

Ling (*Molva molva*) in Division 5.a (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 4735 tonnes.

Stock development over time

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

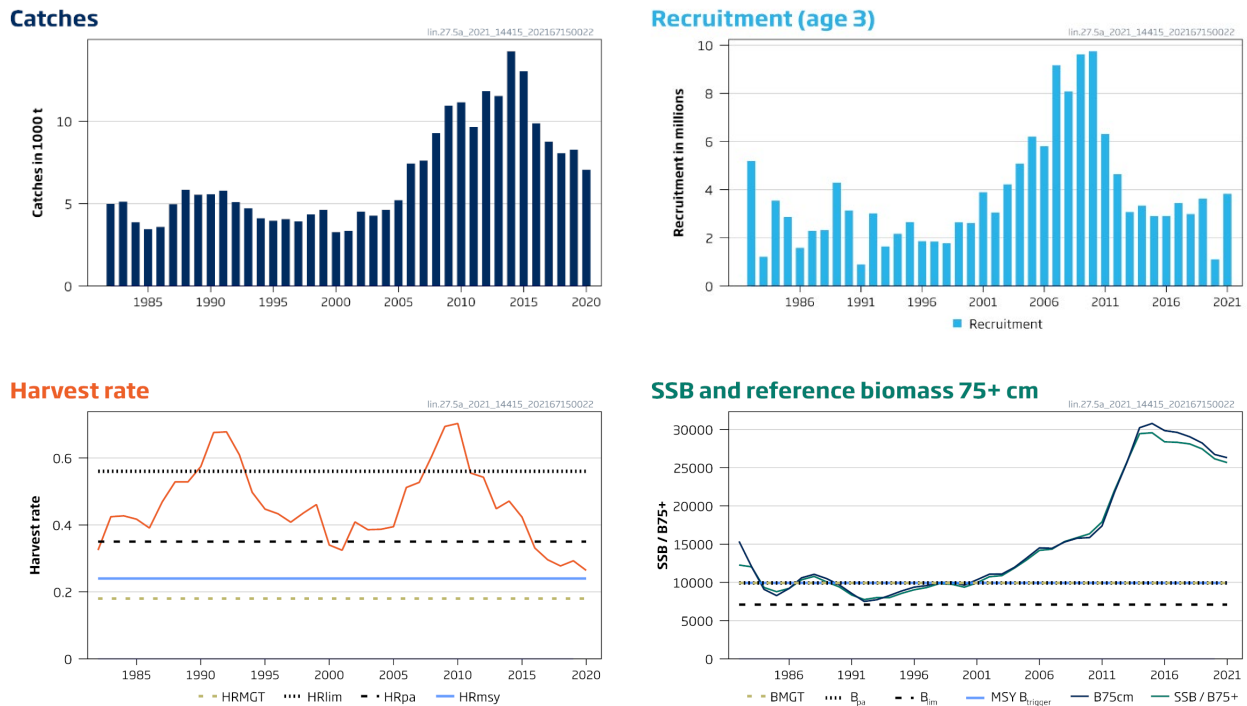


Figure 1 Ling in Division 5.a. Summary of the stock assessment. Top left: total catches; top right: recruitment (age 3); bottom left: harvest rate; bottom right: spawning-stock biomass (SSB). In the bottom right panel, the B75+ line represents the trend in the biomass of ling ≥ 75 cm that is used in the harvest control rule (HCR).

Catch scenarios

The catch scenario is provided for the fishery year from 1 September 2021 to 31 August 2022.

Table 1 Ling in Division 5.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
HR 2021	0.22	Based on assumed catch of 5919 t for 2021
Reference biomass 2022	27634	Biomass of fish 75 cm and larger (75+) at the end of quarter 1; in tonnes
SSB 2022	25 345	SSB resulting from application of HR in 2021; in tonnes
$R_{age\ 3}$ (2021)	3534	Estimated by the model; in thousands
$R_{age\ 3}$ (2022)	2854	Average recruitment over the period 2019-2021; in thousands
$R_{age\ 3}$ (2023)	2854	Average recruitment over the period 2019-2021; in thousands
Catch (2021)	5919	Remainder of the TAC for the fishing year 2020/2021 and assumed catch in the remainder of the calendar year based on the MP; in tonnes

Table 2 Ling in Division 5.a. Annual catch scenario. 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 ^	4735	0.18	26 547	27 575	5 %	-16.9 %	NA

* SSB in 2023 relative to SSB in 2022.

** Advice value for 2021/2022 relative to the domestic TAC in 2020/21 (5 700 t).

*** No advice was requested for 2020/2021. Advice for 2020/2021 was issued by MFRI based on the same method agreed by ICES (5700 tonnes).

^ SSB in 2021 is above MGT $B_{trigger}$, therefore the TAC is $HR_{MGT} \times B_{Ref,2021} = 0.18 \times 26\,304$.

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 2020/2021 because of a downward revision of recent biomass levels.

Basis of the advice

Table 3 Ling in Division 5.a. The basis of the advice.

Advice basis	Management plan (ICES, 2017a).
Management plan	<p>The Icelandic Ministry of Industries and Innovation's fisheries management plan for Icelandic ling has been evaluated by ICES (ICES, 2017a). It is considered to be precautionary and 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> $TAC_{Y/Y+1} = HR_{MGT} \times B_{Ref,Y}$</p> <p><i>When SSB_Y is below MGT $B_{trigger}$:</i> $TAC_{Y/Y+1} = HR_{MGT} \times (SSB_Y / MGT B_{trigger}) \times B_{Ref,Y}$</p> <p><i>The spawning stock biomass trigger (MGT $B_{trigger}$) is defined as 9.93 kt, the reference biomass is defined as the biomass of ling 75+ cm and the target harvest rate (HR_{MGT}) is set to 0.18.</i></p>

Quality of the assessment

The assessment of ling in Division 5a uses all available composition data (although data is sparse) to infer on processes such as growth and maturation and fleet catch selectivity through time. As a large part of the composition data were sampled after 2005, especially age composition data, the assessment of historical levels can shift as more data becomes available. With this increase in available data, the perception of the spawning-stock biomass level has shifted downwards, causing an upward revision in harvest rate.

In the evaluation of the management plan (MP) for ling in Icelandic waters (ICES, 2017b), the harvest control rule (HCR) was tested for robustness against both long periods of over-estimation and potential bias in the assessment. Shifts in the perception of the stock are within the range of scenarios investigated during the HCR evaluation, and therefore the HCR is considered robust to these changes. 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.

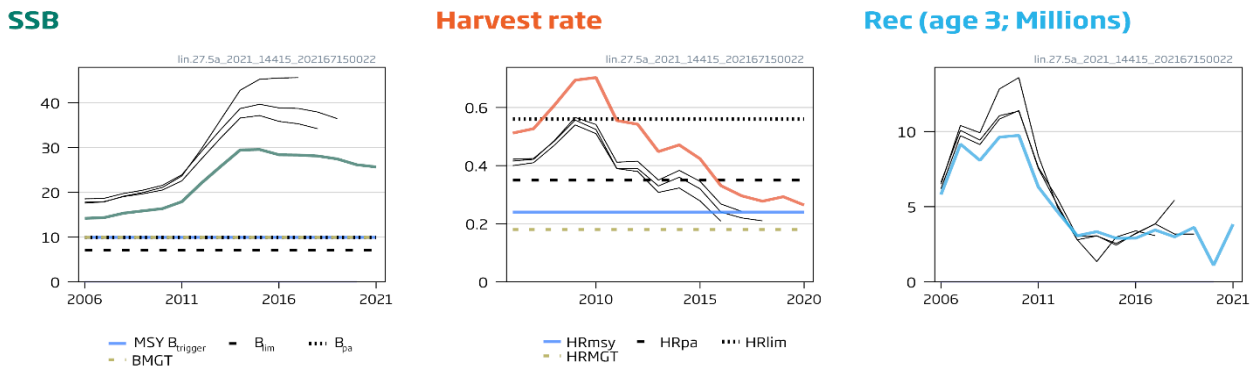


Figure 2 Ling in Division 5.a. Historical assessment results. Final-year recruitment and biomass estimates are included. No ICES assessment was conducted in 2020.

Issues relevant for the advice

ICES notes that the advice may change substantially between years due to the short time-series of data, which results in changes in perception.

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 Ling in Division 5.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	9930	B_{pa} (tonnes)	ICES (2017b)
	F_{MSY}	0.28	Stochastic simulations	ICES (2017b)
	HR_{MSY}	0.24	Stochastic simulations	ICES (2017b)
Precautionary approach	B_{lim}	7090	$B_{pa}/1.4$ (tonnes)	ICES (2017b)
	B_{pa}	9930	B_{loss} (tonnes)	ICES (2017b)
	F_{lim}	0.70	Equilibrium F that will maintain the stock above B_{lim} with a 50% probability	ICES (2017b)
	F_{pa}	0.41	5% probability that the true F has been above F_{lim}	ICES (2017b)
	HR_{lim}	0.56	Equilibrium HR that will maintain the stock above B_{lim} with a 50% probability	ICES (2017b)
	HR_{pa}	0.35	5% probability that the true HR has been above HR_{lim}	ICES (2017b)
Management plan	MGT $B_{trigger}$	9930	B_{pa} (tonnes)	ICES (2017b)
	HR_{MGT}	0.18	Proportion of biomass 75+ cm. Leads to above 95% of long-term MSY. Realized HR can range from 0.12 to 0.28.	ICES (2017b)

Basis of the assessment

Table 5 Ling in 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	March Icelandic groundfish survey (G3239) and data from commercial catches
Discards and bycatch	Not included; discarding is considered negligible
Indicators	None
Other information	Last benchmarked in 2017 (ICES, 2017)
Working group	Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP)

History of the advice, catch, and management

Table 6 Ling in Division 5.a. ICES advice, official landings and TAC. Prior to 2016/2017 ICES advice was for the calendar year. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	ICES catches Division 5.a**	TAC Icelandic Division 5.a*	ICES catches Division 5.a*
2003/2004 [^]	30% reduction on fishing effort	-	4621	3000	4608
2004/2005 [^]	Biennial	-	5195	3000	5238
2005/2006 [^]	30% reduction on fishing effort	-	7431	4000	6961
2006/2007 [^]	Biennial	-	7619	5000	7617
2007/2008	Maintain catches at 2001–2004 level	3800	9279	5000	8560
2008/2009	Biennial	3800	10948	7000	10489
2009/2010	Constrain catches to 2006–2007 average	7500	11150	7000	10713
2010/2011	Biennial	7500	9650	7500	10095
2011/2012	Same advice as previously	7500	11829	9000	11133
2012/2013	F _{proxy} target	12000	11536	12000	12445
2013/2014	No new advice, same as 2013	12000	14346	14000	14983
2014/2015	Fishing at F _{MSY}	14362	13036	14300	13166
2015/2016	Fishing at F _{MSY}	≤ 16156	9884	16200	11229
2016/2017	Fishing at F _{MSY}	≤ 9343	8765	9343	8426
2017/2018	Management plan	≤ 8598	8062	8598	8573
2018/2019	Management plan	≤ 6255	8269	6255	8028
2019/2020	Management plan	≤ 6599	7061	6599	7155
2020/2021	No ICES advice			5700***	
2021/2022	Management plan	≤ 4735			

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

** Calendar year (refers to the second year in the national fishing year).

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

[^] Prior to 2007/2008 the advice for ling was for the entire Northeast Atlantic and was not split into several assessment units.

History of the catch and landings

This stock is distributed primarily in Icelandic waters and does not extend into the NEAFC Regulatory Area.

Table 7 Ling in Division 5.a. Catch distribution by fleet in 2020 as estimated by ICES.

Catch (2020)	Landings			Discards
	7061	Longlines 67%	Trawl 28%	Other gears 5%
	7061 tonnes			

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

Year	Belgium	Faroes	France	Germany	Iceland	Norway	UK	Total
1973	1080	984	0	586	3564	418	829	7461
1974	681	890	0	486	3868	318	532	6775
1975	736	732	23	375	3748	522	562	6698
1976	431	498	0	404	4538	502	268	6641
1977	442	613	0	254	3433	506	0	5248
1978	541	534	0	0	3439	484	0	4998
1979	508	536	0	0	3759	399	0	5202
1980	445	607	0	0	3149	423	0	4624
1981	196	489	0	0	3348	415	0	4448
1982	116	524	0	0	3738	612	0	4990
1983	128	644	0	0	4236	115	0	5123
1984	103	450	0	0	3306	21	0	3880
1985	59	384	0	0	2989	17	0	3449
1986	88	556	0	0	2948	4	0	3596
1987	157	657	0	0	4154	6	0	4974
1988	134	619	0	0	5083	10	0	5846
1989	95	614	0	0	4833	5	0	5547
1990	42	399	0	0	5121	0	0	5562
1991	69	530	0	0	5187	0	0	5786
1992	34	526	0	0	4529	0	0	5089
1993	20	501	0	0	4322	0	0	4843
1994	3	548	0	0	4054	0	0	4605
1995	0	463	0	0	3733	0	0	4196
1996	0	358	0	0	3671	20	0	4049
1997	0	299	0	0	3635	0	0	3934
1998	0	699	0	0	3604	0	0	4303
1999	0	500	0	0	3972	120	1	4593
2000	0	0	0	0	3218	67	3	3288
2001	0	362	0	2	2870	116	1	3351
2002	0	1629	0	0	2840	45	0	4514
2003	0	565	0	2	3599	108	5	4279
2004	0	739	0	1	3742	139	0	4621
2005	0	682	0	1	4312	180	20	5195
2006	0	960	0	1	6312	158	0	7431
2007	0	807	0	0	6627	185	0	7619
2008	0	1366	0	0	7737	176	0	9279
2009	0	1157	0	0	9619	172	0	10948
2010	0	1095	0	0	9887	168	0	11150
2011	0	588	0	0	8813	249	0	9650
2012	0	875	0	0	10706	248	0	11829
2013	0	1030	0	0	10212	294	0	11536
2014	0	1738	0	0	12450	158	0	14346
2015	0	1233	0	0	11553	250	0	13036
2016	0	1072	0	0	8582	230	0	9884
2017	0	829	0	0	7692	244	0	8765
2018	0	1103	0	0	6756	203	0	8062
2019	0	1093	0	0	6992	184	0	8268
2020	0	989	0	0	5836	237	0	7061

Summary of the assessment

Table 9 Ling in Division 5.a. Assessment summary by calendar year. Catches are ICES estimates.

Year	Recruitment (age 3 in thousands)	SSB (tonnes)	Biomass of B75+ cm (tonnes)	Harvest rate	Total catch (tonnes)
1982	5188	12272	15374	0.32	4990
1983	1220	12033	12068	0.42	5123
1984	3544	9334	9084	0.43	3880
1985	2872	8782	8270	0.42	3450
1986	1583	9215	9204	0.39	3596
1987	2299	10346	10605	0.47	4974
1988	2325	10787	11061	0.53	5846
1989	4290	10061	10495	0.53	5547
1990	3140	9419	9684	0.57	5562
1991	896	8354	8560	0.68	5786
1992	3014	7756	7507	0.68	5089
1993	1644	8007	7733	0.61	4713
1994	2167	7999	8274	0.50	4114
1995	2658	8568	8884	0.45	3973
1996	1863	9035	9384	0.43	4068
1997	1851	9334	9584	0.41	3913
1998	1775	9842	9988	0.44	4354
1999	2648	9755	10033	0.46	4623
2000	2618	9380	9644	0.34	3279
2001	3900	9937	10340	0.32	3355
2002	3051	10739	11071	0.41	4527
2003	4222	10890	11096	0.39	4281
2004	5072	11867	11966	0.39	4628
2005	6202	12964	13220	0.39	5219
2006	5807	14190	14516	0.51	7431
2007	9168	14348	14457	0.53	7619
2008	8081	15341	15273	0.61	9279
2009	9626	15851	15773	0.69	10948
2010	9746	16356	15861	0.70	11150
2011	6315	17911	17389	0.56	9651
2012	4642	22043	21808	0.54	11828
2013	3073	25793	25731	0.45	11536
2014	3338	29449	30233	0.47	14246
2015	2901	29566	30785	0.42	13036
2016	2906	28384	29849	0.33	9884
2017	3449	28318	29615	0.30	8766
2018	2993	28109	29051	0.28	8062
2019	3626	27453	28226	0.29	8269
2020	1103	26157	26730	0.26	7061
2021	3834	25667	26304		

Sources and references

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

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