

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

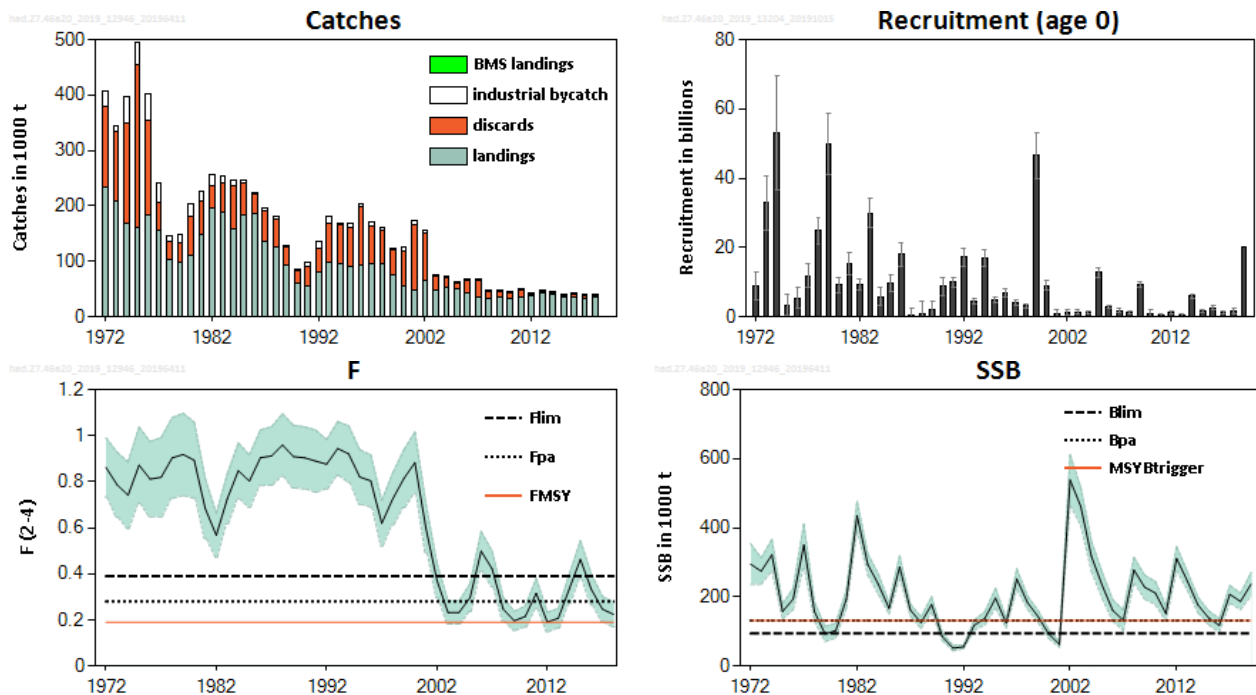
### ICES advice on fishing opportunities

Please note: The present advice replaces the advice given in August 2019 for catches in 2020.

ICES advises that when the MSY approach is applied, total catches in 2020 should be no more than 41 818 tonnes.

### Stock development over time

Fishing mortality (F) has declined since the beginning of the 2000s, but it has been above  $F_{MSY}$  for the entire time-series. Spawning-stock biomass (SSB) has been above  $MSY B_{trigger}$  in most of the years since 2002. Recruitment since 2000 has been low with occasional larger year classes. The 2019 year class is estimated to be the largest since 2000.



**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 95% confidence intervals.

### Stock and exploitation status

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

**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		
		2016	2017	2018	2017	2018	2019
Maximum sustainable yield	$F_{MSY}$	✘	✘	✘ Above	$MSY B_{trigger}$	✔	✔ Above trigger
Precautionary approach	$F_{pa}, F_{lim}$	○	✔	✔ Harvested sustainably	$B_{pa}, B_{lim}$	✔	✔ Full reproductive capacity
Management plan	$F_{MGT}$	—	—	— Not applicable	$B_{MGT}$	—	— Not applicable

### Catch scenarios

**Table 2** Haddock in Subarea 4, Division 6.a, and Subdivision 20. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F ages 2–4 (2019)	0.190	F based on TAC for 2019 of 33 956 tonnes plus industrial bycatch of 32 tonnes
SSB (2020)	204 041	Short-term forecast (STF), in tonnes
R <sub>age 0</sub> (2019)	20 288 000	RCT3, in thousands
R <sub>age 0</sub> (2020)	3 287 400	Assessment model forecast, in thousands
Total catch, excluding industrial bycatch (2019)	33 956	TAC 2019; TAC constraint applied to human consumption fishery catch only, in tonnes
Wanted catch (2019)	29 856	STF, relative contribution to total catch by age = average 2016–2018, in tonnes
Unwanted catch (2019)	4100	STF, relative contribution to total catch by age = average 2016–2018, in tonnes
Industrial bycatch (2019)	32	STF, relative contribution to total catch by age = average 2016–2018, 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 (2020)	Wanted catch * (2020)	Unwanted catch * (2020)	IBC ** (2020)	HCF ** catch (2020)	F <sub>total</sub> (ages 2–4) (2020)	F <sub>wanted</sub> (ages 2–4) (2020)	F <sub>unwanted</sub> (ages 2–4) (2020)	F <sub>IBC</sub> (ages 2–4) (2020)	SSB (2021)	% SSB change ***	% TAC change ^	% Advice change ^^
ICES advice basis													
MSY approach: F <sub>MSY</sub>	41818	25630	16157	30	41788	0.194	0.163	0.030	0.00020	196886	-3.5%	23%	23%
Other scenarios													
F = MAP <sup>^^^</sup> F <sub>MSY lower</sub>	36257	22288	13939	30	36227	0.167	0.141	0.026	0.00020	201199	-1.39%	7%	7%
F = MAP F <sub>MSY upper</sub> <sup>#</sup>	41818	25630	16157	30	41788	0.194	0.163	0.030	0.00020	196886	-3.5%	23%	23%
F = 0 (IBC only)	32	0	0	32	0	0	0	0	0.00020	230173	12.8%	-100%	-100%
F <sub>pa</sub>	57798	35099	22671	29	57769	0.274	0.23	0.043	0.00020	184689	-9.5%	70%	70%
F <sub>lim</sub>	78562	47057	31478	28	78534	0.384	0.32	0.060	0.00020	169349	-17.0%	131%	131%
SSB (2021) = B <sub>lim</sub>	175523	93613	81888	23	175501	1.06	0.89	0.166	0.00020	94000	-54%	417%	417%
SSB (2021) = B <sub>pa</sub> = MSY B <sub>trigger</sub>	129303	74032	55247	25	129279	0.69	0.58	0.109	0.00020	132000	-35%	281%	281%
F <sub>2019</sub>	40938	25103	15805	30	40908	0.190	0.160	0.030	0.00020	197566	-3.2%	20%	21%
Rollover TAC	33956	20899	13027	30	33926	0.156	0.131	0.024	0.00020	202994	-0.51%	0%	0%

\* “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 2016–2018. Unwanted catch includes discards and below minimum size (BMS) landings.

\*\* IBC = Industrial bycatch, HCF = Human Consumption fishery.

\*\*\* SSB 2021 relative to SSB 2020.

^ Human Consumption fishery (HCF) catch in 2020 relative to TAC in 2019: Subdivision 20 (1 780 t) + Subarea 4 (28 950 t) + Division 6.a (3 226 t) = 33 956 t.

^^ Total catch 2020 relative to advice value 2019 (33 956 t).

^^^ EU multiannual plan (MAP) for the North Sea (EU, 2018).

# For this stock, F<sub>MSY upper</sub> = F<sub>MSY</sub>.

The change in advice (+23%) is due to an incoming year class that is substantially larger than the recruitment seen in the most recent years for this stock.

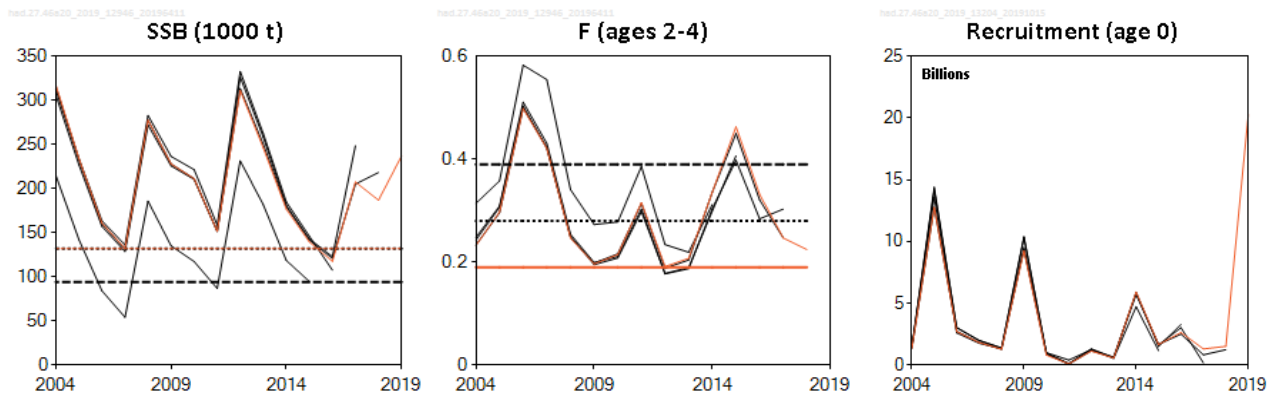
### Basis of the advice

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

Advice basis	MSY approach
Management plan	An EU multiannual management plan (MAP) has been agreed by the EU for this stock (EU, 2018). There is no agreement with Norway regarding this plan and it is not used as the basis of the advice for this shared stock. ICES was requested by the EC to provide advice based on the MSY approach, and to include the MAP as a catch option. EU–Norway have requested an evaluation of multiple management strategies (ICES, 2019a), which are currently under consideration.

**Quality of the assessment**

The assessment uses North Sea (Subarea 4 and Subdivision 20) survey indices, which are considered to be sufficiently representative of the whole stock (that also includes Division 6.a). No combined survey index for the entire area is available.



**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 became available in summer 2019, the forecast and advice has been updated from that released in June 2019. The increase in advice compared to June is due to an updated recruitment estimate based on 2019 IBTS Q3 data. ICES provides total catch advice, assuming that fishing mortality in the industrial fishery remains constant; this implies that the catch in the human consumption fishery in 2020 should be no more than 41 818 tonnes.

More abundant year classes were produced prior to 2000; recruitment since then has, however, tended to be consistently lower. The 2019 year class is the largest since 2000, thus increasing the risk of catching undersized fish.

The EU landing obligation has been phased in to all catches of haddock in ICES Subarea 4 since 2016. Since 2019, the stock is fully under the EU landing obligation. Landings of fish below the minimum conservation reference size (MCRS) are very low, and discarding still takes place. The estimated discard amount is 4895 tonnes in 2018 (12.4%), based on observer data.

## Reference points

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

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	132 000	$B_{pa}$	ICES (2016)
	$F_{MSY}$	0.194	EQsim analysis based on the recruitment period 2000–2015	ICES (2017)
Precautionary approach	$B_{lim}$	94 000	Lowest estimated SSB that resulted in high recruitment (1979)	ICES (2016)
	$B_{pa}$	132 000	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$	ICES (2016)
	$F_{lim}$	0.384	EQsim analysis based on the recruitment period 2000–2015	ICES (2016)
	$F_{pa}$	0.274	$F_{lim} \times \exp(-1.645 \times 0.2) \approx F_{lim} / 1.4$	ICES (2016)
EU Management Plan (MAP)*	MAP MSY $B_{trigger}$	132 000	MSY $B_{trigger}$	ICES (2016)
	MAP $B_{lim}$	94 000	$B_{lim}$	
	MAP $F_{MSY}$	0.194	$F_{MSY}$	ICES (2017)
	MAP range $F_{lower}$	0.167–0.194	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2017)
	MAP range $F_{upper}^{**}$	0.194–0.194	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2017)

\* EU multiannual plan (MAP) for the North Sea (EU, 2018).

\*\* For this stock,  $F_{MSY upper} = F_{MSY}$ .

## 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, 2018).
Assessment type	Age-based analytical assessment (TSA; ICES, 2019b) 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, 2019b).
Discards, BMS landings and bycatch	Included in the assessment, data from the main fleets (covering around 94% of the landings). BMS landings, where reported, are included with discards as unwanted catch in the assessment from 2016 onwards.
Indicators	None.
Other information	Last benchmarked in 2014 (ICES, 2014), at which time it was decided that the previously separate stocks in the North Sea and Skagerrak, and West of Scotland, should be assessed as one stock. The ICES Benchmark Meeting on Northern Haddock Stocks (WKHAD; ICES, 2014) also updated biological parameters and selected a new assessment model. The 2016 inter-benchmark protocol (ICES, 2016) corrected an error in the computer code, derived a model configuration that reduced the retrospective bias in the current 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

The number of samples used to derive the input data for the assessment has increased since 2012, through extended sampling programmes such as the Scottish Industry–Science observer sampling scheme.

## History of the advice, catch, and management

**Table 7a** Haddock in Subarea 4, Division 6.a, and Subdivision 20. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of landings, discards, and catches for the period 1987 to 2014 are presented to the nearest thousand tonnes.

### Haddock in Subarea 4

Year	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice ^	Agreed TAC	Official landings	ICES landings	ICES discards ^^	ICES industrial 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
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	30276	30015	4650	17	34682
2016	MSY approach		≤ 59945	61933	30162^^^	29647	6243	30	35920
2017	MSY approach		≤ 39461	33643	29682^^^	28563	5341	16	33921
2018	MSY approach		≤ 48990	41767	29210^^^	29389	3710	1	33100

Year	ICES advice	Wanted catch corresponding to advice	Total catch corresponding to advice ^	Agreed TAC	Official landings	ICES landings	ICES discards ^^	ICES industrial bycatch	ICES total
2019	MSY approach		≤ 33956	28950					
2020	MSY approach		≤ 41818						

\* 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.

^^ Since 2016 discards estimated by ICES correspond to unwanted catch (including BMS landings).

^^^ Since 2016 official landings include officially reported BMS landings.

**Table 7b** Haddock in Subarea 4, Division 6.a, and Subdivision 20. ICES advice, TAC, official landings and ICES catch estimates. All weights are in tonnes. Values of landings, discards, and catches for the period 1987 to 2014 are presented to the nearest hundred tonnes.

**Haddock in Subdivision 20**

Year	ICES advice	Wanted catch corresponding to advice	Catch corresponding to advice **	Agreed TAC	Official landings	ICES landings	ICES discards ^	ICES Industrial bycatch	ICES total catch
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
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

Year	ICES advice	Wanted catch corresponding to advice	Catch corresponding to advice **	Agreed TAC	Official landings	ICES landings	ICES discards ^	ICES Industrial bycatch	ICES total catch
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	2000	*	*	*	*
2014	Apply management plan North Sea	2438		2355	2200	2300	100	*	2400
2015	(November update) MSY approach		68690	2504	1432	1411	96	4	1512
2016	MSY approach		≤ 59945	3926	1213^^	1201	38	7	1246
2017	MSY approach		≤ 39461	2069	1094^^	1078	105	1	1183
2018	(November update) MSY approach		≤ 48990	2569	717^^	790	57	4	851
2019	MSY approach		≤ 33956	1780					
2020	MSY approach		≤ 41818						

\* Combined in Table 7a.

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

^ Since 2016 discards estimated by ICES correspond to unwanted catch (including BMS landings).

^^ Since 2016, official landings include officially reported BMS landings.

n/a = not available.

**Table 7c** Haddock in Subarea 4, Division 6.a, and Subdivision 20. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values for the period from 1987 to 2014 are presented to the nearest thousand (official landings) or nearest hundred (ICES landings, discards, and total) tonnes.

**Haddock in Division 6.a**

Year	ICES advice/ Single-stock exploitation boundaries from 2004 onwards *	Wanted catch corresponding to advice	Catch corresponding to advice ^^	Agreed TAC	Official landings	ICES landings	ICES discards #	ICES industrial bycatch	ICES total catch
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
1999	F reduced to $F_{pa}$	14300 ***		19000	11000	10500	4900		15300



Year	ICES advice/ Single-stock exploitation boundaries from 2004 onwards *	Wanted catch corresponding to advice	Catch corresponding to advice ^^	Agreed TAC	Official landings	ICES landings	ICES discards #	ICES industrial bycatch	ICES total catch
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	3889	3868	1509	0	5377
2016	MSY approach		$\leq 59945$	6462	4265^^^	4209	1669	0	5878
2017	MSY approach		$\leq 39461$	3697	3263^^^	3186	1584	2	4772
2018	(November update) MSY approach		$\leq 48990$	4654	4172^^^	4291	1283	0	5575
2019	MSY approach		$\leq 33956$	3226					
2020	MSY approach		$\leq 41818$						

\* 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.

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

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

^^^ Since 2016, official landings include officially reported BMS landings.

# Since 2016 discards estimated by ICES correspond to unwanted catch (including BMS landings).

## History of the catch and landings

**Table 8** Haddock in Subarea 4, Division 6.a, and Subdivision 20. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Wanted catch			Unwanted catch	Industrial bycatch
	Demersal trawl and seine > 100 mm	Trawl 70–99 mm	Others		
39 525 tonnes	95%	< 1%	4%	5050 tonnes	5 tonnes
	34 470 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.

Country	Subdivision 20										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*	2018*
Germany	87	105	65	102	120	90	114	103	125	0	31
Denmark	1052	1263	1139	1661	1916	1456	1763	1057	973	852	542
Netherlands	0	0	1	0	0	5	6	4	2	20	4
Norway	170	121	81	125	239	223	81	63	70	65	0
Portugal	0	0	0	0	0	0	0	0	0	0	0
Sweden	276	166	126	198	210	217	219	202	129	103	140
UK	0	0	0	0	0	3	0	0	0	0	0
BMS landings										< 1	< 1



Subarea 4											
Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*	2018*
Belgium	112	108	78	106	78	78	98	45	53	30	29
Germany	393	657	634	575	548	677	677	599	554	534	347
Denmark	501	552	725	697	947	1283	1079	1426	1213	1185	1117
Spain	0	0	0	0	0	0	0	0	0	0	0
Faroes	3	32	5	0	0	0	0	0	0	0	0
France	448	135	276	320	175	177	209	101	121	140	201
Greenland	0	4	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0
Iceland	0	0	0	0	0	0	0	0	0	0	0
Netherlands	29	24	41	71	191	172	99	43	146	75	89
Norway	1482	1278	1126	1195	1069	1661	2705	2004	1484	2164	1431
Poland	16	0	0	0	0	0	0	0	0	0	0
Portugal	0	0	0	0	0	0	0	0	0	0	0
Sweden	83	141	90	128	103	113	154	135	117	179	99
UK	27365	28393	24983	23343	0	32993	29758	25852	26374	25376	25880
BMS landings										< 1	15
Division 6.a											
Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*	2018*
Germany	1	0	1	0	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	0	2	2	1
Spain	10	21	28	36	15	0	19	9	33	28	28
Faroes	0	0	0	0	0	0	0	0	0	0	0
France	151	136	89	73	32	51	67	41	62	68	66
Ireland	879	297	396	290	845	746	653	768	1033	641	758
Netherlands	0	0	0	0	0	0	0	0	28	31	15
Norway	28	18	9	4	0	6	15	7	5	1	7
UK	1776	2380	2415	1364	0	3878	3230	3051	3090	2492	3295
BMS landings										0	2
Subarea 4, Division 6.a, and Subdivision 20											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Official landings	34862	35831	32308	30288	6488	43830	40945	35520	35614	32290	34083
ICES landings	33058	35590	31940	36570	38162	43734	41143	35295	35058	32827	34470
ICES discards <sup>^</sup>	14503	12326	13071	13067	5032	3305	5090	6255	7950 <sup>^</sup>	7029 <sup>^</sup>	5050 <sup>^</sup>
ICES IBC	199	52	431	24	1	54	65	21	37	19	5
ICES total catch	47759	47968	45442	49661	43195	47092	46295	41571	43133	40801	39524
TAC 4	46444	42110	35794	34057	39000	45041	38284	40711	61933	33643	41767
TAC 3.a 20	2856	2590	2201	2100	2095	2770	2355	2504	3926	2069	2569
TAC 6.a	6120	3520	2670	2005	6015	4211	3988	4536	6462	3697	4654
Total TAC	55420	48220	40665	38162	47110	52022	44627	47751	72321	46538	48990

\* Preliminary.

<sup>^</sup> Since 2016 ICES discards correspond to unwanted catch (including BMS landings).

**Summary of the assessment**

**Table 10** Haddock in Subarea 4, Division 6.a, and Subdivision 20. Assessment summary. Recruitment in thousands. Weights are in tonnes. High and low refers to 95% confidence intervals.

Year	Recruitment (age 0)			SSB			Landings *	Discards *	Industrial bycatch	BMS landings*	F		
	Age 0	High	Low	SSB	High	Low					Ages 2-4	High	Low
1972	8897047	12876959	4917134	294702	353738	235666	234019	144366	29585		0.86	0.99	0.73
1973	32877662	40666067	25089256	274524	312634	236414	207489	126105	11267		0.79	0.93	0.65
1974	53042168	69454673	36629664	321618	366530	276706	167528	181802	47505		0.74	0.89	0.60
1975	3460809	6491659	429960	157849	179819	135880	160271	293321	41487		0.87	1.04	0.71
1976	5458582	8330460	2586703	193714	224636	162791	184421	169776	48163		0.81	0.97	0.65
1977	11845426	15268635	8422216	350331	410648	290013	156639	48732	35022		0.82	0.99	0.65
1978	24774409	28693980	20854838	157408	184715	130101	102970	32860	10903		0.90	1.08	0.73
1979	49783830	58624270	40943389	92555	114369	70741	97896	35054	16240		0.92	1.10	0.74
1980	9098298	11163800	7032795	102738	124430	81047	111371	68831	22472		0.89	1.06	0.73
1981	15397809	18621583	12174034	193876	220381	167371	147806	61683	17041		0.68	0.81	0.55
1982	9257265	10916429	7598100	435007	476410	393604	195456	41297	19383		0.57	0.66	0.47
1983	29956735	34209802	25703669	294138	324633	263643	188754	51584	12898		0.73	0.83	0.62
1984	5814892	8565849	3063934	236480	265813	207148	158205	79012	10080		0.85	0.97	0.73
1985	9559588	11966714	7152462	166810	183398	150221	182946	58373	5998		0.80	0.92	0.69
1986	18058148	21498132	14618164	286791	319424	254158	185137	36063	2643		0.90	1.02	0.78
1987	331750	2483222	0	162245	179787	144703	135022	55674	4410		0.91	1.04	0.79
1988	1050173	4464403	0	125316	142296	108337	126227	49833	4002		0.96	1.09	0.82
1989	1979345	4503599	0	177765	200487	155042	92840	32453	2410		0.91	1.04	0.77
1990	8687179	11220953	6153405	84914	96434	73395	61605	22548	2589		0.90	1.04	0.77
1991	9895037	11443169	8346905	51865	59658	44071	55208	36610	5386		0.89	1.02	0.76
1992	17124698	19616741	14632655	55300	60816	49785	81566	42477	10927		0.88	0.98	0.77
1993	4295180	5074233	3516127	118132	132898	103366	98631	70748	10766		0.94	1.06	0.83
1994	16997410	19300283	14694538	138111	157451	118771	95141	70668	3576		0.92	1.04	0.80
1995	4790999	5567379	4014619	196413	224780	168047	89859	71262	7695		0.82	0.94	0.70
1996	6849311	8005705	5692916	124446	138824	110069	92615	107207	5000		0.80	0.92	0.69
1997	4112149	4893186	3331111	251804	281090	222518	95391	67879	6684		0.62	0.72	0.52
1998	3101245	3653855	2548634	183476	202702	164250	95472	61399	5101		0.73	0.84	0.61
1999	46518857	53195695	39842018	142730	160275	125185	76009	43562	3835		0.81	0.94	0.69
2000	9077862	10301984	7853740	92626	105381	79871	54504	64185	8134		0.88	1.02	0.75
2001	899610	2220954	0	62639	71444	53835	47592	117882	7879		0.60	0.70	0.49
2002	1220443	1865659	575228	538076	610951	465201	65405	86051	3717		0.37	0.45	0.30
2003	1371758	1870522	872994	462130	517283	406978	47282	25975	1150		0.23	0.28	0.182
2004	1345295	1696293	994298	317376	360959	273792	51896	20020	554		0.23	0.28	0.182
2005	12761202	14105120	11417283	234188	272264	196112	51528	12389	168		0.30	0.36	0.24

Year	Recruitment (age 0)			SSB			Landings *	Discards *	Industrial bycatch	BMS landings*	F		
	Age 0	High	Low	SSB	High	Low					Ages 2-4	High	Low
2006	2712346	3115193	2309499	160913	191580	130247	43334	23094	535		0.50	0.58	0.41
2007	1806883	2457654	1156113	132007	162296	101718	34672	32651	48		0.42	0.50	0.34
2008	1271674	1767835	775513	277624	314082	241166	33058	14503	199		0.25	0.30	0.195
2009	9243723	10179946	8307500	227942	262512	193372	35590	12326	52		0.196	0.24	0.155
2010	793470	2019104	0	211325	244775	177876	31940	13071	431		0.21	0.26	0.169
2011	82155	1031999	0	151577	173733	129420	36570	13067	24		0.32	0.38	0.25
2012	1117754	1562626	672882	311353	345806	276901	38162	5032	1		0.191	0.23	0.149
2013	566276	944069	188484	246434	273045	219823	43734	3305	54		0.21	0.25	0.165
2014	5906614	6611629	5201599	176827	199341	154313	41143	5090	65		0.34	0.40	0.27
2015	1646562	1957200	1335924	139537	159795	119279	35295	6255	21		0.46	0.54	0.38
2016	2631177	3190303	2072051	117461	137762	97161	35058	7950 **	37	201	0.33	0.40	0.27
2017	1294733	1709322	880143	207480	232744	182215	32827	7029 **	19	93	0.25	0.30	0.192
2018	1503943	2280464	727422	186846	210674	163018	34470	5032 **	5	155	0.22	0.28	0.170
2019	20288000 ^			236941 ^^	270559	203324							

\* ICES estimates.

\*\* Since 2016, discards correspond to unwanted catch minus BMS landings from EU fleets officially reported in logbooks.

^ In 2019, recruitment is the RCT3 estimate for 2019.

^^ In 2019, SSB is from estimated survivors in 2018.

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