

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 2018 to 31 August 2019 should be no more than 6255 tonnes.

Stock development over time

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 2018 are among the highest in the time-series. The harvest rate (HR) has decreased since 2008 and is now equal to the lowest in the time-series, at HR_{MSY} .

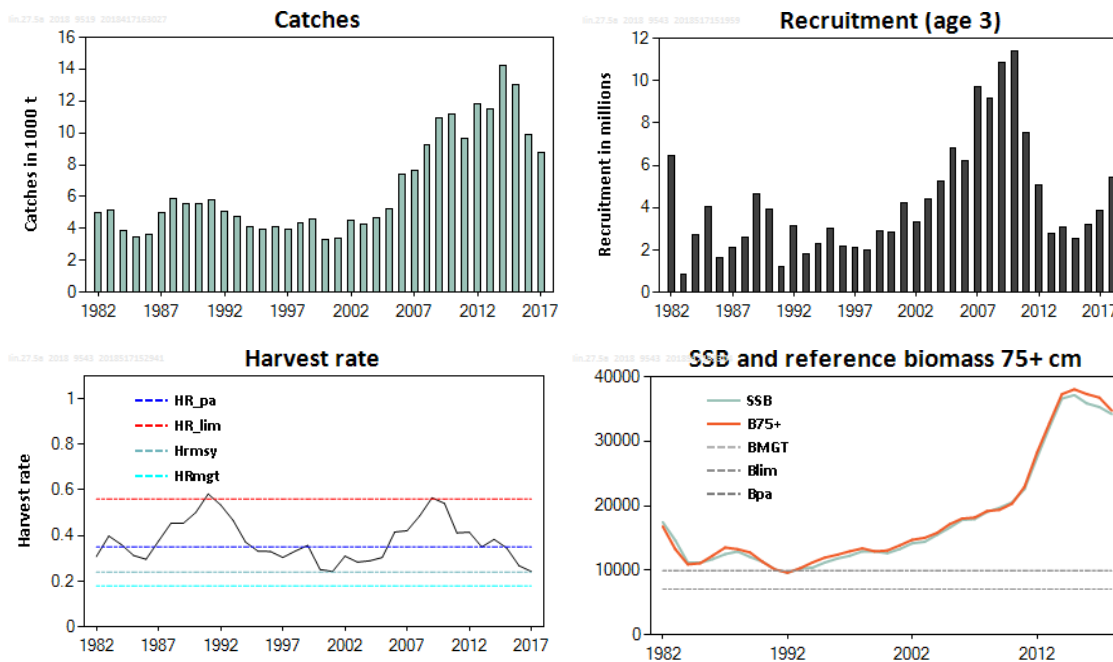


Figure 1 Ling in Division 5.a. Summary of the stock assessment. In the lower right panel (SSB), the B75+ line represents the trend in the biomass of ling at 75 cm and greater that is used in the harvest control rule.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is at HR_{MSY} and spawning-stock size is above $MSY B_{trigger}$.

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				
		2015	2016	2017		2016	2017	2018		
Maximum Sustainable Yield	HR_{MSY}	✗	✗	✓	At	$MSY B_{Trigger}$	✓	✓	✓	Above trigger
Precautionary Approach	HR_{pa} HR_{lim}	✓	✓	✓	Harvested sustainably	B_{pa} , B_{lim}	✓	✓	✓	Full reproductive capacity
Management plan	HR_{MGT}	✗	✓	✓	within the range	B_{MGT}	✓	✓	✓	Above

Catch scenarios

The basis of the catch scenarios for this stock is the management plan. A catch option is provided for the fishery year from 1 September 2018 to 31 August 2019, based on the estimated reference biomass at the end of quarter 1 in 2018. A short-term forecast to the end of 2019 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 _{MGT}	0.180	
Reference biomass 2018	34 748	Biomass of fish 75 cm and greater (75+) at the end of quarter1; in tonnes
R age 3 (2018)	5 440	In thousands estimated by the model
Catch (2018, sum of quarters 2 & 3)	5 110	Remainder of the TAC for the fishing year 2017/2018; in tonnes

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

Basis	Total catch (2018/2019)	HR (2019)	SSB (2020)	% SSB change *	% TAC change **	% Advice change ***
Management plan	6 255	0.180	32 693	-2%	-29%	-29%

* SSB in 2020 relative to SSB in 2019.

** Catches in 2019 relative to the TAC in 2018.

*** Advice value for 2019 relative to advice value for 2018.

The advice has decreased from last year due to downward revision of recent biomass levels, which falls within the expected bounds of model uncertainty.

Basis of the advice

Table 4 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 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:</p> <p>When SSB_Y is equal or above $MGT B_{trigger}$:</p> $TAC_{Y/Y+1} = HR_{MGT} * B_{Ref,Y}$ <p>When SSB_Y is below $MGT B_{trigger}$:</p> $TAC_{Y/Y+1} = HR_{MGT} * (SSB_Y / MGT B_{trigger}) * B_{Ref,Y}$ <p>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.</p>

Quality of the assessment

This stock was benchmarked in 2017 ([ICES, 2017b](#)); therefore, the present assessment is not fully comparable with assessments for this stock prior to 2017. There has been a downwards revision of the SSB and an upward revision of the harvest rate in the most recent assessment compared to 2017. Recruitment is estimated with high uncertainty. Fishing pressure is defined in terms of harvest rate of biomass of ling at 75 cm and larger, but in the assessments prior to 2017 it was defined in terms of fishing mortality for ages 15–19.

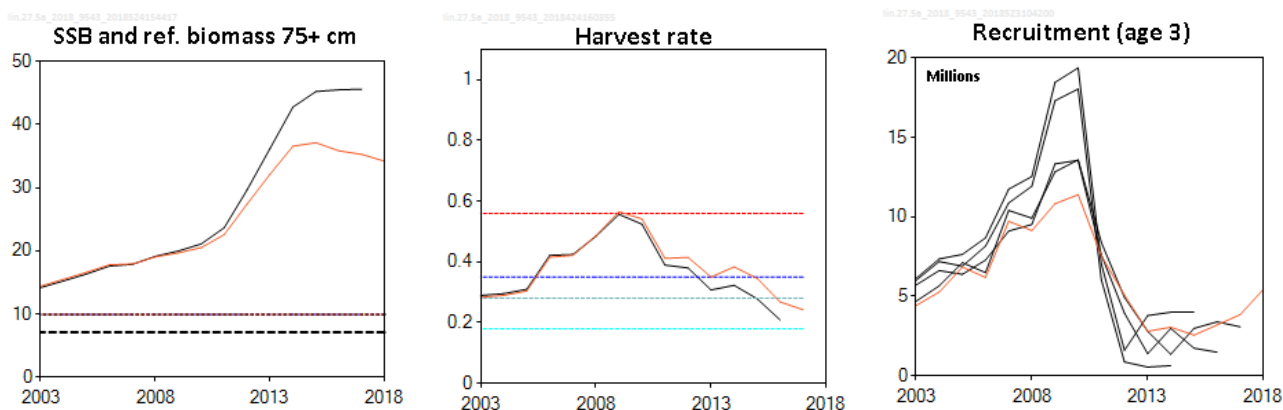


Figure 2 Ling in Division 5.a. Historical assessment results. Harvest rates were not calculated prior to the 2017 assessment.

Issues relevant for the advice

There is no information to present for this stock.

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}	0.284	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}	0.7	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)
Management plan	HR_{pa}	0.35	5% probability that the true HR has been above HR_{lim} .	ICES (2017b)
	SSB_{mgt}	9930	B_{pa} (tonnes).	ICES (2017b)
	HR_{mgt}	0.18	Percentage of biomass 75+ cm. Leads to long-term MSY. Realized HR can range from 0.12 to 0.28.	ICES (2017b)

Basis of the assessment

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

ICES stock data category	1 (ICES, 2016).
Assessment type	Analytical length-based assessment (Gadget model) that uses catches in the model and in the forecast (ICES, 2018).
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. All weights are in tonnes.

Year*	ICES advice*	Predicted 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	14246	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	8766	9343	8426
2017/2018	Management plan	≤ 8598		8598	
2018/2019	Management plan	≤ 6255			

* 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 whole Northeast Atlantic area.

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 2017 as estimated by ICES.

Catch (2017)	Landings			Discards
	longlines 65%	trawl 20%	other gears 15%	
8766 tonnes	8766 tonnes			Discarding is negligible

Table 9 Ling in Division 5.a. History of official catches (tonnes) 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	14246
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	8766

* Preliminary.

Summary of the assessment

Table 10 Ling in Division 5.a. Assessment summary by calendar year. Catches in the assessments are based on landings from the Icelandic Directorate of Fisheries, thus making splitting of catches by quarters possible. Weights are in tonnes.

Year	Recruitment (age 3)	SSB	Total catch	Harvest rate	Biomass of 75+ cm
	thousands	tonnes			tonnes
1982	6475	17432	4990	0.31	16779
1983	873	14629	5123	0.40	13263
1984	2724	11189	3880	0.36	10912
1985	4051	11171	3449	0.31	11091
1986	1605	11720	3596	0.30	12275
1987	2131	12499	4974	0.38	13517
1988	2615	12907	5846	0.45	13261
1989	4625	12058	5547	0.45	12744
1990	3912	11316	5562	0.50	11305
1991	1197	10109	5786	0.58	10117
1992	3163	9627	5089	0.53	9639
1993	1823	10240	4713	0.47	10299
1994	2319	10410	4114	0.37	11210
1995	3014	11206	3975	0.33	11962
1996	2185	11824	4068	0.33	12406
1997	2111	12252	3913	0.30	12941
1998	1969	12927	4354	0.33	13384
1999	2909	12916	4622	0.36	12926
2000	2841	12651	3276	0.25	13054
2001	4234	13282	3358	0.24	13855
2002	3308	14175	4527	0.31	14717
2003	4423	14410	4280	0.28	15025
2004	5268	15499	4630	0.29	15801
2005	6837	16601	5201	0.30	17135
2006	6188	17801	7433	0.42	18008
2007	9724	17927	7619	0.42	18159
2008	9134	19045	9279	0.49	19172
2009	10829	19674	10948	0.57	19365
2010	11398	20511	11150	0.54	20314
2011	7546	22565	9650	0.41	22918
2012	5075	27417	11829	0.42	28189
2013	2797	32152	11536	0.35	32779
2014	3056	36594	14246	0.38	37276
2015	2554	37142	13036	0.35	38033
2016	3198	35851	9884	0.27	37296
2017	3853	35292	8766	0.24	36761
2018	5440	34200			34748

Sources and references

ICES. 2016. Advice basis. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.

ICES. 2017a. Iceland request to evaluate the harvest control rule for ling in Division 5.a. *In* Report of the ICES Advisory Committee, 2017. ICES Advice 2017, sr.2017.09.

ICES. 2017b. Report of the Workshop on Evaluation of the Adopted Harvest Control Rules for Icelandic Summer Spawning Herring, Ling and Tusk (WKICEMSE), 21–25 April 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:45. 196 pp.

ICES. 2018. Report of the Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP), 11–18 April 2018, Copenhagen, Denmark. ICES CM 2018/ACOM:14. 624 pp.