ICES Advice on fishing opportunities, catch, and effort
Greenland Sea and Icelandic Waters ecoregions
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Ling (*Molva molva*) in Division 5.a (Iceland grounds)

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ICES advice on fishing opportunities

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ICES advises that when the Icelandic management plan is applied, catches in the fishing year 1 September 2019 to 31 August 2020 should be no more than 6599 tonnes.

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Stock development over time

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Recruitment was high from 2004 to 2012, but has since declined to the levels of the 1980s and 1990s. The spawning-stock biomass (SSB) and the reference biomass (ling longer than 75 cm) in 2019 is close to the highest in the time-series. The harvest rate (HR) has decreased since 2008 and is now the lowest in the time-series, slightly below HR_{MSY}.
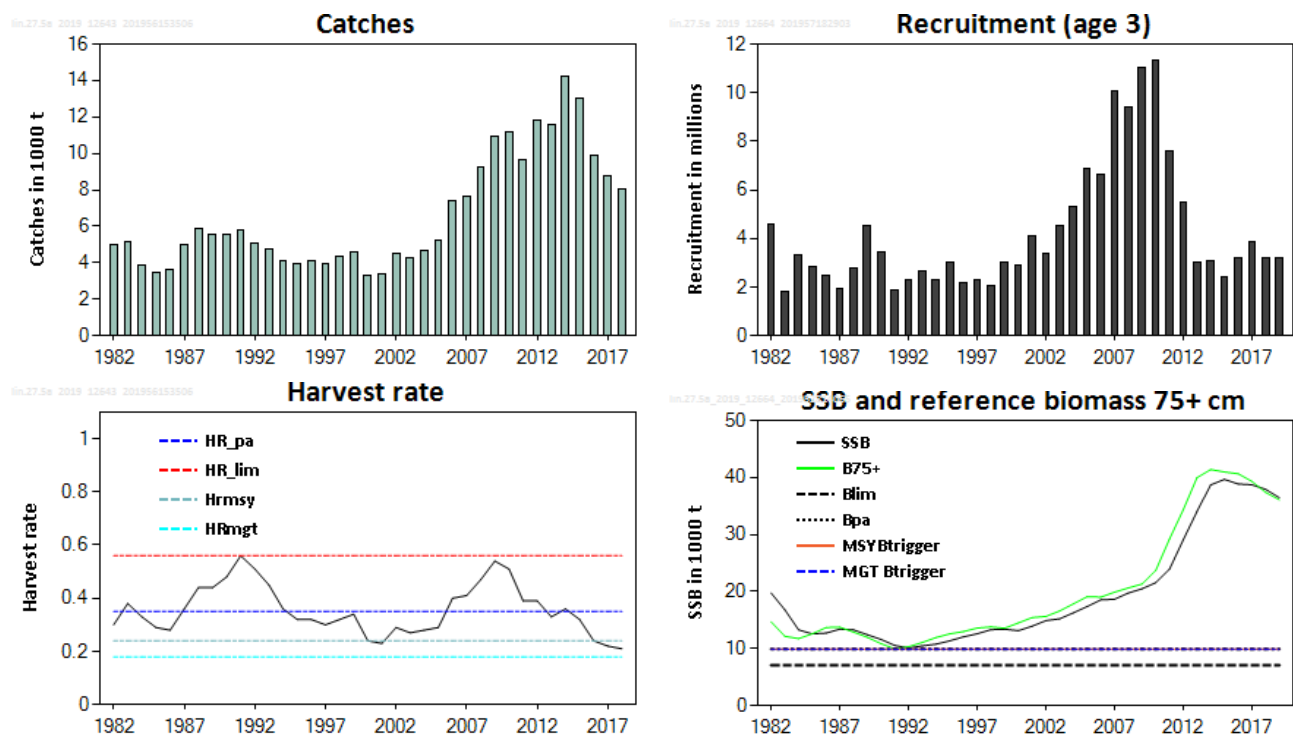

Figure 1   Ling in Division 5.a. Summary of the stock assessment. In the lower right panel (SSB), the B75+ line represents the trend in the biomass of ling at 75 cm and greater that is used in the harvest control rule.

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Stock and exploitation status

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

Table 1   Ling in Division 5.a. State of the stock and fishery relative to reference points. The determination of the symbols for fishing pressure under the management plan is based on the expected range of realized HR (0.12 to 0.28), following the management plan (HR_{MGT}; see ICES, 2017a).

		Fishing pressure				Stock size			
		2016	2017	2018			2017	2018	2019
Maximum sustainable yield	HR_{MSY}	✅	✅	✅ Below	MSY $B_{trigger}$		✅	✅	✅ Above trigger
Precautionary approach	HR_{pa}, HR_{lim}	✅	✅	✅ Harvested sustainably	B_{pa}, B_{lim}		✅	✅	✅ Full reproductive capacity
Management plan	HR_{MGT}	✅	✅	✅ Within the range	MGT $B_{trigger}$		✅	✅	✅ Above

Catch scenarios

The basis of the catch scenarios for this stock is the management plan. A catch scenario is provided for the fishery year from 1 September 2019 to 31 August 2020, based on the estimated reference biomass at the end of quarter 1 in 2019. A short-term forecast to the end of 2020 is provided to evaluate the impact of the advised catch on the SSB.

Table 2   Ling in Division 5.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
HR 2019	0.180	Assumed exploitation rate in 2019.
Reference biomass 2019	36 660	Biomass of fish 75 cm and larger (75+) at the end of quarter 1; in tonnes.
SSB 2019, Q1	35 812	SSB at the end of quarter 1 estimated by the model; in tonnes.
SSB 2020, Q1	35 284	SSB at the end of quarter 1 resulting from application of HR 2019; in tonnes.
$R_{age\ 3}$ (2019)	3180	Estimated by the model; in thousands.
$R_{age\ 3}$ (2020)	3407	Average of last three years of recruitment; in thousands.
Catch (2019, sum of quarters 2 & 3)	3231	Remainder of the TAC for the fishing year 2018/2019; in tonnes.

Table 3   Ling in Division 5.a. Annual catch scenario. All weights are in tonnes.

Basis	Total catch (2019/2020)	HR (2020)	SSB (2021)	% SSB change *	% TAC change **	% Advice change ***
Management plan ^	6599	0.18	34 606	−2%	5%	5%

* SSB in 2021 relative to SSB in 2020.
** Advice value for 2019/2020 relative to the TAC in 2018/19 (6 255 t).
*** Advice value for 2019/2020 relative to advice value for 2018/19 (6 255 t).
^ SSB in 2019 is above MGT $B_{trigger}$, therefore the TAC is $HR_{MGT} \times B_{Ref,2019}$ = 0.18 × 36 660.

The advice has increased from last year due to an upward revision of recent biomass levels.

Basis of the advice

Table 4   Ling in Division 5.a. The basis of the advice.

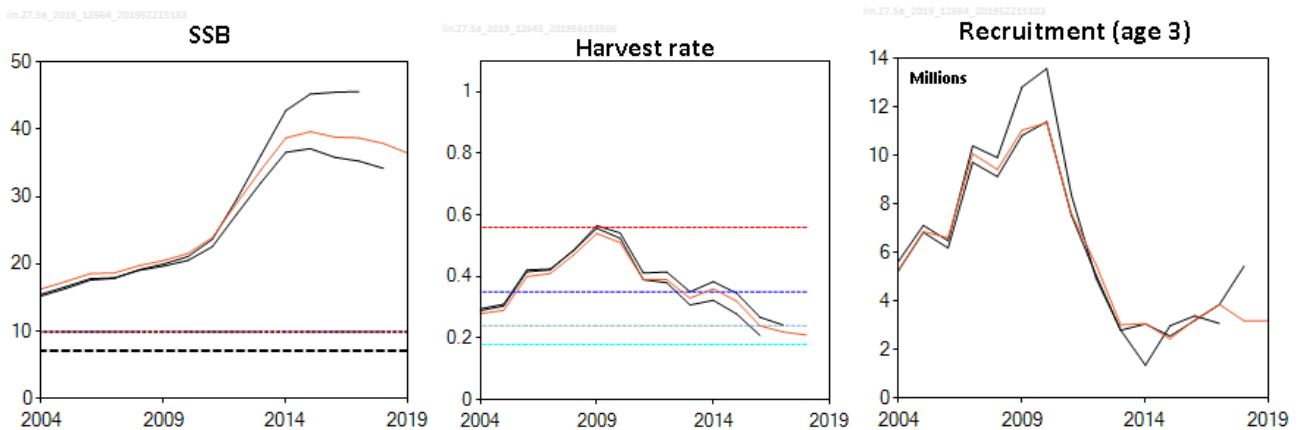| Advice basis	Management plan (ICES, 2017a).
Management plan	The Icelandic Ministry of Industries and Innovation's fisheries management plan for Icelandic ling has been evaluated by ICES (ICES, 2017a). It is considered to be precautionary and conforms to the ICES MSY approach. According to the management 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: *When SSB_Y is equal or above MGT $B_{trigger}$:* $TAC_{Y/y+1} = HR_{MGT} \times {}^*B_{Ref,y}$ *When SSB_Y is below MGT $B_{trigger}$:* $TAC_{Y/y+1} = HR_{MGT}{}^* (SSB_y/MGT\ B_{trigger}) * B_{ref,y}$ *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.*

Quality of the assessment

Figure 2   Ling in Division 5.a. Historical assessment results. Only the three assessments since the 2017 benchmark are shown. Final-year recruitment and biomass estimates are included.

Issues relevant for the advice †

This stock is classified as Category 4 in the [NEAFC categorization of deep-sea species/stocks](#) which 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.

Reference points

Table 5   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	Percentage of biomass 75+ cm. Leads to above 95% of long-term MSY. Realized HR can range from 0.12 to 0.28.	ICES (2017b)

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† Version 2: NEAFC categorisation of deep-sea stocks added to section.

Basis of the assessment

Table 6   Ling in Division 5.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Analytical length-based assessment (Gadget model) that uses catches in the model and in the forecast (ICES, 2019).
Input data	March Icelandic groundfish survey (IS-SMB) and data from commercial catches.
Discards and bycatch	Not included; discarding is considered negligible.
Indicators	None.
Other information	Last benchmark in 2017 (ICES, 2017b).
Working group	Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7   Ling in Division 5.a. ICES advice and official landings. Prior to 2016/2017 ICES advice was for the calendar year. All weights are in tonnes.

Year	ICES advice	Catch corresp. 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	8326
2018/2019	Management plan	≤ 6255		6255	
2019/2020	Management plan	≤ 6599			

* Icelandic national fishing year ending on 31 August.
** Calendar year (refers to the second year in the national fishing year).
^ Prior to 2007/2008 the advice for ling was for the entire Northeast Atlantic, not split in several assessment units.

History of the catch and landings

This stock is distributed primarily in Icelandic waters and does not extend to the NEAFC regulatory area.

Table 8   Ling in Division 5.a. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings			Discards
8062	Longlines 67%	Trawl 20%	Other gears 13%	Discarding is negligible
	8062 tonnes			

Table 9   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

* Preliminary.

Summary of the assessment

Table 10   Ling in Division 5.a. Assessment summary by calendar year. Catches are ICES estimates.

Year	Recruitment (age 3 in thousands)	SSB (tonnes)	Total catch (tonnes)	Harvest rate	Biomass of B75+ cm (tonnes)
1982	4590	19760	4990	0.30	14710
1983	1830	16790	5123	0.38	12159
1984	3320	13300	3880	0.33	11762
1985	2860	12590	3449	0.29	12608
1986	2450	12730	3596	0.28	13703
1987	1950	13420	4974	0.36	13763
1988	2790	13300	5846	0.44	12901
1989	4550	12450	5547	0.44	11989
1990	3460	11620	5562	0.48	10880
1991	1870	10560	5786	0.56	9967
1992	2300	10110	5089	0.51	10330
1993	2630	10490	4713	0.45	11075
1994	2270	10790	4114	0.36	11943
1995	2990	11370	3975	0.32	12595
1996	2160	12070	4068	0.32	12991
1997	2280	12600	3913	0.30	13602
1998	2040	13320	4354	0.32	13808
1999	2990	13400	4622	0.34	13595
2000	2880	13150	3276	0.24	14502
2001	4090	13940	3358	0.23	15439
2002	3400	14910	4527	0.29	15639
2003	4500	15220	4280	0.27	16606
2004	5300	16280	4630	0.28	17837
2005	6860	17370	5201	0.29	19101
2006	6620	18550	7433	0.40	19030
2007	10080	18660	7619	0.41	19902
2008	9430	19740	9279	0.47	20635
2009	11050	20490	10948	0.54	21326
2010	11360	21560	11150	0.51	23706
2011	7620	23920	9650	0.39	29208
2012	5500	29080	11829	0.39	34350
2013	3020	34030	11536	0.33	39955
2014	3070	38710	14246	0.36	41398
2015	2440	39670	13036	0.32	40971
2016	3230	38860	9884	0.24	40646
2017	3860	38730	8766	0.22	39314
2018	3180	37920	8062	0.21	37389
2019	3180	36450			36078

Sources and references

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