

Tusk (*Brosme brosme*) in Subarea 14 and Division 5.a (East Greenland and Iceland grounds)

ICES advice on fishing opportunities

ICES advises that when the Icelandic management plan is applied, catches in the fishing year 1 September 2021 to 31 August 2022 should be no more than 2172 tonnes in Division 5.a.

ICES does not provide a catch advice for the stock component in Subarea 14.

Stock development over time

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

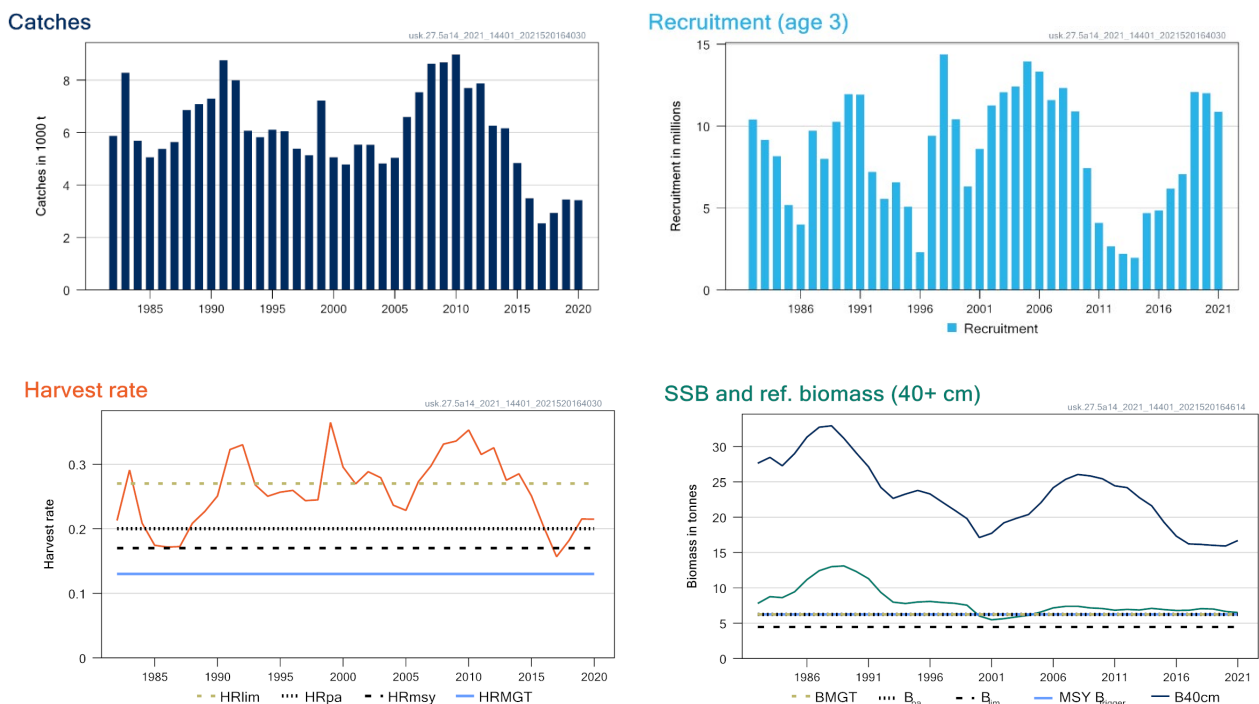


Figure 1 Tusk in Subarea 14 and Division 5.a. Summary of the stock assessment in Division 5.a. The top left panel shows total catches. The top right panel shows recruitment, the final-year recruitment estimate is included. The lower right panel shows trends in spawning-stock biomass (SSB), the biomass of tusk at length ≥ 40 cm (B_{40+}) that is used in the harvest control rule (HCR). The lower left panel shows trends in harvest rate (catches in Division 5.a/ B_{40+}) alongside harvest rate reference points.

Catch scenarios

The basis of the catch scenario for the Division 5.a component of the stock is the management plan. A catch scenario is provided for the Icelandic fishery year from September 2021 to the end of August 2022, based on the estimated reference biomass at the end of quarter 1 in 2021. A short-term forecast to the end of 2022 is provided to evaluate the impact of the catch on the SSB.

Table 1 Tusk in Subarea 14 and Division 5.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
HR 2021	0.103	Based on a catch of 1 721 for 2021.
Reference biomass 2022	20 404	Biomass of fish ≥ 40 cm (B_{40+}) at the end of quarter 1; in tonnes
SSB 2022	7 455	In tonnes

Variable	Value	Notes
Recruitment age 3 (2021)	10 873	Estimated by the model; in thousands
Recruitment age 3 (2022)	12 869	Estimated by the model; in thousands
Recruitment age 3 (2023)	5 234	Estimated by the model; in thousands
Catch (2021)	1 721	Remainder of the TAC for the fishing year 2020/2021 and assumed catches in the remainder of the calendar year 2021 according to the management plan; in tonnes

Table 2 Tusk in Subarea 14 and Division 5.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2021/2022)	HR (2022)	SSB (2023)	Reference biomass (2023)	% SSB change *	% TAC change **	% Advice change ***
Management plan	2 172	0.13	8 708	24 815	16.8%	-5.2%	NA

* SSB in 2023 relative to SSB in 2022.

** Advice value for 2021/2022 relative to the domestic TAC in 2020/2021.

*** No advice was requested for 2020/2021. Advice for 2020/2021 was issued by MFRI based on the same method agreed by ICES (2289 tonnes).

No ICES advice was requested for the fishing year 2020/2021. The advice for 2021/2022 is lower than the advice provided by MFRI for 20220/2021 due to a decrease in the estimated biomass of tusk at length 40 cm and greater (reference biomass; B40+) that is used in the harvest control rule (HCR).

Basis of the advice

Table 3 Tusk in Subarea 14 and Division 5.a. The basis of the advice.

Advice basis	Management plan for the stock component in Division 5.a (ICES, 2017a).
Management plan	<p>The Icelandic Ministry of Industries and Innovation's fisheries management plan for Icelandic tusk (ICES, 2017a) has been evaluated by ICES. It is considered to be precautionary, and it conforms to ICES MSY approach. According to the management plan 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><i>When SSB_Y is equal or above $MGT B_{trigger}$:</i> $TAC_{Y/Y+1} = HR_{MGT} * B_{Ref,Y}$</p> <p><i>When SSB_Y is below $MGT B_{trigger}$:</i> $TAC_{Y/Y+1} = HR_{MGT} * (SSB_Y / MGT B_{trigger}) * B_{Ref,Y}$</p> <p><i>The spawning-stock biomass trigger ($MGT B_{trigger}$) is defined as 6.24 kt, the reference biomass (B_{Ref}) is defined as the biomass of tusk 40+ cm and the target harvest rate (HR_{MGT}) is set to 0.13.</i></p>

Quality of the assessment

An error in the calculations of the survey index was discovered in 2020 (MFRI, 2020; ICES, 2021b) This affected the index substantially. In comparison with previous assessments, there has been a downward correction of the whole time-series of biomass levels as well as a large downward revision of biomass trends estimated over the last decade. As a result of the change in perception, reference points were re-estimated.

The management strategy evaluation that informed the management plan (MP) for this stock was completed with high assessment uncertainty and autocorrelation. Based on the revised reference points, it is concluded that the HCR remains precautionary and is thus robust to the downward correction of the time series.

The assessment of this stock has not included catch information from the Greenlandic part of Subarea 14 because of the distant location of the fishery that indicated catches potentially coming from a different stock. An increasing proportion of catches in Subarea 14 have been reported in recent years. The Greenlandic deep-sea survey has shown the distribution of the species extends from the Icelandic Exclusive Economic Zone (EEZ) and along the continental shelf edge down to 62° North with an unknown proportion of the stock.

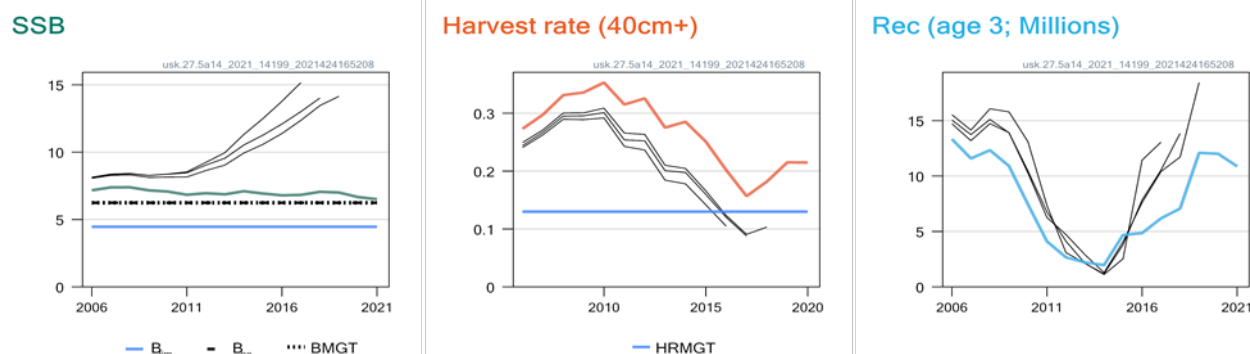


Figure 2 Tusk in Subarea 14 and Division 5.a. Historical assessment results for the stock component in Division 5.a. Final-year recruitment and biomass estimates are included. No ICES assessment was conducted in 2020.

Issues relevant for the advice

When the MP was first evaluated, it was considered that it would be appropriate to review the performance of the rule after some years, e.g. after approximately five years.

This advice pertains only to the tusk stock component in Division 5.a. because catch data from Subarea 14 are not used in the assessment. Therefore, ICES does not provide a catch advice for the stock component in Subarea 14.

This stock is classified as Category 4 in the NEAFC categorization of deep-sea species/stocks. This implies that fisheries are primarily restricted to coastal state Exclusive Economic Zones (EEZs) and therefore management measures are not taken by NEAFC unless complementary to coastal state conservation and management measures (NEAFC, 2016).

Reference points

Table 4 Tusk in Subarea 14 and Division 5.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	5480	B_{pa} (tonnes)	ICES (2021b)
	HR_{MSY}	0.19	Stochastic simulations	ICES (2021b)
Precautionary approach	B_{lim}	3940	SSB (2001) corresponding to B_{loss}	ICES (2021b)
	B_{pa}	5480	B_{loss} (tonnes)	ICES (2021b)
	HR_{lim}		Not defined	ICES (2021b)
	HR_{pa}	0.45	HR that has a 5% probability of $SSB < B_{lim}$	ICES (2021b)
Management plan	MGT $B_{trigger}$	6240	Based on B_{pa} estimated in 2017 (tonnes)	ICES (2017b)
	HR_{mgt}	0.13	Proportion of catch relative to reference biomass. Leads to long-term MSY. Realized HR can range from 0.09 to 0.18	ICES (2017b)

Basis of the assessment

Table 5 Tusk in Subarea 14 and Division 5.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021a)
Assessment type	Analytical age- and length-based assessment (Gadget model) that uses catches in the model and in the forecast (ICES, 2021b)
Input data	Icelandic bottom trawl survey – Spring (IS-SMB [G3239]) and landings in Division 5.a
Discards and bycatch	Discarding is considered negligible
Indicators	None
Other information	Last benchmarked in 2017 (WKICEMSE; ICES, 2017b)
Working group	Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP)

History of the advice, catch, and management

Table 6 Tusk in Subarea 14 and Division 5.a. ICES advice for Division 5.a, catches and TACs. All weights are in tonnes. The EU sets a small TAC (21 tonnes since 2016) exclusively for bycatches and for subareas 1, 2, and 14 combined.

Year	ICES advice ^{^^}	Catch corresponding to advice	TAC Icelandic Division 5.a*	Greenland TAC for Subarea 14**	ICES catches Division 5.a*	ICES catches* *
2005	^		3500		4901	5099
2006	^		3500		5928	6669
2007	^		5000		7942	7581
2008	^		5500		7594	8215
2009	Constrain catches to 5 000 t	< 5000	5500		8162	8295
2010	Biennial	< 5000	5500		8382	8988
2011	Fishing at $F_{0.1}$	< 6000	6000		7777	7565
2012	Biennial	< 6000	7000		7401	8014
2013	Fishing at F_{MSY} (F_{max})	< 6700	6400		6833	6283
2014	No new advice, same as 2013	< 6700	5900		5881	6055
2015	Fishing at F_{MSY}	< 3950	3700	1500	4958	5721
2016	Fishing at F_{MSY}	< 3440	3000	1500	4121	3965
2017	Fishing at F_{MSY}	≤ 3780	3380	1500	2418	3100
2017/2018	Management plan	$\leq 4370^*$	3770	1500	3139	3621
2018/2019	Management plan	$\leq 3776^*$	3100	1500	3232	4037
2019/2020	Management plan	$\leq 3856^*$	3856	1500	3241	3769
2020/2021	No ICES advice		2289***	1500		
2021/2022	Management plan	$\leq 2172^*$	2172			

* Icelandic national fishing year from 1 September ending 31 August.

** Calendar year (last year in the Icelandic national fishing year), including catches from Subarea 14 and Division 5.a.

*** Domestic advice and TAC (no ICES advice requested due to the COVID-19 disruption).

^ Prior to 2008/2009 the advice for tusk was for the entire Northeast Atlantic and was not split into several assessment units.

^^ The ICES advice only applies to Division 5.a.

History of the catch and landings

This stock is distributed primarily in Icelandic waters and there are no reported catches from the NEAFC Regulatory Area.

Table 7 Tusk in Subarea 14 and Division 5.a. Catch distribution by fleet in the calendar year 2020 as estimated by ICES.

Catch (2020)	Landings			Discards
3769 tonnes	Longlines 95%	Trawls 3%	Other gears 2%	Negligible
	3769 tonnes			

Table 8 Tusk in Subarea 14 and Division 5.a. History of official catches by country and calendar year in Division 5.a. All weights are in tonnes.

Year	Denmark	Faroes	Germany	Iceland	Norway	UK	Total
1973	0	3363	576	2366	911	391	7607
1974	0	3172	375	1857	893	230	6527
1975	0	2445	384	1673	975	254	5731
1976	0	2397	334	2935	1352	94	7112
1977	0	2818	212	3122	1796	0	7948
1978	0	2168	0	3352	812	0	6332
1979	0	2050	0	3558	845	0	6453
1980	0	2873	0	3089	928	0	6890
1981	0	2624	0	2827	1025	0	6476
1982	0	2410	0	2801	666	0	5877
1983	0	4046	0	3468	772	0	8286
1984	0	2008	0	3430	254	0	5692
1985	0	1885	0	3064	111	0	5060
1986	0	2811	0	2549	21	0	5381

Year	Denmark	Faroes	Germany	Iceland	Norway	UK	Total
1987	0	2638	0	2987	19	0	5644
1988	0	3757	0	3087	20	0	6864
1989	0	3908	0	3158	10	0	7076
1990	0	2475	0	4821	0	0	7296
1991	0	2286	0	6476	0	0	8762
1992	0	1567	0	6432	0	0	7999
1993	0	1329	0	4745	0	0	6074
1994	0	1212	0	4616	0	0	5828
1995	0	979	1	5247	0	0	6227
1996	0	872	1	5227	3	0	6103
1997	0	575	0	4824	0	0	5399
1998	0	1052	1	4120	0	0	5173
1999	0	1035	2	5797	391	2	7227
2000	0	1154	0	4711	374	2	6241
2001	0	1125	1	3390	285	5	4806
2002	0	1269	0	3906	372	2	5549
2003	0	1163	1	4032	373	2	5571
2004	0	1478	1	3127	214	2	4822
2005	0	1157	3	3502	303	41	5006
2006	0	1239	2	5058	299	2	6600
2007	0	1250	0	5988	300	1	7539
2008	0	1398	0	6934	294	0	8626
2009	0	1516	0	6954	210	0	8680
2010	0	1794	0	6921	263	0	8978
2011	0	1655	0	5848	198	0	7701
2012	0	1310	0	6346	217	0	7873
2013	0.12	1094	0	4978	192	0	6264
2014	0	742	0	4996	425	0	6163
2015	0	637	0	4001	198	0	4836
2016	0	543	0	2650	301	0	3494
2017	0	492	0	1833	216	0	2541
2018	0	517	0	2097	326	0	2940
2019	0	549	0	2579	316	0	3445
2020	0	558	0	2590	271	0	3420

Table 9 Tusk in Subarea 14 and Division 5.a. History of official catches by country and calendar year in Subarea 14. All weights are in tonnes. There have been no catches in the NEAFC Regulatory Area since 2010.

Year	Denmark	Faroes	Germany	Greenland	Iceland	Norway	USSR/Russia*	Spain	UK	Total
1973	0	16	9	0	0	0	0	0	2	27
1974	0	259	2	0	15	0	0	0	1	277
1975	0	29	17	0	13	138	0	0	0	197
1976	0	0	5	0	89	47	0	0	1	142
1977	0	167	16	0	0	40	0	0	1	224
1978	0	0	47	0	0	38	0	0	0	85
1979	0	0	27	0	0	0	0	0	0	27
1980	0	0	13	0	0	0	0	0	0	13
1981	0	110	10	0	0	0	0	0	0	120
1982	0	0	10	0	0	0	0	0	0	10
1983	0	74	11	0	0	0	0	0	0	85
1984	0	0	5	0	0	58	0	0	0	63
1985	0	0	4	0	0	0	0	0	0	4
1986	0	33	2	0	0	0	0	0	0	35
1987	0	13	2	0	0	0	0	0	0	15
1988	0	19	2	0	0	0	0	0	0	21
1989	0	13	1	0	0	0	0	0	0	14

Year	Denmark	Faroes	Germany	Greenland	Iceland	Norway	USSR/Russia*	Spain	UK	Total
1990	0	0	2	0	0	7	0	0	0	9
1991	0	0	2	0	0	68	0	0	1	71
1992	0	0	0	0	3	120	0	0	0	123
1993	0	0	0	0	1	39	0	0	0	40
1994	0	0	0	0	0	16	0	0	0	16
1995	0	0	0	0	0	30	0	0	0	30
1996	0	0	0	0	0	157	0	0	0	157
1997	0	0	0	0	10	9	0	0	0	19
1998	0	0	0	0	0	12	0	0	0	12
1999	0	0	0	0	0	8	0	0	0	8
2000	0	0	0	0	11	11	0	3	0	25
2001	0	3	0	0	20	69	0	0	0	92
2002	0	4	0	0	86	30	0	0	0	120
2003	0	0	0	0	2	88	0	0	0	90
2004	0	0	0	0	0	40	0	0	0	40
2005	0	7	0	0	0	41	8	0	0	56
2006	0	3	0	0	0	19	51	0	0	73
2007	0	0	0	0	0	40	6	0	0	46
2008	0	0	0	33	0	7	0	0	0	40
2009	0	12	0	15	0	5	11	0	0	43
2010	0	7	0	0	0	5	0	0	0	12
2011	0	20	0	0	131	24	0	0	0	175
2012	0	33	0	0	174	46	0	0	0	253
2013	0.3	1.9	0	0	0	23.8	0	0	0	26
2014	0	2	0	0	0	26	0	0	0	28
2015	0.1	670	0	166	0	62	0	0	0	898
2016	0	111	0	182	0	178	0	0	0	471
2017	0.4	83	0	335	0	141	0	0	0	559
2018	0	345	0	108	0	228	0	0	0	681
2019	1	41	0	66	0	458	0	0	0	566
2020**	0	0	2	233	0	114	0	0	0	349

*Russian catches were taken in Subdivision 14.b.1 (Mid-Atlantic Ridge).

**Preliminary.

Summary of the assessment

Table 10 Tusk in Subarea 14 and Division 5.a. Assessment summary by calendar year in Division 5.a and Subarea 14.

Table 10

Risk in Subarea 14 and Division 3.a: Assessment summary by calendar year in Division 3.a and Subarea 14.

Year	Recruitment (age 3)	SSB	Catches*	Harvest rate	B40+
	thousands	tonnes			tonnes
1982	10397	7789	5877	0.21	27630
1983	9161	8754	8286	0.29	28461
1984	8167	8610	5692	0.21	27279
1985	5183	9439	5061	0.174	29010
1986	3987	11162	5381	0.172	31335
1987	9720	12432	5644	0.172	32738
1988	8005	12998	6864	0.21	32933
1989	10267	13101	7076	0.23	31167
1990	11951	12317	7296	0.25	29105
1991	11930	11305	8762	0.32	27142
1992	7207	9361	7999	0.33	24225
1993	5568	7975	6074	0.27	22661
1994	6557	7786	5827	0.25	23273
1995	5082	7996	6106	0.26	23786
1996	2297	8075	6044	0.26	23288
1997	9414	7923	5391	0.24	22128
1998	14372	7812	5136	0.24	20982

Year	Recruitment (age 3)	SSB	Catches*	Harvest rate	B40+
	thousands	tonnes			tonnes
1999	10415	7546	7219	0.36	19797
2000	6308	6016	5059	0.30	17121
2001	8605	5480	4779	0.27	17723
2002	11257	5638	5541	0.29	19210
2003	12073	5884	5536	0.28	19835
2004	12412	6113	4822	0.24	20384
2005	13946	6587	5040	0.23	22053
2006	13334	7166	6598	0.27	24170
2007	11585	7385	7540	0.30	25349
2008	12332	7390	8626	0.33	26048
2009	10904	7165	8680	0.34	25842
2010	7440	7074	8978	0.35	25433
2011	4095	6836	7702	0.32	24444
2012	2664	6951	7873	0.33	24188
2013	2213	6868	6265	0.28	22765
2014	1961	7100	6163	0.29	21612
2015	4682	6929	4836	0.25	19281
2016	4847	6793	3494	0.20	17315
2017	6186	6825	2541	0.160	16219
2018	7064	7057	2940	0.180	16147
2019	12088	7002	3445	0.22	16016
2020	12010	6664	3420	0.21	15922

* Catches for 5.a used in the assessment

Sources and references

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

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