

Haddock (*Melanogrammus aeglefinus*) in Subarea 4, Division 6.a, and Subdivision 20 (North Sea, West of Scotland, Skagerrak)

ICES stock advice

Please note: The present advice replaces the advice given in June 2017 for catches in 2018.

ICES advises that when the MSY approach is applied, catches in 2018 should be no more than 48 990 tonnes.

Stock development over time

Fishing mortality (F) has been fluctuating above F_{MSY} for most of the time-series and was above F_{MSY} in 2016. Spawning-stock biomass (SSB) has been mostly above $MSY B_{trigger}$ since 2002. Recruitment since 2000 has been characterized by a low average level with occasional larger year classes, the size of which is diminishing. The 2014 recruitment estimate, though higher than recent low recruitment, is still below the long-term average.

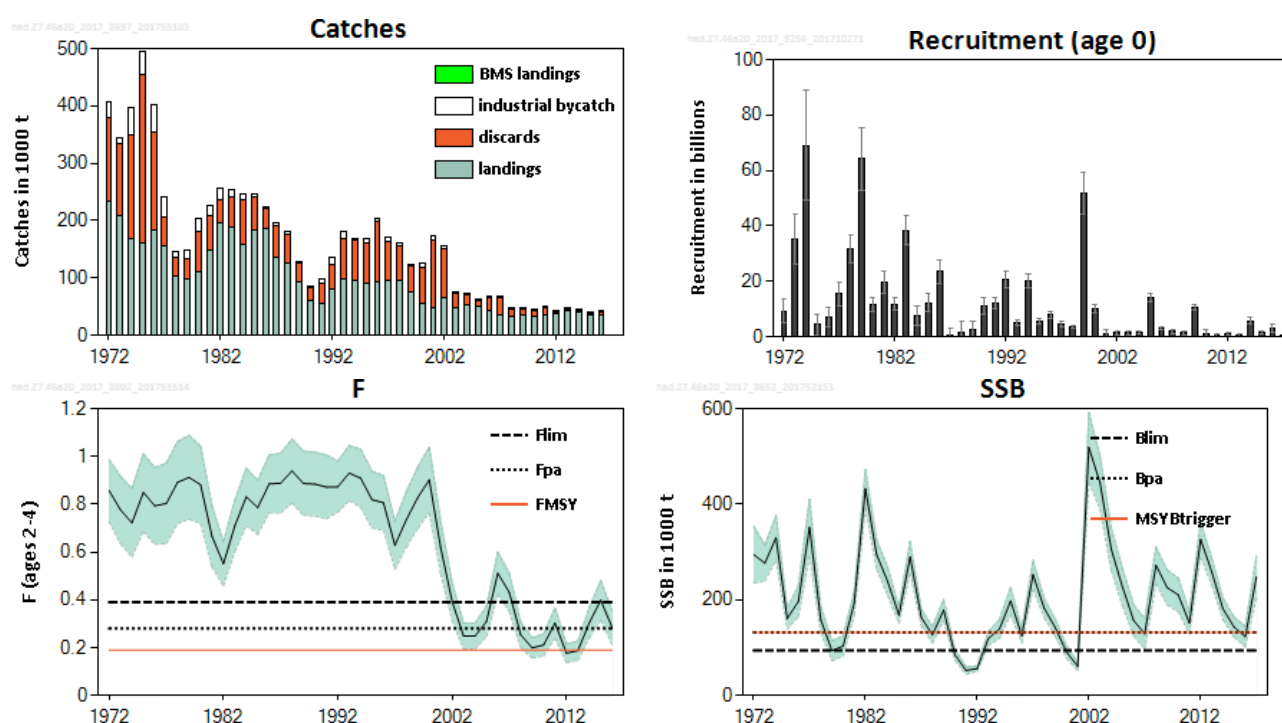


Figure 1 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Summary of the stock assessment. Shaded areas (F, SSB) and error bars (R) indicate ± 2 standard error (approximate 95% confidence intervals).

Stock and exploitation status

Table 1 Haddock in Subarea 4, Division 6.a, and Subdivision 20. 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}	✘	✘	✘	MSY $B_{trigger}$	✔	✘	✔	Above trigger
Precautionary approach	F_{pa} , F_{lim}	○	✘	○	B_{pa} , B_{lim}	✔	○	✔	Full reproductive capacity
Management plan	F_{MGT}	—	—	—	B_{MGT}	—	—	—	Not applicable

Catch options

Table 2 Haddock in Subarea 4, Division 6.a, and Subdivision 20. The basis for the catch options.

Variable	Value	Source	Notes
F ages 2–4 (2017)	0.183	ICES (2017a)	TAC constraint for wanted catch, based on TAC for 2017 (39409 t). The F corresponds to the total catch.
SSB (2018)	229910	ICES (2017a)	Short-term forecast (STF); in tonnes.
R _{age 0} (2017)	1623	ICES (2017a)	RCT3 output; in millions.
R _{age 0} (2018)	4236	ICES (2017a)	Assessment model forecast; in millions.
Total catch (2017)	44965	ICES (2017a)	Sum of catch components, assuming relative contribution of wanted catch to the total catch by age = average 2014–2016; in tonnes.
Wanted catch (2017)	39409	ICES (2017a)	TAC 2017; in tonnes.
Unwanted catch (2017)	5556	ICES (2017a)	STF, relative contribution to total catch by age = average 2014–2016; in tonnes.
Industrial bycatch (2017)	0	ICES (2017a)	STF, relative contribution to total catch by age = average 2014–2016; in tonnes.

Table 3 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Annual catch options. All weights are in tonnes.

Basis	Total catch (2018)	Wanted catch* (2018)	Unwanted catch* (2018)	IBC** (2018)	F _{total} (2018)	F _{wanted} (2018)	F _{unwanted} (2018)	F _{IBC} (2018)	SSB (2019)	% SSB change ***	% TAC change ^, ^^
ICES advice basis											
MSY approach: F _{MSY}	48990	43437	5552	0.000	0.194	0.166	0.028	0	266941	16%	10%
Other options											
F = 0	0	0	0	0	0	0	0	0	315692	37%	-100%
F _{pa}	67145	59464	7681	0.000	0.27	0.24	0.039	0	249102	8%	51%
F _{lim}	90158	79704	10454	0.000	0.38	0.33	0.054	0	226609	-1%	102%
SSB (2019) = B _{lim}	192923	166695	26228	0.000	1.26	1.08	0.179	0	94000	-43%	323%
SSB (2019) = B _{pa}	175109	152807	22302	0.000	0.98	0.84	0.138	0	132000	-36%	288%
SSB (2019) = MSY B _{trigger}	175109	152807	22302	0.000	0.98	0.84	0.138	0	132000	-36%	288%
F = F ₂₀₁₇	46353	41106	5247	0.000	0.183^^	0.15	0.026	0	269537	17%	4.3%
Mixed fisheries options – <i>The mixed-fisheries considerations were published as part of the advice in June 2017 and have not been updated.</i>											
A: Max.	220293				1.27				106861	-54	
B: Min.	41436				0.160				266155	16	
C: HAD	50284				0.19				267716	16	
D: POK	75234				0.34				208920	-9	
E: SQ effort	64286				0.27				238305	4	
F: Value	54641				0.22				253692	10	
G: Range	50056				0.19				267865	17	

* “Wanted” and “unwanted” catch are used to describe fish that would be landed and discarded in the absence of the EU landing obligation, based on discard rate estimates for 2014–2016. Unwanted catch includes discards and below minimum size (BMS) landings.

** Industrial bycatch (IBC) is based on the average proportion of the total catch for 2014–2016. Values are small, but not zero.

*** SSB 2019 relative to SSB 2018.

^ Wanted catch in 2018 relative to TAC in 2017: Subdivision 20 (2069 t) + Subarea 4 (33 643 t) + Division 6.a (3697 t) = 39 409 t.

^^ Version 2: Correct F = F₂₀₁₇ value and corresponding % TAC change

Mixed-fisheries assumptions (note: “fleet’s stock share” is used to describe the share of the fishing opportunities for each particular fleet, which has been calculated based on the single-stock advice for 2018 and the historical proportion of the stock landings taken by the fleet):

- A. Maximum scenario: Each fleet stops fishing when its last stock share is exhausted.
- B. Minimum scenario: Each fleet stops fishing when its first stock share is exhausted.
- C. HAD: Each fleet stops fishing when its individual haddock share is exhausted.
- D. POK: Each fleet stops fishing when its individual saithe share is exhausted.
- E. SQ (*status quo*) effort scenario: The effort of each fleet in 2017 and 2018 is as in 2016.
- F. Value scenario: The effort of each fleet is equal to the weighted average of the efforts required to catch the fleet’s quota share of each of the stocks, where the weights are the relative catch values of each stock in the fleet’s portfolio.
- G. Range scenario: where the potential for TAC mismatches in 2018 are minimized within the F_{MSY} range, for the demersal fish stocks for which such a range is available (cod.27.47d20; had.27.46a20; pok.27.3a46; ple.27.420; ple.27.7d; sol.27.4; sol.27.7d).

Basis of the advice

Table 4 Haddock in Subarea 4, Division 6.a, and Subdivision 20. The basis of the advice.

Advice basis	ICES MSY approach.
Management plan	ICES is not aware of of any agreed precautionary management plan for haddock for the full stock area.

Quality of the assessment

Catch data have been provided to ICES since 2012 through sampling programmes such as Fully Documented Fisheries (FDF), and through increased coverage by the Scottish industry/science observer sampling scheme.

The assessment is based on the North Sea (Subarea 4 and Subdivision 20) survey indices, which are considered to be sufficiently representative of the whole stock. No combined survey index for the whole area is available. The differences from the 2015 assessment result from an alternative model configuration that reduces the retrospective bias, and the addition of the new data (ICES, 2016a).

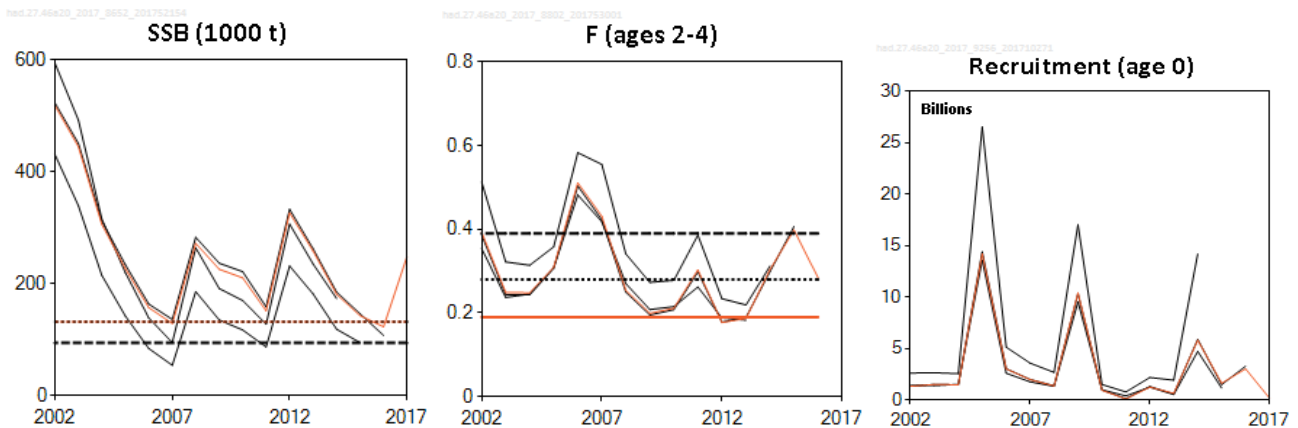


Figure 2 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Historical assessment results.

Issues relevant for the advice

Based on the survey information (IBTS Q3) that has become available in summer 2017, the advice has been updated from that released in June 2017 (ICES, 2017b).

ICES previously provided advice on the F_{MSY} range for this stock in 2015 (ICES, 2015). F_{MSY} was revised in 2016 (ICES, 2016a) and 2017 (ICES, 2017a), and the F_{MSY} range was updated as follows:

Description	Value	Source
F_{MSY} lower	0.167	ICES (2017a)
F_{MSY} upper	0.194	ICES (2017a)

More abundant year classes were produced prior to 2000; however, recruitment has tended to be consistently lower since then. Because of the larger 2014 year class, the SSB increased from 2016 to 2017 and is now above $MSY B_{trigger}$. The principal driver of the stock is the occasional larger year classes, resulting in strongly fluctuating advice. The magnitude of these strong year classes is decreasing.

The assumption for the forecast is based on a TAC constraint derived from the 2017 TAC. Assuming *status quo* F for 2017 would imply a TAC overshoot of approximately 22 000 tonnes, which is considered unlikely.

It is expected that under the EU landing obligation, fish below minimum size that would formerly have been discarded would now be reported as below minimum size (BMS) landings in logbooks. However, BMS landings reported to ICES may be lower than expected for several reasons: fish caught below minimum size could either not have been landed and not recorded in logbooks, or landed but not recorded as BMS; additionally, BMS landings recorded in logbooks may not have been reported to ICES.

In the case of haddock, there is no indication that fish that would formerly have been discarded are being reported as BMS, based on the observation that BMS landings reported to ICES are currently 0.47% of total catch, whereas estimates of unwanted catch from observer programmes are 18% of the total catch. The majority of the catch for haddock comes

from the Scottish fleet where all recorded BMS have been reported to ICES. This indicates that the primary reason for low BMS landings is that caught fish of below minimum size are not being landed and subsequently not recorded in logbooks.

The EU–Norway management strategy has not been evaluated against the current reference points.

Results from a North Sea mixed-fisheries analysis are presented in ICES (2017c); this analysis has not been updated. The analysis for 2018, assuming a strictly implemented discard ban (corresponding to the “Minimum” scenario), indicated that whiting would be the most limiting stock, being estimated to constrain 24 out of 42 fleet segments. Haddock is the second most limiting stock, constraining eight fleet segments. Additionally, if Norway lobster (*Nephrops*) was managed by separate TACs for the individual functional units (FUs), Norway lobster in FU 6 would be considered the most limiting stock for ten fleet segments. Conversely, in the “Maximum” scenario, saithe and Eastern Channel plaice would be the least limiting for 20 and 11 fleet segments, respectively. Finally, if Norway lobster was managed by separate TACs, Norway lobster in FUs 7, 5, 33, and outside the FUs in Subarea 4 would be the least limiting for nine, two, one, and two fleet segments, respectively. For those demersal fish stocks for which the F_{MSY} range is available, a “Range” scenario is presented that minimizes the potential for TAC mismatches in 2018 within the F_{MSY} range. This scenario returns a fishing mortality by stock which, if used for setting single-stock fishing opportunities for 2018, may reduce the gap between the most and the least restrictive TACs, thus reducing the potential for quota over- and undershoot. This “Range” scenario suggests that the potential for mixed-fisheries mismatch would be lowered with a 2018 TAC in the lower part of the F_{MSY} range for Eastern English Channel plaice and saithe, and in the upper part of the range for cod and North Sea plaice.

Reference points

Table 5 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	132000 t	B_{pa}	ICES (2016a)
	F_{MSY}	0.194	EQsim analysis, based on the recruitment period 2000–2015	ICES (2017a)
Precautionary approach	B_{lim}	94000 t	Lowest estimated SSB that resulted in high recruitment (1979)	ICES (2016a)
	B_{pa}	132000 t	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$	ICES (2016a)
	F_{lim}	0.384	EQsim analysis, based on recruitment period 2000–2015	ICES (2016a)
	F_{pa}	0.274	$F_{lim} \times \exp(-1.645 \times 0.2) \approx F_{lim} / 1.4$	ICES (2016a)
Management plan	SSB_{mgt}	100000 t, 140000 t	Former $B_{trigger}$ values B_{lim} and B_{pa} .	EU–Norway management strategy
	F_{mgt}	0.3	Management strategy evaluation.	EU–Norway management strategy

Basis of the assessment

Table 6 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016b)
Assessment type	Age-based analytical assessment (TSA; ICES, 2017a) that uses catches in the model and in the forecast
Input data	Commercial catches (international landings, ages from catch sampling), two survey indices: IBTS Q1, IBTS Q3. Maturity data are assumed fixed over time and knife-edged at age 3, while natural mortality data vary with age and over time (estimates updated in ICES, 2015).
Discards, BMS landings, and bycatch	Included in the assessment, data series from the main fleets (covering around 90% of the landings). BMS landings, where reported, are included with discards as unwanted catch in the assessment from 2016.
Indicators	None
Other information	Last benchmarked in 2014 (ICES, 2014), at which it was decided that the stocks in the North Sea and Skagerrak, and West of Scotland, previously assessed separately, should now be assessed as one stock. WKHAD (ICES, 2014) also updated biological parameters and selected a new assessment model. The 2016 interbenchmark protocol (ICES, 2016a) corrected an error in the computer code and derived a model configuration that reduced the retrospective basis in the extant assessment model, and re-estimated the reference points accordingly.
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7a Haddock in Subarea 4. ICES advice and official landings. All weights are in tonnes. Values of landings, discards, and catches for the period 1987 to 2014 are presented to the nearest thousand tonnes.

Year	ICES advice	Predicted landings corresp. to advice	Predicted catch corresp. to advice ^	Agreed TAC	Official landings	ICES landings	ICES discards	BMS reported to ICES	ICES Indust. bycatch	ICES Total
1987	80% of F(85)	105000		140000	109000	108000	59000		4000	172000
1988	77% of F(86); TAC	185000		185000	105000	105000	62000		4000	171000
1989	Reduce decline in SSB; TAC; protect juveniles	68000		68000	64000	76000	26000		2000	104000
1990	80% of F(88); TAC	50000		50000	43000	51000	33000		3000	87000
1991	70% of effort (89)			50000	45000	45000	40000		5000	90000
1992	70% of effort (89)			60000	51000	70000	48000		11000	129000
1993	70% of effort (89)			133000	80000	80000	80000		11000	170000
1994	Significant reduction in effort; mixed fishery			160000	87000	81000	65000		4000	150000
1995	Significant reduction in effort; mixed fishery			120000	75000	75000	57000		8000	140000
1996	Mixed fishery to be taken into account			120000	75000	76000	73000		5000	154000
1997	Mixed fishery to be taken into account			114000	73000	79000	52000		7000	138000
1998	No increase in F	100300		115000	72000	77000	45000		5000	128000
1999	Reduction of 10% F(95–97)	72000		88600	64000	64000	43000		4000	111000
2000	F less than F_{pa}	< 51700		73000	47000	45000	47000		8000	100000
2001	F less than F_{pa}	< 58000		61000	40000	39000	118000		8000	165000
2002	F less than F_{pa}	< 94000		104000	54000	53000	45000		4000	101000
2003	No cod catches	-		52000	42000	42000	23000		1000	76000
2004	Mixed-fisheries considerations / F should be below F_{pa}	No forecast *		85000	48000	47000	17000		1000	65000
2005	Mixed-fisheries considerations / F should be below F_{pa}	92 000*		66000	31000	48000	10000		0	57000
2006	Mixed-fisheries considerations / $F < 0.3$	39 000*		52000	36000	36000	17000		0	55000
2007	Mixed-fisheries considerations / $F < 0.3$	554 00*		55000	31000	31000	30000		0	61000
2008	Mixed-fisheries considerations / 15% TAC reduction	49300 **, **		46000	30000	29000	13000		0	42000
2009	Mixed-fisheries considerations / Apply management plan	44700 **, **		42000	31000	31000	10000		0	41000
2010	Mixed-fisheries considerations / Apply management plan	38000 **, **		36000	28000	28000	10000		0	38000
2011	See scenarios	-		34000	26000	34000	11000		0	46000

Year	ICES advice	Predicted landings corresp. to advice	Predicted catch corresp. to advice ^	Agreed TAC	Official landings	ICES landings	ICES discards	BMS reported to ICES	ICES Indust. bycatch	ICES Total
2012	Apply management plan	41575 **		39000	30000	30000	4000		1000	35000
2013	Apply management plan	47811 **		45041	37000 ***	39000 ***	2000 ***		0 ***	41000 ***
2014	Apply management plan	38201 *		38284	35000	35000	4000		65 ***	39000
2015	(November update) MSY approach		68690	40711	35520	30165	4151		18	34335
2016	MSY approach		≤ 59945	61933	30061	29687	6099	191	29	36024
2017	MSY approach		≤ 39461	33643						
2018	MSY approach		≤ 48990							

* The exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.

** Including industrial bycatch.

*** Subarea 4 and Subdivision 20 combined.

^ Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 20.

Table 7b Haddock in Subdivision 20. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in tonnes. Values of landings, discards, and catches for the period 1987 to 2014 are presented to the nearest hundred tonnes.

Year	ICES advice	Predicted landings corresp. to advice	Predicted catch corresp. to advice **	Agreed TAC	Official landings	ICES landings	ICES discards	BMS reported to ICES	ICES Indust. bycatch	ICES Total
1987	Precautionary TAC	-		11500		3800			1400	5300
1988	Precautionary TAC	-		10000		2900			1500	4300
1989	Precautionary TAC	-		10000		4100			400	4500
1990	Precautionary TAC	-		10000		4100			2000	6100
1991	Precautionary TAC	4600		4600		4100			2600	6700
1992	TAC	4600		4600		4400			4600	9000
1993	Precautionary TAC	-		4600		2000			2400	4400
1994	Precautionary TAC	-		10000		1800			2200	4000
1995	If required, precautionary TAC; link to North Sea	-		10000		2200			2200	4400
1996	If required, precautionary TAC; link to North Sea	-		10000		3100			2900	6100
1997	Combined advice with North Sea	-		7000		3400			600	4000
1998	Combined advice with North Sea	4700		7000		3800			300	4000
1999	Combined advice with North Sea	3400		5400		1400			300	1700
2000	Combined advice with North Sea	< 1800		4500		1500			600	2100
2001	Combined advice with North Sea	< 2000		4000		1900			200	2100
2002	Combined advice with North Sea	< 3000		6300		4100			60	4100
2003	Combined advice with North Sea	-		3200		1800	200		n/a	1800
2004	Combined advice with North Sea / F should be below F_{pa}	No forecast		4900		1400	100		n/a	1400
2005	Combined advice with North Sea / F should be below F_{pa}	-		4000		800	200		0	800

Year	ICES advice	Predicted landings corresp. to advice	Predicted catch corresp. to advice **	Agreed TAC	Official landings	ICES landings	ICES discards	BMS reported to ICES	ICES Indust. bycatch	ICES Total
2006	Combined advice with North Sea / $F < 0.3$	-		3200		1500	1000		0	1500
2007	Combined advice with North Sea / $F < 0.3$	-		3400		1600	800		0	2500
2008	Combined advice with North Sea / 15% TAC reduction	2900		2900		1400	600		0	2000
2009	Combined advice with North Sea / Apply management plan	-		2600		1500	600		0	2100
2010	Combined advice with North Sea / Apply management plan	-		2200		1300	600		0	1900
2011	See scenarios	-		2100		9900	1700		0	11600
2012	Apply management plan North Sea	-		2095	2500	2600	700		0	3300
2013	Apply management plan North Sea	-		2770	200	*	*		*	*
2014	Apply management plan North Sea	2438		2355	2100	2300	100		*	2400
2015	(November update) MSY approach		68690	2504	1429	1419	86		3	1507
2016	MSY approach		≤ 59945	3926	1300	1212	97	0	7	1319
2017	MSY approach		≤ 39461	2069						
2018	MSY approach		≤ 48990							

* Combined in Table 7a.

** Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 20.

n/a = not available.

Table 7c Haddock in Division 6.a. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in tonnes. Values for the period 1987 to 2014 are presented to the nearest thousand (official landings) or nearest hundred (ICES landings, discards, and total) tonnes.

Year	ICES advice/ Single-stock exploitation boundaries from 2004 onwards *	Predicted landings corresp. to advice	Predicted catch corresp. to advice^^^	Agreed TAC	Official landings	ICES landings	ICES discards	BMS reported to ICES	ICES Indust. bycatch	ICES Total
1987	Reduce F towards F_{max}	20000		32000	27000	27000	16200			43200
1988	No increase in F; TAC	25000		35000	21000	21200	9500			30700
1989	80% of $F(87)$; TAC	15000		35000	24000	16700	3000			19700
1990	80% of $F(88)$; TAC	14000		24000	13000	10100	5400			15500
1991	70% of effort (89)	-		15200	10000	10600	8700			19200
1992	70% of effort (89)	-		12500	7000	11400 **	9300 **			20500 **
1993	70% of effort (89)	-		17600	13000	19100 **	16800 **			35900 **
1994	30% reduction in effort	-		16000	9000	14200 **	11100 **			25000 **
1995	Significant reduction in effort	-		21000	13000	12400	8600			20900
1996	Significant reduction in effort	-		22900	13000	13500	11400			24800
1997	Significant reduction in effort	-		20000	13000	12900	6500			19300
1998	No increase in F	20800 ***		25700	14000	14400	5500			19900

Year	ICES advice/ Single-stock exploitation boundaries from 2004 onwards *	Predicted landings corresp. to advice	Predicted catch corresp. to advice ^{^^}	Agreed TAC	Official landings	ICES landings	ICES discards	BMS reported to ICES	ICES Indust. bycatch	ICES Total
1999	F reduced to F_{pa}	14300 ***		19000	11000	10500	4900			15300
2000	Maintain F below F_{pa}	< 14900 ***		19000	7000	7000	7900			14900
2001	Reduce F below F_{pa}	< 11200 ***		13900	7000	6870	6600			13400
2002	Reduce F below F_{pa}	< 14100 ***		14100	7000	7100	8900			16000
2003	No cod catches	-		8700	4900	5300	4100			9400
2004	F_{pa} *	12200		6500	3000	3900	3700			7600
2005	$0.75 \times F_{pa}$ *	7600		7600	3200	3800	2900			6700
2006	$0.7 \times F_{pa}$ *	8000		7810	5700	6300	4600			10900
2007	$0.87 \times F_{pa}$ *	7200		7200	3700	3800	4000			7700
2008	$SSB > B_{pa}$ *	4200		6120	2800	2800	1200			4100
2009	No fishing and recovery plan*	0		3520	2800	2900	1600			4500
2010	No fishing and recovery plan	0		2670	2900	3000	2800			5800
2011	See scenarios	0		2005	1700	1700	1500			3300
2012	MSY framework ^^	5600^		6015	5000	5100	500			5600
2013	MSY framework	3100		4211	4700	4600	1000			5600
2014	MSY approach	6432 ^^		3988	4000	4000	800			4800
2015	(November update) MSY approach		68690	4536	3888	1347	0			5235
2016	MSY approach		≤ 59945	6462	4253	4247	1553	9	0	5808
2017	MSY approach		≤ 39461	3697						
2018	MSY approach		≤ 48990							

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.

** Adjusted for misreporting.

*** For Division 6.a only.

^ An error in this advice was detected in 2012 (the previous value of 10.2 thousand tonnes was incorrect).

^^ This value (6432) refers to total catch, including discards. Therefore, it is not directly comparable to the value advised for 2013 (3100), which referred only to landings.

^^^ Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 20.

History of the catch and landings

Table 8 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Wanted catch			Unwanted catch		Industrial bycatch
	Demersal trawl and seine >100 mm 97%	Trawl 70–99 mm < 1%	Others 3%	Discards	BMS	
42745 tonnes	35058 tonnes			7449 tonnes	201 tonnes	37 tonnes

Table 9 Haddock in Subarea 4, Division 6.a, and Subdivision 20. History of official commercial catch and landings, along with ICES estimates for individual areas. All weights are in tonnes.

Subdivision 20										
Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Germany	206	87	105	65	102	120	90	114	103	125
Denmark	1054	1052	1263	1139	1661	1916	1456	1763	1057	973
Netherlands	0	0	0	1	0	0	5	6	4	2
Norway	152	170	121	81	125	239	223	81	63	70
Portugal	37	0	0	0	0	0	0	0	0	0
Sweden	278	276	166	126	198	210	217	219	202	129
UK	0	0	0	0	0	0	3	0	0	0
Subarea 4										
Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Belgium	178	112	108	78	106	78	78	98	45	53
Germany	727	393	657	634	575	548	677	677	599	554
Denmark	645	501	552	725	697	947	1283	1079	1426	1213
Spain	0	0	0	0	0	0	0	0	0	0
Faroes	0	3	32	5	0	0	0	0	0	0
France	498	448	135	276	320	175	177	209	101	121
Greenland	8	0	4	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0
Iceland	0	0	0	0	0	0	0	0	0	0
Netherlands	55	29	24	41	71	191	172	99	43	146
Norway	1706	1482	1278	1126	1195	1069	1661	2705	2004	1484
Poland	8	16	0	0	0	0	0	0	0	0
Portugal	0	0	0	0	0	0	0	0	0	0
Sweden	130	83	141	90	128	103	113	154	135	117
UK	26717	27365	28393	24983	23343	0	32993	29758	25852	26374
Division 6.a										
Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Germany	0	1	0	1	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	0	0	2
Spain	5	10	21	28	36	15	0	19	9	33
Faroes	2	0	0	0	0	0	0	0	0	0
France	211	151	136	89	73	32	51	67	41	62
Ireland	759	879	297	396	290	845	746	653	768	1033
Netherlands	0	0	0	0	0	0	0	0	0	28
Norway	16	28	18	9	4	0	6	15	7	5
UK	2780	1776	2380	2415	1364	0	3878	3230	3051	3090
Northern Shelf										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Official landings	36172	34862	35831	32308	30288	6488	43830	40945	35520	35614
ICES landings	34672	33058	35590	31940	36570	38162	43681	41143	35316	35058
ICES discards	32651	14503	12326	13071	13067	5032	3038	5090	6255	7449
ICES IBC	48	199	52	431	24	1	54	65	21	37
ICES BMS										201
ICES total catch	67371	47759	47968	45442	49661	43195	46772	46295	41571	42745
TAC 4	54640	46444	42110	35794	34057	39000	45041	38284	40711	61933
TAC 3.a	3360	2856	2590	2201	2100	2095	2770	2355	2504	3926
TAC 6.a	7200	6120	3520	2670	2005	6015	4211	3988	4536	6462
Total TAC	65200	55420	48220	40665	38162	47110	52022	44627	47751	72321

Summary of the assessment

Table 10 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Assessment summary. Weights are in tonnes.

Year	Recruitment Age 0	High	Low	SSB	High	Low	Wanted catch*	Unwanted catch **,**	Industrial bycatch	F Ages 2-4	High	Low
	thousands			tonnes								
1972	9333067	13687941	4978193	294731	354116	235347	234019	144366	29585	0.86	0.99	0.73
1973	35180835	44003790	26357880	276668	314261	239075	207489	126105	11267	0.78	0.92	0.64
1974	69073223	88924636	49221811	329950	376366	283534	167528	181802	47505	0.72	0.87	0.58
1975	4518937	8275531	762342	160999	182863	139134	160271	293321	41487	0.85	1.01	0.69
1976	7151096	10679988	3622204	196556	228526	164586	184421	169776	48163	0.79	0.95	0.63
1977	15461105	19753551	11168659	351894	410941	292848	156639	48732	35022	0.80	0.97	0.64
1978	31678298	36539263	26817333	158997	186063	131931	102970	32860	10903	0.89	1.06	0.72
1979	64187861	75461338	52914383	93694	114800	72588	97896	35054	16240	0.91	1.09	0.74
1980	11660364	14219015	9101713	103231	124009	82454	111371	68831	22472	0.88	1.04	0.72
1981	19597462	23608796	15586128	192964	218147	167781	147806	61683	17041	0.67	0.79	0.54
1982	11798299	13888385	9708213	432753	472655	392851	195456	41297	19383	0.55	0.64	0.46
1983	38263370	43580620	32946120	294743	325198	264289	188754	51584	12898	0.71	0.82	0.60
1984	7488605	10866393	4110817	238229	267575	208883	158205	79012	10080	0.83	0.95	0.71
1985	12354367	15377134	9331600	168006	184783	151228	182946	58373	5998	0.79	0.90	0.67
1986	23431090	27799915	19062266	289540	322153	256928	185137	36063	2643	0.89	1.01	0.77
1987	462922	3257038	0	163286	180829	145743	135022	55674	4410	0.89	1.01	0.76
1988	1429202	5730113	0	126846	143913	109779	126227	49833	4002	0.94	1.07	0.81
1989	2610815	5734207	0	178319	200722	155916	92840	32453	2410	0.89	1.02	0.75
1990	11064560	14259297	7869822	85305	96936	73673	61605	22548	2589	0.88	1.02	0.75
1991	12227448	14106847	10348049	52413	60348	44479	55208	36610	5386	0.87	1.01	0.74
1992	20442383	23410917	17473850	55976	61712	50241	81566	42477	10927	0.87	0.98	0.77
1993	5175016	6108526	4241506	119000	133931	104069	98631	70748	10766	0.93	1.05	0.82
1994	20115763	22837668	17393857	139202	158702	119702	95141	70668	3576	0.91	1.03	0.79
1995	5564074	6460180	4667969	197776	226127	169424	89859	71262	7695	0.82	0.94	0.70
1996	7877682	9204273	6551092	124839	139420	110259	92615	107207	5000	0.81	0.92	0.69
1997	4659272	5583442	3735101	252753	282611	222894	95391	67879	6684	0.63	0.73	0.53
1998	3478206	4135062	2821349	182511	202160	162862	95472	61399	5101	0.74	0.85	0.62
1999	51745407	59313704	44177110	141479	159302	123655	76009	43562	3835	0.83	0.96	0.70
2000	10121234	11512368	8730100	90949	103771	78126	54504	64185	8134	0.90	1.04	0.77
2001	956807	2464128	0	60830	69494	52166	47592	117882	7879	0.62	0.73	0.51
2002	1327967	2114186	541748	518942	591936	445948	65405	86051	3717	0.39	0.47	0.31
2003	1499661	2211849	787472	445025	500383	389668	47282	25975	1150	0.25	0.30	0.194
2004	1470407	1916861	1023952	306241	350305	262178	51896	20020	554	0.25	0.30	0.194
2005	14198200	15708097	12688303	227102	266386	187819	51528	12389	168	0.31	0.37	0.25
2006	3009409	3433965	2584854	157195	189380	125009	43334	23094	535	0.51	0.60	0.42
2007	1972905	2688854	1256955	128666	160658	96673	34672	32651	48	0.43	0.51	0.35
2008	1361509	1971316	751702	272277	310283	234272	33058	14503	199	0.25	0.31	0.20
2009	10391533	11433555	9349511	225693	262035	189352	35590	12326	52	0.199	0.24	0.157
2010	933840	2402766	0	210432	245677	175188	31940	13071	431	0.21	0.26	0.165
2011	88555	1185482	0	151515	174764	128266	36570	13067	24	0.30	0.37	0.24
2012	1242318	1722983	761654	326543	363127	289959	38162	5032	1	0.177	0.22	0.137
2013	632681	1086246	179117	258617	286327	230907	43734	3305	54	0.187	0.23	0.147
2014	5809046	6882291	4735801	181098	204075	158122	41143	5090	65	0.30	0.37	0.24
2015	1625860	2148057	1103663	142921	163725	122116	35295	6255	21	0.40	0.48	0.32
2016	3013286	4376169	1650404	122886	144513	101259	35058	7650	37	0.28	0.36	0.21
2017	1623000***			248592	291864	205319						

* ICES estimates of catch.

** Unwanted catch values include discards and BMS landings from 2016.

*** RCT3 estimate.

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