0	672000	−6%
$HR_{2017–2018} \times 0.5$	12770	0.019	12500	620000	−13%
$HR_{2017–2018} \times 0.75$	19070	0.028	18340	596000	−17%
$HR_{2017–2018} \times 1$	25310	0.037	23930	573000	−20%
$HR_{2017–2018} \times 1.5$	37630	0.053	37630	532000	−26%
$HR_{2017–2018} \times 2$	49730	0.070	44000	495000	−31%
$HR_{2017–2018} \times 3$	73290	0.099	60870	432000	−40%

* 45 cm+ biomass in 2025 relative to 2020.

The advice is the same as last year's advice.

Basis of the advice

Table 4 Greenland halibut in subareas 1 and 2. The basis of the advice.

Advice basis	Precautionary considerations
Management plan	None

Quality of the assessment

The update assessment, while increasing the estimates of 45cm+ biomass by about 15% and shifting the years of peak recruitments, did not affect the trend in the biomass. This was mainly due to a change in the methods used to divide biomass between sexes in two of the survey indices used (EcoJuv and EcoSouth), because of a lack of data available in recent years.

The lack of age data in the assessment increases uncertainty on the absolute levels of modelled biomass and harvest rate, and on the recruitment pattern. The peaks of recruitment identified by the model are corroborated by survey length distributions, but the weaker year classes may be poorly modelled.

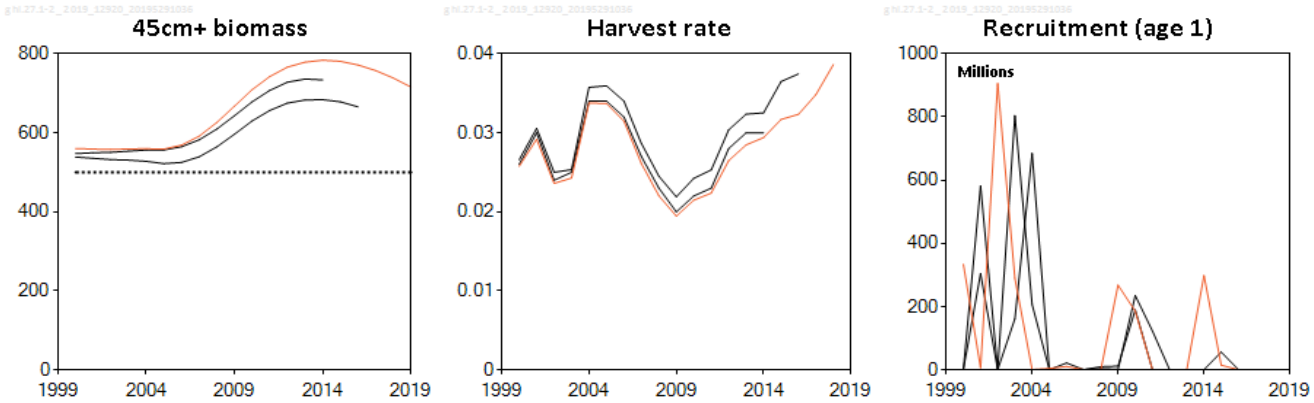

Figure 2 Greenland halibut in subareas 1 and 2. Historical assessment results. Assessment 2019 (orange line) compared to 2015 and 2017 (black lines).

Issues relevant for the advice

In the absence of a harvest control rule, maximum sustainable yield (MSY) reference points, and precautionary fishing mortality reference points, the advice is based on precautionary considerations. With no fishery the stock biomass (B_{45+}) is forecast to decline by 6% over five years due to the absence of strong year classes recruiting to the fishery. The same advice givenfor 2018 and 2019 is the basis of the advice for 2020. If the catch remains constant at 23 000 tonnes per year the stock is expected to decline by 20% over five years, while still remaining above B_{pa}.

The fishery has a history of quotas being set above scientific advice and catches being above the quota.

This is a long-lived, low productivity species which can only sustain low fishing pressure and the stock is currently in a relatively stable state. ICES normally provides advice for a two-year period. This year the advice is for only one year. The advice next year should be based on MSY or precautionary fishing mortality reference points that need to be defined.

The EU sets a TAC covering ICES Subarea 6 and the part of ICES Subarea 2 that is within EU waters. Catches of Greenland halibut in EU waters of ICES Subarea 2 are included in this stock, while catches in ICES Subarea 6 are included in the assessment of the Greenland halibut stock in subareas 5, 6, 12, and 14 (Iceland and Faroes grounds, West of Scotland, North of Azores, East of Greenland).

Reference points

Table 5 Greenland halibut in subareas 1 and 2. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	Not defined		
	F_{MSY}	Not defined		
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	500 000 tonnes	Fishable biomass (length ≥ 45 cm) in 1995 as estimated in 2015, based on the lowest observed stock size for which good recruitment has been observed.	ICES (2015)
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 6 Greenland halibut in subareas 1 and 2. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Age–length-structured (Gadget model), but with only length data used for tuning.
Input data	Biomass and length distributions for four survey indices: the Norwegian slope survey (NO-GH-Btr-Q3), the Russian autumn survey (RU-BTr-Q4), and the EcoSouth and EcoJuv indices (from the Barents Sea ecosystem survey); catch-in-tonnes and length distributions from four aggregated commercial fleets (Norwegian trawl and seine, Russian trawl and seine, Norwegian gillnet and longline, Russian gillnet and longline); and maturity-at-length data from the Norwegian slope survey (NO-GH-Btr Q3).
Discards and bycatch	Not included, considered negligible.
Indicators	None.
Other information	Inter-benchmark process May–August 2015 (ICES, 2015).
Working group	Arctic Fisheries Working Group (AFWG)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7 Greenland halibut in subareas 1 and 2. ICES advice, TACs, and official catches. All weights are in tonnes.

Year	ICES advice	Catches corresponding to advice	Agreed TAC – Norway/JNRFC	TAC – EU zone in ICES subareas 2 and 6 ^	Official catches
1987	Precautionary TAC	-	-		19112
1988	No decrease in SSB	19000	-		19587
1989	F = F(87); TAC	21000	-		20138
1990	F = F(89); TAC	15000	-		23183
1991	F at F_{med}; TAC; improved expl. pattern	9000	-		33320
1992	Rebuild SSB(1991)	6000	7000*		8602
1993	TAC	7000	7000*		11933
1994	F < 0.1	< 12000	11000*		9226
1995	No fishing	0	2500**		11734
1996	No fishing	0	2500**		14347
1997	No fishing	0	2500**		9410
1998	No fishing	0	2500**		11893
1999	No fishing	0	2500**		19517
2000	No fishing	0	2500**		14297
2001	Reduce catch to rebuild stock	< 11000	2500**		16365
2002	Reduce F substantially	< 11000	2500**		13293
2003	Reduce catch to increase stock	< 13000	2500**		13447
2004	Do not exceed recent low catches	< 13000	2500**		18899
2005	Do not exceed recent low catches	< 13000	2500**		18834
2006	Do not exceed recent low catches	< 13000	2500**		17904
2007	Reduce catch to increase stock	< 13000	2500**		15453
2008	Reduce catch to increase stock	< 13000	2500**		13792
2009	Same advice as last year	< 13000	2500**		12990
2010	Same advice as last year	< 13000	15000***	350	15229
2011	Same advice as last year	< 13000	15000***	350	16606
2012	No increase in catches	< 15000	18000***	350	20288
2013	No increase in catches	< 15000	19000***	824	22167
2014	No new advice, same as for 2013	< 15000	19000***	1000	23025
2015	Same as for 2014	< 15000	19000***	1000	24748
2016	Precautionary approach	< 19800	22000***	1100	24950

Year	ICES advice	Catches corresponding to advice	Agreed TAC – Norway/JNRFC	TAC – EU zone in ICES subareas 2 and 6 ^	Official catches
2017	Same advice as last year	< 19800	24000***	1100	26380
2018	Precautionary approach	< 23000	27000***	1100	28544
2019	Same advice as last year	< 23000	27000***	1250	
2020	Precautionary considerations	≤ 23000			

* Set by Norwegian authorities.
** Set by Norwegian authorities for the non-trawl fishery; allowable bycatch in the trawl fishery is additional to this.
*** Set by the Joint Norwegian–Russian Fisheries Commission.
^ Set by EU in the EU zone of ICES subareas 2 and 6.

History of the catch and landings

Table 8 Greenland halibut in subareas 1 and 2. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings				Discards
28 544 tonnes	Trawl 61%	Longline 26%	Gillnet 11%	Others 3%	Discarding is considered negligible
	28 544 tonnes				

Table 9 Greenland halibut in subareas 1 and 2. History of commercial catch and landings; both the official and ICES estimated values are presented for subareas 1 and 2 for each country participating in the fishery. All weights are in tonnes.

Year	Estonia	Denmark	Faroe Isl.	France	Fed. Rep. Germany	Greenland	Iceland	Ireland	Latvia	Lithuania	Norway	Poland	Portugal	Russia*	Spain	UK	UK (Engl. & Wales)	UK (Scotland)	Total
1984	0	0	0	138	2165	0	0	0	0	0	4376	0	0	15181	0	0	23	0	21883
1985	0	0	0	239	4000	0	0	0	0	0	5464	0	0	10237	0	0	5	0	19945
1986	0	0	42	13	2718	0	0	0	0	0	7890	0	0	12200	0	0	10	2	22875
1987	0	0	0	13	2024	0	0	0	0	0	7261	0	0	9733	0	0	61	20	19112
1988	0	0	186	67	744	0	0	0	0	0	9076	0	0	9430	0	0	82	2	19587
1989	0	0	67	31	600	0	0	0	0	0	10622	0	0	8812	0	0	6	0	20138
1990	0	0	163	49	954	0	0	0	0	0	17243	0	0	4764	0	0	10	0	23183
1991	2564	11	314	119	101	0	0	0	0	0	27587	0	0	2490	132	0	0	2	33320
1992	0	0	16	111	13	13	0	0	0	0	7667	0	31	718	23	0	10	0	8602
1993	0	2	61	80	22	8	56	0	0	30	10380	0	43	1235	0	0	16	0	11933
1994	0	4	18	55	296	3	15	5	0	4	8428	0	36	283	1	0	76	2	9226
1995	0	0	12	174	35	12	25	2	0	0	9368	0	84	794	1106	0	115	7	11734
1996	0	0	2	219	81	123	70	0	0	0	11623	0	79	1576	200	0	317	57	14347
1997	0	0	27	253	56	0	62	2	0	0	7661	12	50	1038	157	0	67	25	9410
1998	0	0	57	67	34	0	23	2	0	0	8435	31	99	2659	259	0	182	45	11893
1999	0	0	94	0	34	38	7	2	0	0	15004	8	49	3823	319	0	94	45	19517
2000	0	0	0	45	15	0	16	1	0	0	9083	3	37	4568	375	0	111	43	14297
2001	0	0	0	122	58	0	9	1	0	0	10896	2	35	4694	418	0	100	30	16365
2002	219	0	0	7	42	22	4	6	0	0	7143	5	14	5584	178	0	41	28	13293
2003	0	0	459	2	18	14	0	1	0	0	8216	5	19	4384	230	0	41	58	13447
2004	0	0	0	0	9	0	9	0	0	0	13939	1	50	4662	186	0	43	0	18899
2005	170	0	0	32	8	0	0	0	0	0	13011	0	23	4883	660	0	29	18	18834
2006	0	0	204	46	8	0	8	0	0	196	11119	201	26	6055	29	0	10	2	17904
2007	0	0	203	41	8	198	15	0	0	0	8230	200	47	6484	8	0	11	8	15453
2008	0	0	663	42	5	0	28	0	0	0	7393	201	46	5294	94	0	16	10	13792
2009	0	0	422	16	19	16	15	2	0	0	8446	204	237	3335	210	0	9	60	12990
2010	0	0	272	102	14	15	16	0	0	0	7700	3	11	6888	182	0	4	22	15229
2011	0	0	538	46	80	4	7	0	0	234	8270	169	21	7053	144	0	36	4	16606
2012	0	0	564	40	40	12	13	0	0	0	9331	22	1	10041	190	0	21	14	20288
2013	0	0	783	168	49	22	106	1	0	0	10403	30	7	10310	196	0	17	75	22167
2014	0	0	887	269	33	20	86	0	0	0	11232	19	0	10061	206	0	28	184	23025
2015	0	0	312	227	33	14	53	0	0	5	10874	13	1	12953	159	0	25	79	24748
2016	359	2	483	229	9	17	79	0	0	0	12932	8	19	10576	198	0	20	19	24950
2017	523	0	917	177	21	26	10	0	1	72	13741	27	13	10714	56	0	83	0	26380
2018	574	2	409	150	51	32	0	0	4	177	14874	27	6	12072	60	108	0	0	28544

* USSR prior to 1991.

Summary of the assessment

Table 10 Greenland halibut in subareas 1 and 2. Assessment summary.

Year	Recruitment (age 1)	45cm+ biomass	Catches	Harvest rate
	thousands	tonnes		
1992	20860	367295	8602	0.023
1993	91564	447306	11933	0.027
1994	363945	503851	9226	0.0183
1995	228363	543258	11734	0.022
1996	1250	561725	14347	0.026
1997	31132	566085	9410	0.0166
1998	18273	568614	11893	0.021
1999	1172	565486	19517	0.035
2000	334315	560294	14297	0.026
2001	6751	558722	16365	0.029
2002	906023	557754	13293	0.024
2003	289634	559312	13447	0.024
2004	1128	559751	18899	0.034
2005	4612	558818	18834	0.034
2006	10785	568786	17904	0.031
2007	1250	591555	15453	0.026
2008	1000	626103	13792	0.022
2009	268272	667548	12990	0.0195
2010	185689	709186	15229	0.021
2011	1000	742303	16606	0.022
2012	1053	766191	20288	0.026
2013	1000	778597	22167	0.028
2014	298455	783560	23025	0.029
2015	15027	780918	24748	0.032
2016	1000	771502	24950	0.032
2017	1000	757426	26380	0.035
2018		738643	28544	0.039
2019		715671		

Sources and references

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