

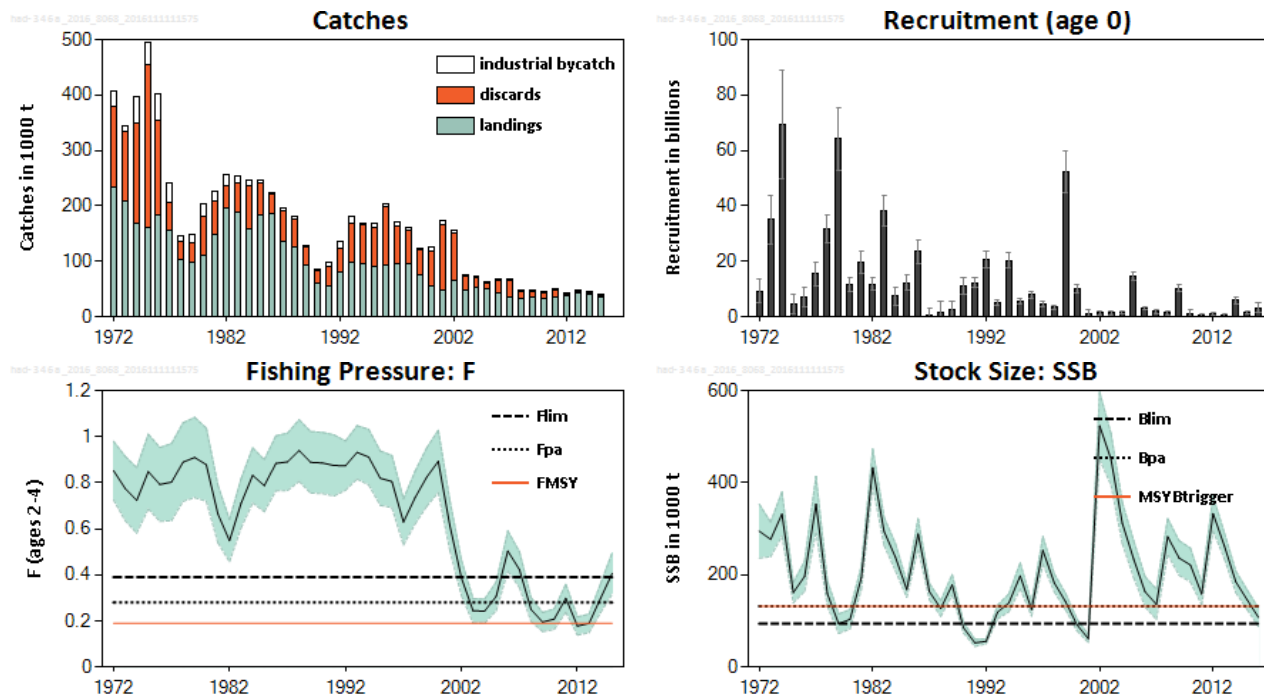
### 6.3.16 Haddock (*Melanogrammus aeglefinus*) in Subarea 4, Division 6.a, and Subdivision 3.a.20 (North Sea, West of Scotland, Skagerrak)

#### ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2017 should be no more than 39 461 tonnes.

#### Stock development over time

Fishing mortality (F) is above  $F_{MSY}$  and spawning-stock biomass (SSB) has fallen below  $MSY B_{trigger}$ . 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 is higher than recent poor recruitment years, but is still below the long-term average.



**Figure 6.3.16.1** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. Summary of the stock assessment (weights in thousand tonnes). Last year's recruitment estimate is shaded.

#### Stock and exploitation status

**Table 6.3.16.1** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. State of the stock and fishery relative to reference points\*.

		Fishing pressure			Stock size		
		2013	2014	2015	2014	2015	2016
Maximum sustainable yield	$F_{MSY}$	✓	✗	✗	MSY	✓	✗
Precautionary approach	$F_{pa}, F_{lim}$	✓	○	✗	$B_{pa}, B_{lim}$	✓	○
Management plan	$F_{MGT}$	-	-	-	$SSB_{MGT}$	-	-
				Above			Below trigger
				Harvested unsustainably			Increased risk
				Not applicable			Not applicable

\*Version 2: Updated with correct fishing pressure years.

## Catch options

**Table 6.3.16.2** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. The basis for the catch options.

Variable	Value	Source	Notes
F ages 2–4 (2016)	0.378	ICES (2016a)	F constraint based on assessment model forecast assuming effort of a similar level to 2015
SSB (2017)	235113 t	ICES (2016a)	Short-term forecast (STF)
$R_{age 0}$ (2016–2017)	3280 million	ICES (2016a)	Assessment model forecast
Total catch (2016)	78980 t	ICES (2016a)	STF
Commercial landings (2016)	62993 t	ICES (2016a)	STF, relative contribution to total catch = average 2013–2015.
Discards (2016)	15985 t	ICES (2016a)	STF, relative contribution to total catch = average 2013–2015.
Industrial bycatch (2016)	2 t	ICES (2016a)	STF, relative contribution to total catch = average 2013–2015.

**Table 6.3.16.3** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. The catch options. All weights are in thousand tonnes.

Rationale	Total catch (2017)	Wanted catch* (2017)	Unwanted catch* (2017)	IBC** 2017	Basis	F <sub>total</sub> (2017)	F <sub>wanted</sub> (2017)	F <sub>unwanted</sub> (2017)	F <sub>IBC</sub> (2017)	SSB (2018)	% SSB change***	% TAC Change total catch^
MSY approach	39.461	33.385	6.071	0.006	F <sub>MSY</sub>	0.190	0.159	0.031	0.000	205.595	-13%	-45%
Previous management strategy ^^	60.003	50.653	9.344	0.006	F <sub>MGT</sub> from previous MS	0.300	0.251	0.049	0.000	187.292	-20%	-17%
IBC only	0.007	0.000	0.000	0.007	No HC fishery	0.000	0.000	0.000	0.000	241.562	3%	-100%
Other options	57.029	48.159	8.864	0.006	0.75 × F <sub>2016</sub>	0.284	0.237	0.047	0.000	189.932	-19%	-21%
	73.469	61.914	11.549	0.006	F <sub>2016</sub>	0.378	0.316	0.062	0.000	175.332	-25%	2%
	88.817	74.691	14.118	0.005	1.25 × F <sub>2016</sub>	0.473	0.395	0.078	0.000	161.934	-31%	23%
	64.940	54.789	10.145	0.006	15% TAC decrease	0.328	0.274	0.054	0.000	182.918	-22%	-15%
	75.903	63.949	11.947	0.006	Roll-over TAC	0.392	0.327	0.065	0.000	173.245	-26%	0%
	86.290	72.594	13.689	0.005	15% TAC increase	0.456	0.381	0.075	0.000	164.140	-30%	15%
	55.300	46.708	8.586	0.006	F <sub>pa</sub>	0.274	0.229	0.045	0.000	191.468	-19%	-24%
	73.882	62.263	11.612	0.006	F <sub>lim</sub>	0.380	0.317	0.063	0.000	175.024	-26%	2%
	146.572	121.590	24.985	0.005	SSB <sub>2018</sub> = B <sub>lim</sub>	0.946	0.790	0.156	0.000	94.000	-52%	103%
119.463	99.898	19.561	0.005	SSB <sub>2018</sub> = MSY B <sub>trigger</sub> = B <sub>pa</sub>	0.692	0.578	0.114	0.000	132.000	-42%	65%	
<i>Mixed fisheries options – differences with calculation above can occur because of the different methodology used (ICES, 2015b).</i>												
Maximum	173276				A	1.31				79550	-66%	
Minimum	37456				B	0.19				194247	-17%	
Cod	63300				C	0.34				171155	-27%	
SQ effort	76311				D	0.43				159698	-32%	
Value	55544				E	0.3				178040	-24%	

\* “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 2013–2015.

\*\* Industrial bycatch (IBC) also based on average proportion of the total catch for 2013–2015.

\*\*\* SSB 2018 relative to SSB 2017.

^ Total catch in 2017 relative to the combined TACs 2016 (TAC Subarea 4 = 61.933; TAC Division 3.a = 3.926; TAC Division 6.a = 6.462; Total TAC = 72.321).

^^ EU–Norway management strategy for Subarea 4 and Division 3.a–West applied to the whole stock area.

*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 2017 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. Cod scenario: Each fleet stops fishing when its cod stock share is exhausted.

D. SQ (*status quo*) effort scenario: The effort of each fleet in 2016 and 2017 remains the same as in 2015.

E. 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.

**Basis of the advice**

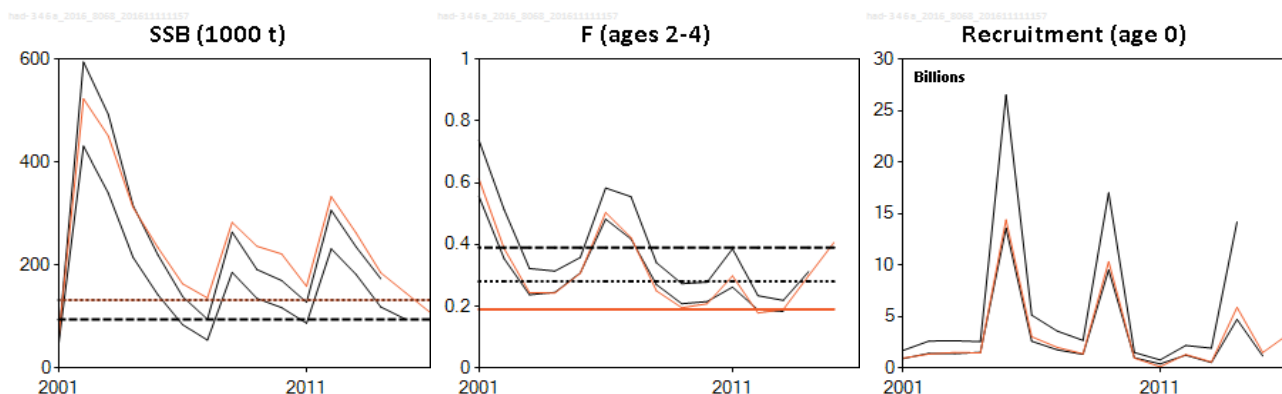
**Table 6.3.16.4** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. The basis of the advice.

Advice basis	MSY approach
Management plan	There is currently no agreed management plan for haddock for the stock area.

**Quality of the assessment**

The overall reporting of catch data provided to ICES has improved during 2012–2015 through such aspects as the fully documented fisheries (FDF) programme and increased coverage by the Scottish industry/science observer sampling scheme.

The assessment is based on the North Sea (Subarea 4 and Subdivision 3.a.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 previous assessment are due to an alternative model configuration that reduces the retrospective bias and the addition of the new data.



**Figure 6.3.16.2** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. Historical assessment results (final-year recruitment estimates included). Horizontal lines show  $F_{MSY}$  (solid),  $B_{lim}$  (dashed), and the MSY  $B_{trigger}$  (dotted).

**Issues relevant for the advice**

An error in the computer code used for the 2015 assessment was found during the 2016 interbenchmark protocol for this stock (ICES, 2016c). A correction of the advice issued last year was released in November 2016.

More abundant year classes were produced prior to 2000; however, recruitment has tended to be consistently lower since then. Reference points have consequently been re-estimated based on the low level of recruitment observed since 2000, which is considered to be more representative of the current productivity of the stock. This has resulted in a large reduction of the  $F_{MSY}$  reference point, from 0.37 to 0.19. Because of the larger 2014 year class, the stock is expected to increase from 2016 to 2017 to a size above MSY  $B_{trigger}$ . Despite this increase, the large downward revision of the  $F_{MSY}$  reference point to ensure sustainability in the long term results in reduced catch advice for 2017.

The baseline  $F_{MSY}$  approach when applied to this stock suggests a 45% cut in total catch for 2017. However, the assumption for the forecast is based on an F constraint derived from the assessment model assuming a similar effort level to 2015 and would mean an uptake of the TAC for 2016 of about 87%. While the full quota for the stock has almost never been taken and uptake is usually around 70%, the TAC attributed to Division 6.a has generally been reached. The principal drivers for this stock remain the very low average recruitment, as well as the declining contribution of the sporadic larger year classes.

New reference points have been estimated and the EU-Norway management strategy has not been evaluated against these reference points.

Results from a North Sea mixed-fisheries analysis are presented in ICES (2016b). For 2017, assuming a strictly implemented discard ban (corresponding to the “Minimum” scenario), haddock would be the most limiting stock (assuming that the full advised catch is taken), constraining 36 out of 41 fleet segments (corresponding to 91% of the 2015 kW days of effort). Cod and eastern Channel sole would be limiting for fleets, corresponding to 5% and 4% of the 2015 effort, respectively. Conversely, in the “Maximum” scenario with *Nephrops* managed by separate TACs for the individual functional units (FUs), *Nephrops* would be considered the least limiting stocks in many FUs. *Nephrops* in FU 33, FU 5, FU 32, FU 7, and FU Others would be the least limiting stocks for fleets in these FUs, representing 32%, 16%, 10%, 4%, and 17% of the 2015 effort, respectively. Eastern Channel plaice and saithe would be least limiting for other fleet segments, representing 12% and 9% of the 2015 effort, respectively.

Results for the haddock stock are also included as additional rows in the catch options table of this advice sheet.

## Reference points

**Table 6.3.16.5** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{\text{trigger}}$	132000 t	$B_{\text{pa}}$	ICES (2016c)
	$F_{\text{MSY}}$	0.19	Estimated by application of EqSIM evaluation.	ICES (2016c)
Precautionary approach	$B_{\text{lim}}$	94000 t	Lowest estimated SSB which resulted in high recruitment (1972).	ICES (2016c)
	$B_{\text{pa}}$	132000 t	$B_{\text{pa}} = B_{\text{lim}} \times \exp(1.645 \sigma_B)$ ; $\sigma_B = 0.2045$ .	ICES (2016c)
	$F_{\text{lim}}$	0.384	Estimated by application of EqSIM evaluation.	ICES (2016c)
	$F_{\text{pa}}$	0.274	Estimated by application of EqSIM evaluation.	ICES (2016c)
Previous 4 and 3.a.20 management strategy	$F_{\text{MGT}}$	0.3	Management strategy evaluation.	EU–Norway management strategy
	$\text{SSB}_{\text{MGT}}$	100000 t, 140000 t	Former trigger values $B_{\text{lim}}$ and $B_{\text{pa}}$ .	EU–Norway management strategy

## Basis of the assessment

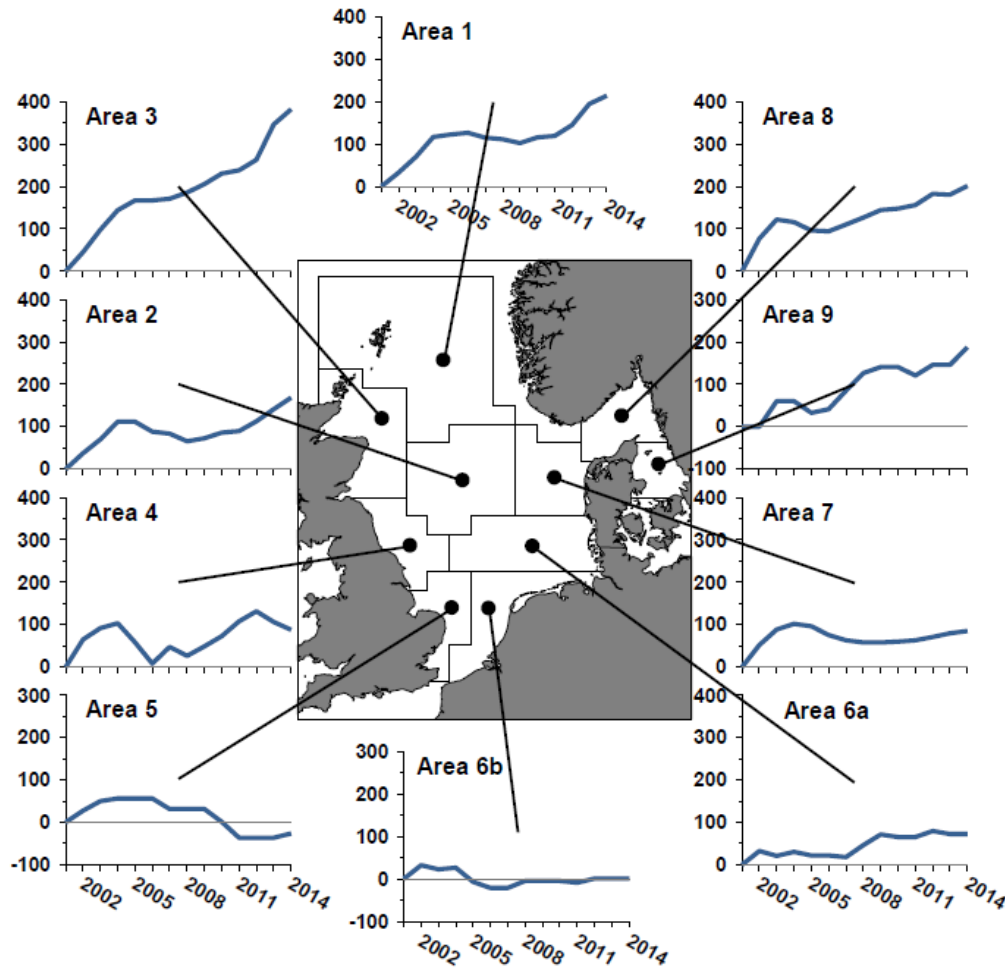
**Table 6.3.16.6** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. The basis of the assessment.

ICES stock data category	1 (ICES, 2016d).
Assessment type	Age-based analytical assessment (TSA; ICES, 2016c) 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.
Discards and bycatch	Included in the assessment, data series from the main fleets (covering around 88% of the landings).
Indicators	None.
Other information	Last full benchmark in 2014 (ICES, 2014), at which it was decided that the previously separate stocks in the North Sea and Skagerrak, and West of Scotland, should be assessed as one stock. WKHAD (ICES, 2014) also updated biological parameters and selected a new assessment model. The 2016 interbenchmark protocol (ICES, 2016c) corrected an error in the computer code and derived a model configuration that reduced the retrospective basis in the extant assessment model, and reestimated the reference points accordingly.
Working groups	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), Working Group on Mixed Fisheries Advice (WGMIXFISH-ADVICE), Inter-benchmark Protocol on Haddock ( <i>Melanogrammus aeglefinus</i> ) in Subarea 4, Division 6.a and Subdivision 3.a.20 (North Sea, West of Scotland, Skagerrak) (IBPHaddock).

**Information from stakeholders**

The proportions reporting a greater abundance of haddock tended to be highest in the northern part of the North Sea (including areas 1, 2, 3, 8, and 9; Figure 6.3.16.3). The highest proportion reporting a lower abundance was in the west (area 4), while no change was most commonly reported in the south (Napier, 2014).

**Abundance Index**



**Figure 6.3.16.3** Cumulative time-series of index of perceptions of abundance of haddock, by area (see page 14 of Napier (2014) for an explanation of the index).

### History of the advice, catch, and management

**Table 6.3.16.7a** Haddock in Subarea 4. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in thousand tonnes.

Year	ICES advice	Predicted landings corresp. to advice	Predicted catch corresp. to advice ^	Agreed TAC	Off. Indgs	Human cons.	Disc. Slip.	Indust. bycatch	Total
1987	80% of F(85)	105		140	109	108	59	4	172
1988	77% of F(86); TAC	185		185	105	105	62	4	171
1989	Reduce decline in SSB; TAC; protect juveniles	68		68	64	76	26	2	104
1990	80% of F(88); TAC	50		50	43	51	33	3	87
1991	70% of effort (89)			50	45	45	40	5	90
1992	70% of effort (89)			60	51	70	48	11	129
1993	70% of effort (89)			133	80	80	80	11	170
1994	Significant reduction in effort; mixed fishery			160	87	81	65	4	150
1995	Significant reduction in effort; mixed fishery			120	75	75	57	8	140
1996	Mixed fishery to be taken into account			120	75	76	73	5	154
1997	Mixed fishery to be taken into account			114	73	79	52	7	138
1998	No increase in F	100.3		115	72	77	45	5	128
1999	Reduction of 10% F(95–97)	72		88.6	64	64	43	4	111
2000	F less than $F_{pa}$	< 51.7		73.0	47	45	47	8	100
2001	F less than $F_{pa}$	< 58.0		61	40	39	118	8	165
2002	F less than $F_{pa}$	< 94.0		104.0	54	53	45	4	101
2003	No cod catches	-		52	42	42	23	1	76
2004	Mixed-fisheries considerations / F should be below $F_{pa}$	No forecast *		85	48	47	17	1	65
2005	Mixed-fisheries considerations / F should be below $F_{pa}$	92 *		66	31	48	10	0	57
2006	Mixed-fisheries considerations / F < 0.3	39 *		52	36	36	17	0	55
2007	Mixed-fisheries considerations / F < 0.3	55.4 *		55	31	31	30	0	61
2008	Mixed-fisheries considerations / 15% TAC reduction	49.3 **, **		46	30	29	13	0	42
2009	Mixed-fisheries considerations / Apply management plan	44.7 **, **		42	31	31	10	0	41
2010	Mixed-fisheries considerations / Apply management plan	38 **, **		36	28	28	10	0	38
2011	See scenarios	-		34	26	34	11	0	46
2012	Apply management plan	41.575 **, **		39	30	30	4	1	35
2013	Apply management plan	47.811 **, **		45.041	37 **	39 **	2 **	0 **	41 **
2014	Apply management plan	38.201 *		38.284	35	35	4	0.065 **	39
2015	(November update) MSY approach		68.690	40.711	35.520	30.165	4.151	0.018	34.335
2016	MSY approach		≤ 59.945	61.933					
2017	MSY approach		≤ 39.461						

\* 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 3.a.20 combined.

^ Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 3.a.20.



**Table 6.3.16.7b** Haddock in Division 3.a.20. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in thousand tonnes.

Year	ICES advice	Predicted landings corresp. to advice	Predicted catch corresp. to advice **	Agreed TAC	Official landings	ICES estimates			
						Human cons.	Disc. Slip.	Industrial bycatch	Total
1987	Precautionary TAC	-		11.5		3.8		1.4	5.3
1988	Precautionary TAC	-		10.0		2.9		1.5	4.3
1989	Precautionary TAC	-		10.0		4.1		0.4	4.5
1990	Precautionary TAC	-		10.0		4.1		2.0	6.1
1991	Precautionary TAC	4.6		4.6		4.1		2.6	6.7
1992	TAC	4.6		4.6		4.4		4.6	9.0
1993	Precautionary TAC	-		4.6		2.0		2.4	4.4
1994	Precautionary TAC	-		10.0		1.8		2.2	4.0
1995	If required, precautionary TAC; link to North Sea	-		10.0		2.2		2.2	4.4
1996	If required, precautionary TAC; link to North Sea	-		10.0		3.1		2.9	6.1
1997	Combined advice with North Sea	-		7.0		3.4		0.6	4.0
1998	Combined advice with North Sea	4.7		7.0		3.8		0.3	4.0
1999	Combined advice with North Sea	3.4		5.4		1.4		0.3	1.7
2000	Combined advice with North Sea	< 1.8		4.5		1.5		0.6	2.1
2001	Combined advice with North Sea	< 2.0		4.0		1.9		0.2	2.1
2002	Combined advice with North Sea	< 3.0		6.3		4.1		0.06	4.1
2003	Combined advice with North Sea	-		3.2		1.8	0.2	n/a	1.8
2004	Combined advice with North Sea / F should be below $F_{pa}$	No forecast		4.9		1.4	0.1	n/a	1.4
2005	Combined advice with North Sea / F should be below $F_{pa}$	-		4.0		0.8	0.2	0	0.8
2006	Combined advice with North Sea / $F < 0.3$	-		3.2		1.5	1.0	0	1.5
2007	Combined advice with North Sea / $F < 0.3$	-		3.4		1.6	0.8	0	2.5
2008	Combined advice with North Sea / 15% TAC reduction	2.9		2.9		1.4	0.6	0	2.0
2009	Combined advice with North Sea / Apply management plan	-		2.6		1.5	0.6	0	2.1
2010	Combined advice with North Sea / Apply management plan	-		2.2		1.3	0.6	0	1.9
2011	See scenarios	-		2.1		9.9	1.7	0	11.6
2012	Apply management plan North Sea	-		2.095	2.5	2.6	0.7	0	3.3
2013	Apply management plan North Sea	-		2.770	2	*	*	*	*
2014	Apply management plan North Sea	2.438		2.355	2.1	2.3	0.1	*	2.4
2015	(November update) MSY approach		68.690	2.504	1.429	1.419	0.086	0.003	1.507
2016	MSY approach		$\leq 59.945$	3.926					
2017	MSY approach		$\leq 39.461$						

\* Combined in Table 6.3.16.7a.

\*\* Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 3.a.20.

**Table 6.3.16.7c** Haddock in Division 6.a. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in thousand tonnes.

Year	ICES advice/ Single-stock exploitation boundaries from 2004 onwards *	Predicted landings corresp. to advice	Predicted catch corresp. to advice <sup>^^</sup>	Agreed TAC	Official landings	ICES estimates		
						Hum. cons.	Disc. Slip.	Total
1987	Reduce F towards $F_{max}$	20.0		32.0	27	27.0	16.2	43.2
1988	No increase in F; TAC	25.0		35.0	21	21.2	9.5	30.7
1989	80% of F(87); TAC	15.0		35.0	24	16.7	3.0	19.7
1990	80% of F(88); TAC	14.0		24.0	13	10.1	5.4	15.5
1991	70% of effort (89)	-		15.2	10	10.6	8.7	19.2
1992	70% of effort (89)	-		12.5	7	11.4 **	9.3 **	20.5 **
1993	70% of effort (89)	-		17.6	13	19.1 **	16.8 **	35.9 **
1994	30% reduction in effort	-		16.0	9	14.2 **	11.1 **	25.3 **
1995	Significant reduction in effort	-		21.0	13	12.4	8.6	20.9
1996	Significant reduction in effort	-		22.9	13	13.5	11.4	24.8
1997	Significant reduction in effort	-		20.0	13	12.9	6.5	19.3
1998	No increase in F	20.8 ***		25.7	14	14.4	5.5	19.9
1999	F reduced to $F_{pa}$	14.3 ***		19.0	11	10.5	4.9	15.3
2000	Maintain F below $F_{pa}$	< 14.9 ***		19.0	7	7.0	7.9	14.9
2001	Reduce F below $F_{pa}$	< 11.2 ***		13.9	7	6.87	6.6	13.4
2002	Reduce F below $F_{pa}$	< 14.1 ***		14.1	7	7.1	8.9	16.0
2003	No cod catches	-		8.7	4.9	5.3	4.1	9.4
2004	$F_{pa}$ *	12.2		6.5	3.0	3.9	3.7	7.6
2005	$0.75 \times F_{pa}$ *	7.6		7.6	3.2	3.8	2.9	6.7
2006	$0.7 \times F_{pa}$ *	8.0		7.81	5.7	6.3	4.6	10.9
2007	$0.87 \times F_{pa}$ *	7.2		7.2	3.7	3.8	4.0	7.7
2008	$SSB > B_{pa}$ *	4.2		6.12	2.8	2.8	1.2	4.1
2009	No fishing and recovery plan*	0		3.52	2.8	2.9	1.6	4.5
2010	No fishing and recovery plan	0		2.67	2.9	3.0	2.8	5.8
2011	See scenarios	0		2.005	1.7	1.7	1.5	3.3
2012	MSY framework <sup>^</sup>	5.6 <sup>^</sup>		6.015	5.0	5.1	0.5	5.6
2013	MSY framework	3.1		4.211	4.7	4.6	1.0	5.6
2014	MSY approach	6.432 <sup>^^</sup>		3.988	4.0	4.0	0.8	4.8
2015	(November update) MSY approach		68.690	4.536	3.888	1.347	0.0	5.235
2016	MSY approach		$\leq 59.945$	6.462				
2017	MSY approach		$\leq 39.461$					

\* 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.

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

<sup>^^</sup> This value (6.432) refers to total catch, including discards. Therefore, it is not directly comparable to the value advised for 2013 (3.1), which referred only to landings.

<sup>^^^</sup> Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 3.a.20.

## History of catch and landings

**Table 6.3.16.8** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. Catch distribution by fleet in 2015 as estimated by ICES.

Catch (2015)	Landings			Discards	Industrial bycatch
	95% demersal trawl and seine >100 mm	3% trawl 70–99 mm	2% others		
41572 t				6251 t	21 t
	35316 t				

**Table 6.3.16.9** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Subdivision 3.a.20										
Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Germany	186	206	87	105	65	102	120	90	114	103
Denmark	1001	1054	1052	1263	1139	1661	1916	1456	1763	1057
Netherlands	0	0	0	0	1	0	0	5	6	4
Norway	113	152	170	121	81	125	239	223	81	63
Portugal	30	37	0	0	0	0	0	0	0	0
Sweden	246	278	276	166	126	198	210	217	219	202
UK	0	0	0	0	0	0	0	3	0	0
Subarea 4										
Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Belgium	106	178	112	108	78	106	78	78	98	45
Germany	726	727	393	657	634	575	548	677	677	599
Denmark	759	645	501	552	725	697	947	1283	1079	1426
Spain	0	0	0	0	0	0	0	0	0	0
Faroe Islands	4	0	3	32	5	0	0	0	0	0
France	444	498	448	135	276	320	175	177	209	101
Greenland	5	8	0	4	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	33	55	29	24	41	71	191	172	99	43
Norway	1798	1706	1482	1278	1126	1195	1069	1661	2705	2004
Poland	8	8	16	0	0	0	0	0	0	0
Portugal	76	0	0	0	0	0	0	0	0	0
Sweden	100	130	83	141	90	128	103	113	154	135
UK	32390	26717	27365	28393	24983	23343	0	32993	29758	25852
Division 6.a										
Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Germany	7	0	1	0	1	0	0	0	0	0
Spain	44	5	10	21	28	36	15	0	19	9
Faroe Islands	1	2	0	0	0	0	0	0	0	0
France	291	211	151	136	89	73	32	51	67	41
Ireland	526	759	879	297	396	290	845	746	653	768
Netherlands	0	0	0	0	0	0	0	0	0	11
Norway	17	16	28	18	9	4	0	6	15	7
UK	4947	2780	1776	2380	2415	1364	0	3878	3230	3051
Northern Shelf										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Official landings	43858	36172	34862	35831	32308	30288	6488	43830	40945	35520
ICES landings	43334	34672	33058	35590	31940	36570	38162	43681	41143	35316
ICES discards	23094	32651	14503	12326	13071	13067	5032	3038	5090	6251
ICES IBC	535	48	199	52	431	24	1	54	65	21
ICES total catch	66962	67371	47759	47968	45442	49661	43195	46772	46298	41572
TAC IV	51850	54640	46444	42110	35794	34057	39000	45041	40711	61933
TAC 3.a	3189	3360	2856	2590	2201	2100	2095	2770	2504	3926
TAC 6.a	7810	7200	6120	3520	2670	2005	6015	4211	4536	6462
Total TAC	62849	65200	55420	48220	40665	38162	47110	52022	47751	72321

### Summary of the assessment

**Table 6.3.16.10** Haddock in Subarea 4, Division 6.a, and Subdivision 3.a.20. Assessment summary. Weights are in tonnes.

Year	Recruits age 0 (thousands)	High	Low	SSB	High	Low	Landings	Discards	Industrial bycatch	$F_{bar}$ 2–4	High	Low
1972	9334178	13632242	5036114	294835	353393	236277	234019	144366	29585	0.852	0.98	0.725
1973	35028610	43794600	26262620	276958	314536	239379	207489	126105	11267	0.775	0.914	0.636
1974	69453988	89160672	49747305	331762	379504	284019	167528	181802	47505	0.723	0.865	0.581
1975	4607792	8286114	929470	161530	183829	139231	160271	293321	41487	0.848	1.01	0.686
1976	7190961	10656122	3725800	196822	229394	164251	184421	169776	48163	0.792	0.952	0.632
1977	15430704	19704931	11156476	353701	413795	293606	156639	48732	35022	0.802	0.97	0.635
1978	31724047	36603305	26844789	159401	186775	132028	102970	32860	10903	0.89	1.06	0.719
1979	64106952	75387409	52826496	93894	115136	72651	97896	35054	16240	0.909	1.083	0.735
1980	11637362	14171028	9103697	103563	124447	82679	111371	68831	22472	0.878	1.037	0.719
1981	19582587	23569171	15596003	193503	218867	168139	147806	61683	17041	0.664	0.789	0.539
1982	11819198	13904105	9734291	432650	473065	392235	195456	41297	19383	0.548	0.64	0.457
1983	38209077	43487165	32930988	294486	324781	264191	188754	51584	12898	0.71	0.817	0.604
1984	7549963	10845174	4254751	238292	267772	208812	158205	79012	10080	0.832	0.951	0.712
1985	12359046	15341515	9376577	168059	185047	151072	182946	58373	5998	0.787	0.9	0.674
1986	23436516	27740869	19132162	288815	321579	256051	185137	36063	2643	0.884	1.003	0.764
1987	511175	3216888	0	163463	181254	145671	135022	55674	4410	0.89	1.015	0.766
1988	1442810	5621429	0	126941	144056	109825	126227	49833	4002	0.939	1.073	0.806
1989	2623166	5684478	0	178229	200612	155847	92840	32453	2410	0.888	1.022	0.755
1990	11049117	14223651	7874584	85310	96937	73684	61605	22548	2589	0.886	1.018	0.753
1991	12277185	14162503	10391867	52414	60321	44507	55208	36610	5386	0.875	1.008	0.742
1992	20621156	23615589	17626722	55814	61514	50115	81566	42477	10927	0.874	0.981	0.767
1993	5212195	6151408	4272983	119014	133952	104075	98631	70748	10766	0.932	1.047	0.816
1994	20248492	22983366	17513619	139261	158683	119840	95141	70668	3576	0.911	1.032	0.791
1995	5600800	6496346	4705255	197825	226053	169597	89859	71262	7695	0.82	0.937	0.702
1996	7872209	9191233	6553184	124912	139431	110392	92615	107207	5000	0.805	0.918	0.692
1997	4641366	5562319	3720413	253112	282948	223275	95391	67879	6684	0.629	0.729	0.529
1998	3468782	4121526	2816037	182752	202352	163151	95472	61399	5101	0.735	0.849	0.621
1999	52278672	59898058	44659287	141729	159497	123961	76009	43562	3835	0.824	0.951	0.697
2000	10186254	11581731	8790776	91483	104312	78654	54504	64185	8134	0.893	1.028	0.758
2001	958698	2457644	0	61624	70381	52867	47592	117882	7879	0.614	0.722	0.506
2002	1341073	2121141	561006	523362	596408	450315	65405	86051	3717	0.387	0.463	0.31
2003	1508352	2239266	777438	450852	506592	395111	47282	25975	1150	0.244	0.297	0.191
2004	1460362	1917095	1003630	312235	356753	267717	51896	20020	554	0.243	0.295	0.191
2005	14398949	15926109	12871790	234038	273858	194218	51528	12389	168	0.307	0.369	0.244
2006	3033564	3452039	2615089	163429	196212	130646	43334	23094	535	0.503	0.591	0.416
2007	1992846	2702311	1283380	136082	168943	103220	34672	32651	48	0.423	0.5	0.345
2008	1374472	1992391	756552	282911	321975	243848	33058	14503	199	0.25	0.302	0.198
2009	10329091	11381709	9276473	236544	274158	198930	35590	12326	52	0.195	0.236	0.154
2010	952186	2447633	0	221500	258120	184880	31940	13071	431	0.208	0.253	0.163
2011	113917	1229154	0	158629	182654	134604	36570	13067	24	0.298	0.359	0.237
2012	1300389	1797355	803424	332903	370206	295601	38162	5032	1	0.178	0.217	0.139
2013	576257	1046503	106011	262506	290522	234490	43734	3305	54	0.189	0.23	0.149
2014	5885774	7099376	4672172	184867	208136	161598	41143	5090	65	0.299	0.362	0.236
2015	1488346	2090597	886096	146053	167366	124740	35316	6255	21	0.407	0.496	0.317
2016	3279669	5072220	1487117	107505	127517	87493						

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