

Haddock (*Melanogrammus aeglefinus*) in Division 5.b (Faroes grounds)

ICES stock advice

ICES advises that when the MSY approach is applied, fishing mortality in 2018 should be no more than 0.165, corresponding to catches of no more than 4570 t. ICES is not in a position to advise on the corresponding level of fishing effort.

Stock development over time

The spawning-stock biomass (SSB) has decreased since 2003 and is estimated to have been below B_{lim} since 2010, except in 2017. The fishing mortality (F) has decreased in recent years but is still above F_{MSY} . Recruitment (age 1) from 2004 onwards has been well below the long-term average. However, the 2016 year class is estimated to be above average.

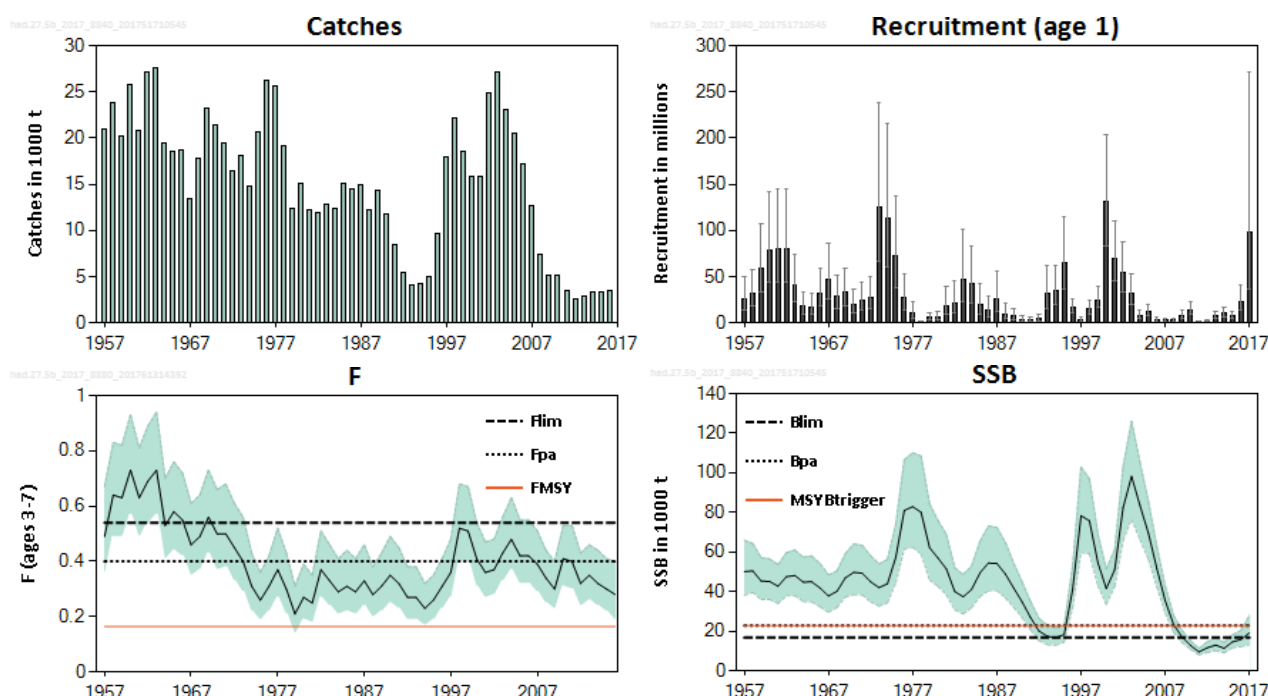


Figure 1 Haddock in Division 5.b. Summary of the stock assessment with point-wise 95% confidence intervals.

Stock and exploitation status

Table 1 Haddock in Division 5.b. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size		
		2014	2015	2016	2015	2016	2017
Maximum Sustainable Yield	F_{MSY}	✗	✗	✗ Above	$MSY B_{Trigger}$	✗	✗ Below trigger
Precautionary Approach	F_{pa} , F_{lim}	✓	✓	✓ Harvested sustainably	B_{pa} , B_{lim}	✗	✗ Increased risk
Management plan	F_{MGT}	—	—	— Not applicable	B_{MGT}	—	— Not applicable

Catch options

Table 2 Haddock in Division 5.b. The basis for the catch options.

Variable	Value	Source	Notes
F ages 3–7 (2017)	0.28	ICES (2017)	F ₂₀₁₇ as estimated by SAM.
SSB (2018)	34 435 t	ICES (2017)	Based on F(2017) = 0.28.
R _{age 1} (2018)	8 371 thousand	ICES (2017)	Median of resampled estimates from 2000–2016.
R _{age 1} (2019)	8 371 thousand	ICES (2017)	Median of resampled estimates from 2000–2016.
Total catch (2017)	4 265 t	ICES (2017)	Based on F(2017) = 0.28.

Table 3 Haddock in Division 5.b. Annual catch options. All weights are in tonnes.

Basis	Total catch (2018)	F _{total} (2018)	SSB (2019)	% SSB change *
ICES advice basis				
MSY approach: F _{MSY}	4570	0.165	79907	132
Other options				
F = 0	0	0	85604	149
F = F ₂₀₁₇	7396	0.28	76111	121
F = F _{pa}	10030	0.40	73107	112
F = F _{lim}	12814	0.54	69981	103

* SSB 2019 relative to SSB 2018.

Basis of the advice

Table 4 Haddock in Division 5.b. The basis of the advice.

Advice basis	MSY approach.
Management plan	There is no management plan for this stock. A preliminary management plan, including a recovery plan, was formulated in 2011, but has not been implemented.

Quality of the assessment

The stock was benchmarked in 2017. Input data and assessment model were changed, and uncertainty estimates are now available to assess the quality of the assessment. The historical stock perception has not changed significantly.

The landings data are considered accurate. There are no strong incentives to discard fish under the effort management system. The sampling of the landings is adequate. No major problems have been observed with the tuning indices (the two surveys).

There are indications that the 2016 year class may be well above average.

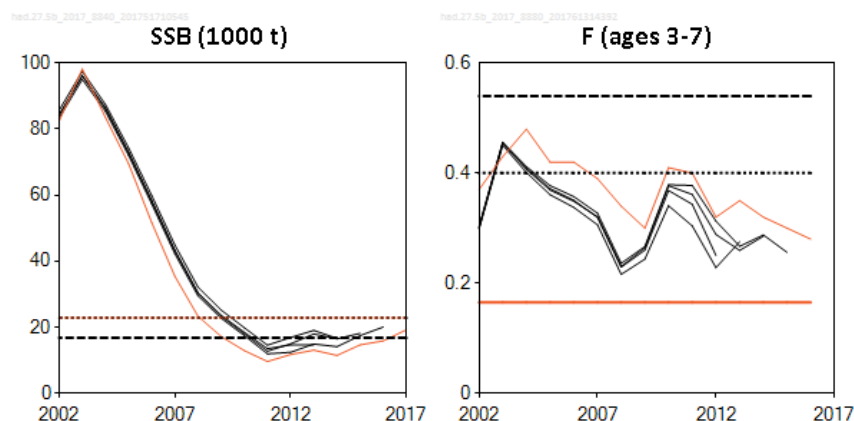


Figure 2 Haddock in Division 5.b. Historical assessment results. The age of recruitment has changed from age 2 to age 1 at the benchmark; therefore, the recruitment plot is not shown this year.

Issues relevant for the advice

An effort management system has been used since 1996. The Faroese parliament decides the number of allocated fishing days for each new fishing season. The number of fishing days used by the main fleet targeting cod (longliners) only amounts to around half of the allocated days. With surplus allocated fishing days, this system is not limiting fishing pressure.

ICES has not quantified the relationship between effort and F for this stock, as there is no apparent relationship between effort and F in the available data.

The Faroese parliament decided in 2007 to cancel all fishing licences for Faroese vessels in Faroese waters by 31 December 2017. A proposal for a new fisheries management system was delivered by the government to the Faroese parliament in May 2017. The new fisheries management system is expected to be implemented on 1st of January 2018.

Faroe Plateau cod and Faroe haddock are caught in a mixed fishery. Further development of management measures that includes the mixed-fishery issue would be useful.

Reference points

Table 5 Haddock in Division 5.b. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	22 843 t	B_{pa}	ICES (2017)
	F_{MSY}	0.165	Stochastic simulations based on segmented regression stock–recruitment relationship.	ICES (2017)
Precautionary approach	B_{lim}	16 780 t	The lowest biomass that has led to good recruitment.	ICES (2017)
	B_{pa}	22 843 t	$B_{lim} \times \exp(1.645 \times \sigma)$, where $\sigma = 0.19$.	ICES (2017)
	F_{lim}	0.54	Stochastic simulations (ICES, 2017) that gives a 50% probability of $SSB > B_{lim}$.	ICES (2017)
	F_{pa}	0.40	$F_{lim} \times \exp(-1.645 \times \sigma)$, where $\sigma = 0.18$.	ICES (2017)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 6 Haddock in Division 5.b. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016).
Assessment type	SAM with catch-at-age data and age-disaggregated indices, using catches in the model and in the forecast.
Input data	Commercial catches (mainly Faroese catches, ages and length frequencies from catch sampling); survey indices (FO-GFS-Q1 and FO-GFS-Q3); annual maturity data from FO-GFS-Q1; natural mortalities set at 0.2.
Discards and bycatch	Discarding is assumed to be negligible.
Indicators	None.
Other information	Benchmarked in 2017.
Working group report	North-Western Working Group (NWWG)

Information from stakeholders

No information is available.

History of the advice, catch, and management

Table 7 Haddock in Division 5.b. ICES advice and catch. All weights are in tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC*	ICES catch
1987	No increase in F	17000		14882
1988	No increase in F	18000		12178
1989	No increase in F	11000		14325
1990	No increase in F	11000		11726
1991	TAC	11000		8429
1992	TAC	13000–15000		5476
1993	Reduction in F	8000		4026
1994	No fishing	0	6200	4252
1995	No fishing	0	6200	4948
1996	TAC	8300	12600	9642
1997	$F = F(95)$	9300		17924
1998	$F = F(96)$	16000		22210
1999	$F < \text{proposed } F_{pa} (0.25)$	9000		18482
2000	$F < \text{proposed } F_{pa} (0.25)$	22000		15821
2001	$F < \text{proposed } F_{pa} (0.25)$	20000		15890
2002	No fishing	0		24933
2003	$F < \text{proposed } F_{pa} (0.25)$	12000		27072
2004	$F < \text{proposed } F_{pa} (0.25)$	21000		23101
2005	$F < \text{proposed } F_{pa} (0.25)$	19000		20455
2006	$F < \text{proposed } F_{pa} (0.25)$	18000		17154
2007	$F < 0.20$	16000		12631
2008	F_{pa}	14000		7388
2009	No fishing and recovery plan	0		5197
2010	No fishing and recovery plan	0		5202
2011	No direct fishing; minimize bycatch, implement recovery plan	0		3540

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC*	ICES catch
2012	No direct fishing; minimize bycatch, implement recovery plan	0		2634
2013	No direct fishing; minimize bycatch, implement recovery plan	0		2950
2014	No direct fishing; minimize bycatch, implement recovery plan	0		3276
2015	No direct fishing; minimize bycatch, implement recovery plan	0		3395
2016	No direct fishing; minimize bycatch, implement recovery plan	0		3465
2017	MSY approach ($F \leq 0.17$)	≤ 3500		
2018	MSY approach ($F \leq 0.165$)	≤ 4570		

* Not applicable since 1997.

** Preliminary.

History of the catch and landings

Table 8 Haddock in Division 5.b. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings		Discards
3465 tonnes	Longliners 79%	Trawlers 21%	Negligible
	3465 tonnes		

Table 9 Haddock in Division 5.b. History of commercial catch and landings in subdivisions 5.b.1. and 5.b.2; both the official and ICES estimated values are presented for each country participating in the fishery. All weights are in tonnes. ICES estimated values used in the assessment (last column) are obtained by adding catch on the Faroe Bank (Subdivision 5.b.2) to the Faroe Plateau (Subdivision 5.b.1) and correction of conversion factors for round/gutted weight.

Year	Faroe Islands	England	France	Germany	Iceland	Norway	Scotland	Spain	Greenland	Russia	Total	Used in the assessment in Division 5.b
2000	15185	19	6	1	0	403	185	0	22	0	15821	15821
2001	15405	4	6	1	0	323	148	0	0	0	15887	15890
2002	24474	11	2	6	4	255	177	0	4	0	24933	24933
2003	26549	14	4	1	0	282	185	0	0	0	27035	27072
2004	22589	8	1	6	0	246	186	49	0	16	23101	23101
2005	20616	1	0	0	0	257	126	0	0	0	21000	20455
2006	16975	1	12	1	0	58	106	0	1	0	17154	17154
2007	12499	35	4	0	0	69	15	0	4	0	12626	12631
2008	7284	60	3	0	0	26	5	0	0	10	7388	7388
2009	5087	64	2	0	0	11	27	0	6	0	5197	5197
2010	5110	73	1	0	0	5	0	0	12	0	5201	5202
2011	3544	0	3	0	0	0	0	0	0	0	3547	3540
2012	2631	0	0	0	2	0	0	0	1	0	2634	2634
2013	2924	0	0	0	26	0	0	0	26*	0	2976	2950
2014	2827	350	0	0	0	3	74	0	0	0	3254	3276
2015	2940	449	0	0	0	6	0	0	0	0	3395	3395
2016	3202	252	0	0	0	11	0	0	0	0	3465	3465

* Not included in assessment catches.

Summary of the assessment

Table 10 Haddock in Division 5.b. Assessment summary. Weights are in tonnes.

Year	Recruitment (Age 1)	Recruit. 97.5 percentile	Recruit. 2.5 percentile	SSB	SSB 97.5 percentile	SSB 2.5 percentile	Catch	Mean F (Ages 3–7)	Mean F 97.5 percentile	Mean F 2.5 percentile
	thousands			tonnes			tonnes	per year		
1957	26530	50372	13972	50158	65958	38143	20995	0.49	0.67	0.36
1958	31896	58006	17538	50504	64310	39662	23871	0.64	0.83	0.49
1959	59499	106659	33191	45336	57139	35972	20239	0.63	0.82	0.49
1960	78895	141597	43959	45184	56562	36096	25727	0.73	0.93	0.57
1961	79881	144464	44170	42774	53713	34063	20831	0.63	0.81	0.49
1962	80073	144998	44219	47550	59688	37879	27151	0.69	0.89	0.54
1963	40716	73964	22413	48179	61041	38027	27571	0.73	0.94	0.57
1964	17917	32738	9806	44843	57396	35036	19490	0.53	0.7	0.41
1965	17307	31695	9451	44989	58022	34883	18479	0.58	0.76	0.44
1966	32436	59330	17733	41844	54112	32357	18766	0.55	0.72	0.42
1967	47006	86048	25678	37826	48389	29569	13381	0.46	0.61	0.35
1968	28386	51822	15549	40214	50474	32040	17852	0.49	0.64	0.37
1969	32633	59476	17904	46984	59171	37307	23272	0.56	0.73	0.43
1970	19878	36319	10880	49721	64123	38553	21361	0.5	0.66	0.37
1971	24055	43924	13174	49357	63386	38434	19393	0.5	0.68	0.38
1972	27202	49866	14839	45001	58149	34826	16485	0.45	0.61	0.33
1973	125775	237607	66578	42038	54032	32707	18035	0.4	0.56	0.29
1974	113579	214940	60017	43996	56264	34403	14773	0.31	0.43	0.22
1975	72284	137730	37936	57436	74136	44497	20715	0.26	0.36	0.19
1976	27482	53018	14245	81012	106595	61570	26211	0.31	0.42	0.22
1977	10019	22460	4469	82909	110126	62419	25555	0.37	0.52	0.27
1978	861	1943	381	80031	108481	59042	19200	0.3	0.43	0.21
1979	5802	11438	2943	62235	84356	45915	12424	0.21	0.31	0.14
1980	5975	12635	2825	57002	75956	42778	15016	0.27	0.39	0.19
1981	18569	39319	8770	51449	68857	38442	12233	0.25	0.35	0.18
1982	21309	45190	10048	40072	52014	30871	11937	0.37	0.51	0.27
1983	47375	100850	22255	37402	48661	28748	12894	0.33	0.46	0.24
1984	42570	83166	21791	41150	52991	31955	12378	0.29	0.41	0.21
1985	19972	42642	9355	49568	65427	37554	15143	0.31	0.44	0.22
1986	13301	28488	6211	54455	73141	40542	14477	0.29	0.41	0.21
1987	25604	55155	11886	54261	72469	40627	14882	0.33	0.46	0.24
1988	9544	20513	4440	48946	64963	36878	12178	0.28	0.38	0.2
1989	7429	15833	3486	41816	54419	32131	14325	0.31	0.43	0.22
1990	3338	7099	1570	34817	44855	27025	11726	0.35	0.49	0.25
1991	2908	6169	1371	26982	35049	20772	8429	0.32	0.45	0.23
1992	4293	9177	2008	20141	26505	15304	5476	0.27	0.38	0.19
1993	31254	62535	15620	17474	23010	13269	4026	0.27	0.38	0.19
1994	35270	61825	20121	16780	21704	12974	4252	0.23	0.32	0.17
1995	64456	114591	36256	18269	22897	14577	4948	0.26	0.35	0.19
1996	16474	26064	10412	41129	53116	31847	9642	0.31	0.41	0.23
1997	3897	6361	2388	78402	102958	59702	17924	0.36	0.48	0.27
1998	14894	23973	9253	75743	96930	59187	22210	0.52	0.68	0.4
1999	25027	39070	16031	54561	69084	43090	18482	0.51	0.67	0.4
2000	130456	203778	83516	41580	51496	33573	15821	0.41	0.54	0.31
2001	69922	109497	44650	51146	61275	42692	15890	0.36	0.47	0.27
2002	54446	88267	33584	82414	103067	65899	24933	0.37	0.48	0.28

Year	Recruitment (Age 1)	Recruit. 97.5 percentile	Recruit. 2.5 percentile	SSB	SSB 97.5 percentile	SSB 2.5 percentile	Catch	Mean F (Ages 3–7)	Mean F 97.5 percentile	Mean F 2.5 percentile
	thousands			tonnes			tonnes	per year		
2003	32299	52223	19976	98249	125991	76615	27072	0.43	0.56	0.33
2004	8371	13190	5313	83579	105276	66353	23101	0.48	0.63	0.37
2005	11939	19295	7387	69544	85655	56463	20455	0.42	0.55	0.32
2006	3379	5456	2093	51700	62919	42482	17154	0.42	0.55	0.32
2007	3343	5390	2073	35408	42811	29285	12631	0.39	0.51	0.29
2008	3416	5416	2155	23292	27915	19435	7388	0.34	0.44	0.25
2009	8156	13165	5052	17149	20490	14352	5197	0.3	0.4	0.23
2010	13947	22599	8608	12908	15260	10918	5202	0.41	0.53	0.31
2011	724	1193	439	9597	11394	8084	3540	0.4	0.53	0.3
2012	1748	2833	1079	11717	14701	9340	2634	0.32	0.43	0.24
2013	7244	11722	4477	13038	16703	10176	2950	0.35	0.46	0.26
2014	10045	16305	6188	11432	14349	9108	3276	0.32	0.44	0.24
2015	7171	11857	4338	14625	18193	11757	3395	0.3	0.41	0.22
2016	23162	40729	13172	15852	20461	12281	3465	0.28	0.4	0.19
2017	98629	271357	35848	19210	27952	13202				

Sources and references

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

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