

**ECOREGION North Sea**  
**STOCK Haddock in Subarea IV (North Sea) and Division IIIa West (Skagerrak)**

**Advice for 2014**

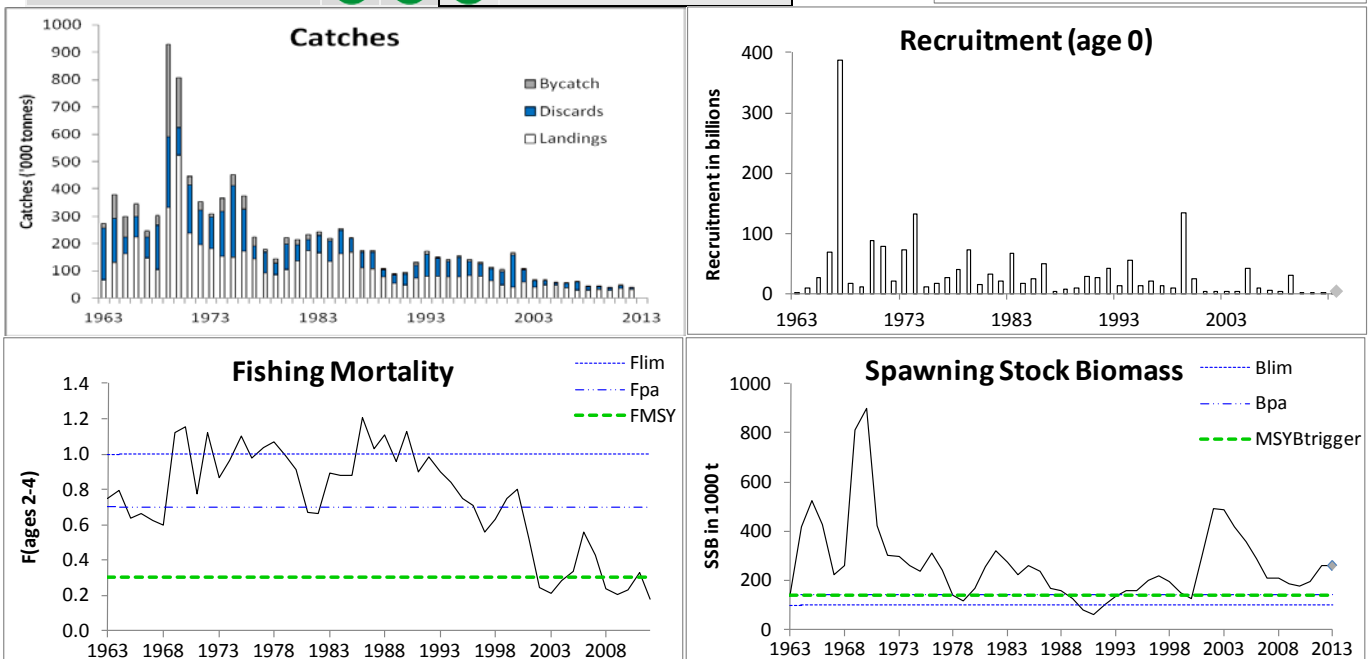
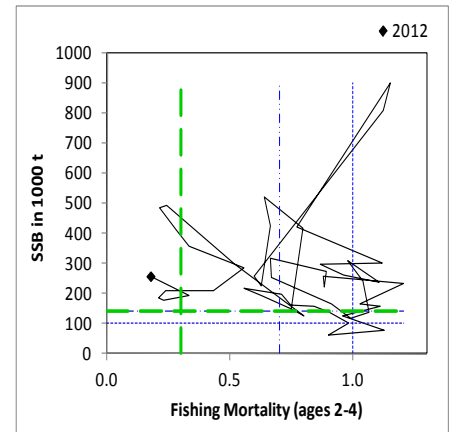
ICES advises on the basis of the EU–Norway management plan that the TAC (Human Consumption landings) should be no more than 40 639 tonnes in 2014. If rates of discards and industrial bycatch do not change from the average of the last 3 years (2010–2012), this implies catches of no more than 45 318 tonnes.

**Stock status**

F (Fishing Mortality)			
	2010	2011	2012
MSY ( $F_{MSY}$ )	✓	✗	✓ Appropriate
Precautionary approach ( $F_{pa}, F_{lim}$ )	✓	✓	✓ Harvested sustainably
Management plan ( $F_{MP}$ )	✓	✗	✓ Below target

SSB (Spawning-Stock Biomass)			
	2011	2012	2013
MSY ( $B_{trigger}$ )	✓	✓	✓ Above trigger
Precautionary approach ( $B_{pa}, B_{lim}$ )	✓	✓	✓ Full reproductive capacity
Management plan ( $SSB_{MP}$ )	✓	✓	✓ Above trigger



**Figure 6.4.7.1** Haddock in Subarea IV (North Sea) and Division IIIa West (Skagerrak). Summary of stock assessment (weights in thousand tonnes), Estimates are shaded. Top right: SSB and F over the time-series used in the assessment.

Fishing mortality has been below  $F_{pa}$  and around the  $F_{MSY}$  proxy and SSB has been above  $MSY B_{trigger}$  since 2001. Recruitment is characterized by occasional large year classes, the last of which was the strong 1999 year class. Apart from the 2005 and 2009 year classes which are about average, recent recruitment has been poor.

**Management plans**

A management plan was agreed by EU and Norway in 2008 (see Annex 6.4.7). ICES has evaluated the plan and concludes that it can be accepted as precautionary.

## Biology

The North Sea haddock stock exhibits sporadic high recruitment, leading to dominant year classes in the fishery. These large year classes often grow more slowly than less abundant year classes, possibly due to density-dependent effects. Recruitment appears poorly determined by either spawning-stock biomass or egg production. Haddock primarily prey on benthic and epibenthic invertebrates, sandeels, and herring eggs. Haddock are an important prey species, mainly for saithe and other large gadoids.

## Environmental influence on the stock

Haddock growth may be linked to water temperature. Warmer waters may lead to faster growth in early life stages, but also a lower maximum size (possibly due to faster maturation). There are indications that parental stock size has little effect on subsequent haddock recruitment success, which is principally determined by the environment.

## The fisheries

Haddock are primarily caught by demersal trawlers (single, twin, and pair), and (to a lesser extent) by seiners. Haddock is a specific target for some fleets, but is also caught as part of a mixed fishery catching cod, whiting, and *Nephrops*. The minimum permitted mesh size for targeted fisheries was increased to 120 mm in 2002. Estimates of haddock bycatch in the industrial fishery are low.

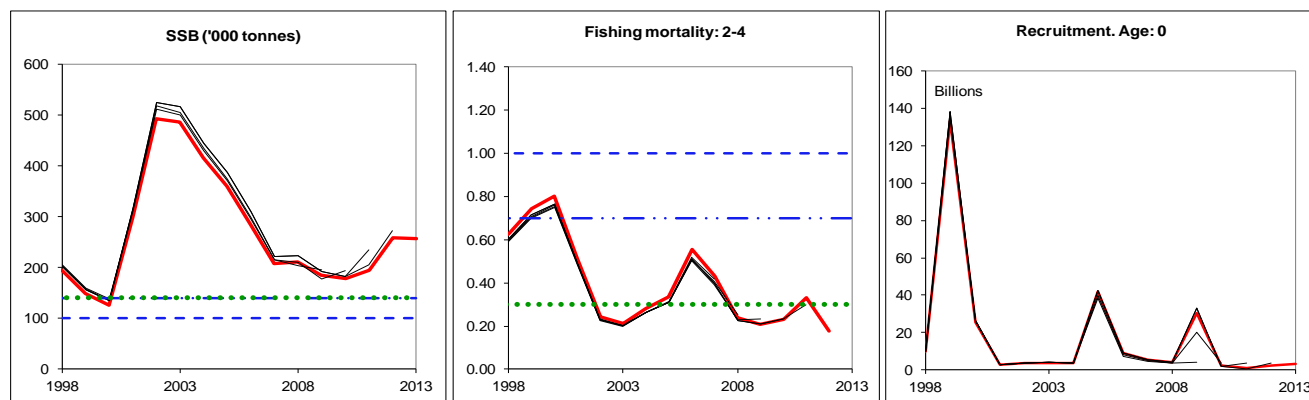
<b>Catch by fleet</b>	Total catch (2012) was 37.4 kt, where 88% were landings (of which 80% demersal trawl and seine >100 mm, 6% trawl 70–99 mm, and 14% others), 12% discards, and <0.5% industrial bycatch.
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## Effects of the fisheries on the ecosystem

Trawling impacts the benthos, as summarized in the North Sea ecosystem overview. Trawl gear are also relatively non-selective in terms of species caught, and trawl fisheries have a bycatch of non-commercial species that are important components of the North Sea ecosystem. Reduced benthic biomass is found in areas of bottom trawl activity compared to unfished areas. Since 2001, effort reductions in this fishery have likely led to decreased bycatches.

## Quality considerations

The overall reporting (in particular through the fully documented fisheries (FDF) programme) of catch data provided to ICES is likely to have improved in 2012 and 2013. The assessment shows strong consistency across the years.



**Figure 6.4.7.2** Haddock in Subarea IV (North Sea) and Division IIIa West (Skagerrak). Historical assessment results (final-year recruitment estimates included).

## Scientific basis

<b>Assessment type</b>	Age-based analytical assessment (XSA).
<b>Input data</b>	Commercial catches (international landings, ages from catch sampling), three survey indices: IBTS Q1, ScoGFS Q3, EngGFS Q3. (ScoGFS Q3 and EngGFS Q3 are split into two time-periods). Maturity data and natural mortality assumed fixed over time.
<b>Discards and bycatch</b>	Discards (observations available since 1978) and industrial bycatch are included in the assessment.
<b>Indicators</b>	None.
<b>Other information</b>	Last benchmarked in 2011 ( <a href="#">WKBENCH 2011</a> ). To be benchmarked (along with Division VIa haddock) in early 2014.
<b>Working group report</b>	<a href="#">WGNSSK</a> (ICES, 2013a)

## 6.4.7

Supporting information June 2013

ECOREGION North Sea  
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## Reference points

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
Management Plan	$F_{MP}$	0.3	
	$SSB_{MP}$	100 000 t	Trigger value $B_{lim}$ .
MSY Approach	$MSY B_{trigger}$	140 000 t	Default to value of $B_{pa}$ .
	$F_{MSY}$	0.3	Provisional proxy is the management target $F_{mgt}$ , within the range of fishing mortalities consistent with $F_{MSY}$ (0.25–0.48).
Precautionary Approach	$B_{lim}$	100 000 t	Smoothed $B_{loss}$ .
	$B_{pa}$	140 000 t	$B_{pa} = 1.4 * B_{lim}$ .
	$F_{lim}$	1.0	$F_{lim} = 1.4 * F_{pa}$ .
	$F_{pa}$	0.7	10% probability that SSB (medium term) < $B_{pa}$ .

(unchanged since: 2011)

## Outlook for 2014

Basis: F (2013) = average (2010–2012), scaled to 2012 = 0.1756; SSB (2014) = 242.848; Human consumption landings (2013) = 38.693; Discards (2013) = 3.037; Industrial bycatch (2013) = 0.068; Recruitment (2013) = trimmed GM = 3103.226 million.

Rationale	Total catch 2014	Human consumption Landings 2014	Discards 2014	IBC 2014	Basis	Total F 2014	F(landings) 2014	F(disc) 2014	F(IBC) 2014	SSB 2015	% SSB change <sup>1)</sup>	% TAC change <sup>2)</sup>
Management plan	45.318	40.639	4.581	0.098	15% TAC decrease (F <sub>2013</sub> *1.71)	0.332	0.226	0.106	0.0003	200	-22%	-15%
MSY approach	41.418	37.146	4.174	0.098	F <sub>MSY</sub> (F <sub>2013</sub> *1.70)	0.300	0.204	0.096	0.0003	204	-21%	-22%
Precautionary approach	95.538	85.775	9.670	0.093	F <sub>pa</sub> (F <sub>2013</sub> *3.98)	0.700	0.476	0.223	0.0003	145	-44%	80%
IBC only	0.102	0.000	0.000	0.102	F = 0	0.000	0.000	0.000	0.0003	249	-3%	-100%
Other options	19.296	17.286	1.910	0.100	0.75 * F <sub>2013</sub>	0.132	0.090	0.042	0.0003	228	-11%	-64%
	25.315	22.697	2.518	0.100	F <sub>2013</sub>	0.176	0.119	0.056	0.0003	222	-14%	-53%
	61.263	54.982	6.185	0.096	15% TAC increase	0.446	0.303	0.142	0.0003	182	-29%	15%
	53.281	47.810	5.374	0.097	Rollover TAC (F <sub>2013</sub> *1.93)	0.386	0.263	0.123	0.0003	191	-26%	0%
	31.148	27.935	3.114	0.099	1.25 * F <sub>2013</sub>	0.219	0.149	0.070	0.0003	215	-16%	-42%
<i>Mixed-fisheries options – minor differences with calculation above can occur due to different methodology used (ICES, 2013b) □</i>												
Maximum	54.133	49.366	4.768	-	A	0.42	-	-	-	185.550	-24%	+3%
Minimum	14.634	13.390	1.244	-	B	0.1	-	-	-	227.893	-6%	-72%
Cod MP	14.891	13.625	1.266	-	C	0.1	-	-	-	227.615	-6%	-72%
SQ effort	28.730	26.258	2.472	-	D	0.2	-	-	-	212.663	-12%	-45%
Effort Mgt	10.648	9.746	0.902	-	E	0.07	-	-	-	232.223	-4%	-80%

Weights in thousand tonnes.

Under the assumption that effort is linearly related to fishing mortality.

<sup>1)</sup> SSB 2015 relative to SSB 2014.

<sup>2)</sup> Human Consumption 2014 relative to TACs 2013 (TAC for IV + IIIa = 47 810 t).

Mixed-fisheries assumptions:

- A. Maximum scenario: Fleets stop fishing when the last quota is exhausted.
- B. Minimum scenario: Fleets stop fishing when the first quota is exhausted.
- C. Cod management plan scenario: Fleets stop fishing when the cod quota is exhausted.
- D. SQ effort scenario: Effort in 2012 and 2013 as in 2011.
- E. Effort management scenario: Effort reductions according to cod and flatfish management plans.

### ***Management plan***

In 2008 the EU and Norway agreed a revised management plan for this stock, which states that every effort will be made to maintain a minimum level of SSB greater than 100 000 t ( $B_{lim}$ ). Furthermore, fishing was restricted on the basis of a TAC consistent with a fishing mortality rate of no more than 0.30 for appropriate age groups, along with a limitation on interannual TAC variability of  $\pm 15\%$ . Following a minor revision in 2008, interannual quota flexibility (“banking and borrowing”) of up to  $\pm 10\%$  is permitted (although this facility has not yet been used). The stipulations of the management plan have been adhered to by the EU and Norway since its implementation in January 2007.

Following the agreed management plan implies fishing at the target rate of 0.3, which results in a TAC (Human Consumption landings) reduction of more than 15%. Therefore, the maximum TAC reduction of 15% is applied, resulting in human consumption landings of no more than 40 639 t in 2014. If rates of discards and industrial bycatch do not change from the average of the last 3 years (2010–2012), this implies catches of no more than 45 318 t.

This advice implies a reduction in TAC (15%) and increase in F (71%) which is due to the absence of young fish recruiting to the population, and hence a predicted decline in spawning-stock biomass. The possibility of extended periods of low recruitment was accounted for in the 2008 evaluation of the management plan that was deemed to be sustainable.

### ***MSY approach***

Following the ICES MSY approach implies fishing mortality to be increased to 0.3, resulting in a TAC (Human Consumption landings) of no more than 37 146 t in 2014. If rates of discards and industrial bycatch do not change from the average of the last 3 years (2010–2012), this implies catches of no more than 41 418 t. This is expected to lead to an SSB of 204 000 t in 2015.

### ***Precautionary approach***

The fishing mortality in 2014 should be no more than  $F_{pa}$ , corresponding to human consumption landings of 85 775 t in 2014. If rates of discards and industrial bycatch do not change from the average of the last 3 years (2010–2012), this implies catches of no more than 95 538 t. This is expected to keep SSB just above  $B_{pa}$  in 2015.

### ***Mixed fisheries***

In contrast to single-species advice there is no single recommendation for mixed fisheries (ICES, 2013b), but rather a range of example scenarios, assuming fishing patterns and catchability in 2013 and 2014 are unchanged from those in 2012. Major differences between the outcomes of the various scenarios indicate potential undershoot or overshoot of the advised landings corresponding to the single-species advice. As a result, fleet dynamics may change, but cannot be determined.

Cod is the limiting species for the North Sea demersal fisheries in 2014. In all scenarios except the ‘max’, the haddock management plan catch options could not be fully utilized.

### **Additional considerations**

Adherence to the EU–Norway management plan has contributed to lower fishing mortality levels and greatly improved stability of yield. Discards are highly variable without obvious long-term trend but appear to be declining in recent years. Discard rates in 2012 are the lowest observed in the time series and appear to be linked to low recruitment.

ICES has developed a generic approach to evaluate whether new survey information that becomes available in September forms a basis to update the advice. If this is the case, ICES will publish new advice in November 2013.

### ***Management plan evaluations***

The evaluations of the management plan that were carried out during 2007 and 2008 used a recruitment model which is thought to capture the sporadic nature of haddock recruitment. On this basis, a target  $F = 0.3$  with TAC constraint  $\pm 15\%$  leads to a low risk (<12% in any year) of  $B < B_{lim}$  over the next 20 years, and a mean risk of 5% over all years. Lower Fs lead to lower risks. Interannual quota flexibility (banking and borrowing) has also been evaluated and it is concluded that this has no significant impact on sustainability.

ICES concludes that the management plan can be accepted as precautionary and can be used as the basis for advice.

### ***Regulations and their effects***

Effort restrictions in the EU were introduced in 2003 (annexes to the annual TAC regulations) for the protection of the North Sea cod stock. In addition, a long-term plan for the recovery of cod stocks was adopted in 2008 (EC regulation 1342/2008). In 2009, the effort management programme switched from a days-at-sea to a kW-day system (EC regulation 43/2009), in which different amounts of kW-days are allocated within each area by member state to different groups of vessels depending on gear and mesh size. Effort ceilings are updated annually. However, for 2013, the European Council decided upon a roll-over of effort level of 2012 into 2013 for both the cod and the sole/plaice management plan.

Overall nominal effort (kW-days) by EU demersal trawls, seines, beam trawls, gill/trammel nets and longlines (all mesh sizes included) in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced since the implementation of the two successive effort management plans in 2003 and 2008 (-40% between 2003 and 2012, -16% between 2008 and 2012). Following the introduction of days-at-sea regulations in 2003, there was a substantial switch from the larger mesh (>100 mm, TR1) gear to the smaller mesh (70–99 mm, TR2) gear. Subsequently, effort by TR1 has been relatively stable, whereas effort in TR2 and in small mesh beam trawl (80–120 mm, BT2), has shown a pronounced decline (-14%, -45%, and -48%, respectively, between 2004 and 2012). Gill and trammel nets fisheries have remained stable (ICES, 2013b). Effort in large mesh size beam trawl (>=120 mm, BT1) has increased significantly in 2012 after a decade of continuous decline. Nominal effort reported by Norway has increased since 2011 due to the generalization of electronic logbooks.

Scotland implemented in February 2008 a national scheme known as the ‘Conservation Credits Scheme’. The principle of this two-part scheme involves additional time at sea in return for the adoption of measures which aim to reduce mortality on cod and lead to a reduction in discard numbers (real-time closures and technical measures). In 2010 there were 165 closures, and from July 2010 the area of each closure increased (from 50 square nautical miles to 225 square nautical miles). During 2011 there were 185 of these larger closures, while there were 173 in 2012. The effects of this regulation on the behaviour of the fleet and on the haddock stock have been investigated, but do not show a consistent pattern.

#### *Changes in fishing technology and fishing patterns*

The expansion of the closed-circuit TV (CCTV) and fully documented fisheries (FDF) programmes in 2010–2013 in Scotland, Denmark, and England is expected to have contributed to the reduction of cod mortality. Under this scheme, UK vessels are not permitted to discard any cod, while Danish vessels are still permitted to discard undersize cod. For both nations, all cod caught are counted against the quota. Vessels carrying CCTV systems may preferentially target haddock to prevent exhausting the cod quota and having to tie up. The uptake of Scottish haddock quota in 2012 was very close to 100%, which contrasts with historical under-utilisation of the quota and supports the hypothesis of increased targeting in combination with a quota that was predicted to be restrictive.

#### *Information from the fishing industry*

The 2012 report of the North Sea Stock Survey (Napier, 2012) shows the industry’s perception of increasing haddock abundance in all areas of the North Sea in 2012. This does not concur with the stock assessment perception up to 2009. In the last three years both the stock assessment and industry perception show an increasing trend.

#### *Effect of the environment on the stock*

Baudron *et al.* (2011) has suggested that haddock growth may be linked to temperature. Warmer waters lead to faster growth in early life stages, but also (potentially) faster maturation and hence a lower maximum size. Water temperature in the North Sea has increased and Wright *et al.* (2011) also shows that smaller size at maturity was partly linked to temperature rises and a greater proportion of haddock maturing at a younger age. Other ongoing work (Marine Scotland, unpublished) has indicated that haddock recruitment is only weakly linked to spawning-stock biomass, being more obviously determined by ecosystem factors.

#### *Revisions in data and methodologies*

The approach used to collate discard data has changed to conform to the EU Data Collection Framework (DCF), beginning with the 2009 data year. Direct comparisons with the previous method are not available, but analysis shows that the 2009 estimates are well within the range of recent variation. This suggests that the new collation method has not changed the perception of discard rates for haddock.

Prior to 1977 there were few discard observations, therefore discard estimates used in the assessment come from a statistical model. Since 1978, observed discards are used in the assessment. Discard estimates for 2012 derived from sampling by the main countries fishing haddock.

The overall reporting (in particular through the fully documented fisheries programme) of catch data provided to ICES has improved in 2012. International landings and discard rate estimates were provided and raised according to Data Collection Framework (DCF) metier categories.

#### *Uncertainties in assessment and forecast*

The assessment is suspected to be sensitive to the choice of assessment model. However, the current model generates a consistent time-series on which the management plan is based. The management plan was evaluated in 2008 and 2009 on this basis and was deemed to be sustainable.

#### *Comparison with previous assessment and advice*

There is close agreement between the assessments in 2012 and 2013.

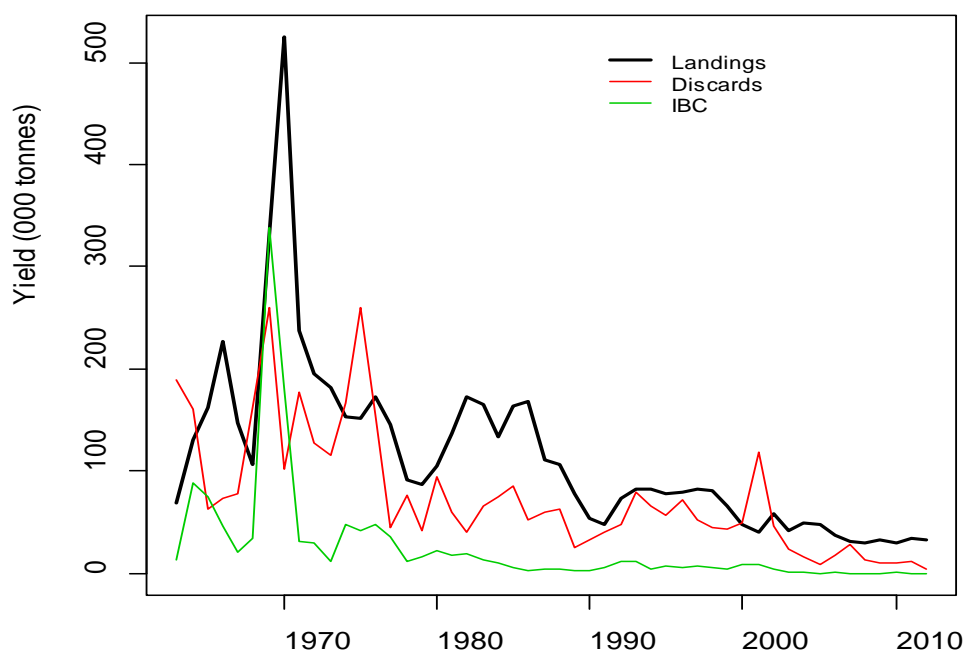
The basis for the advice is the same as last year: the agreed management plan.

#### **Assessment and management area**

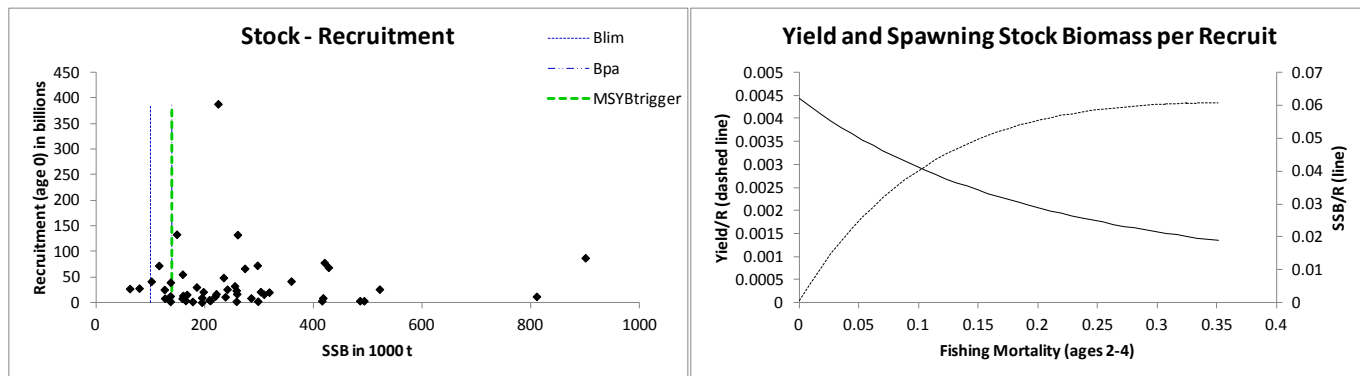
The advice for this stock is given for Subarea IV (North Sea) and Division IIIaW (Skagerrak), while the TACs for this stock are set for Division IIa (EU waters) and Subarea IV, and the whole of Subarea III, respectively.

#### **Sources**

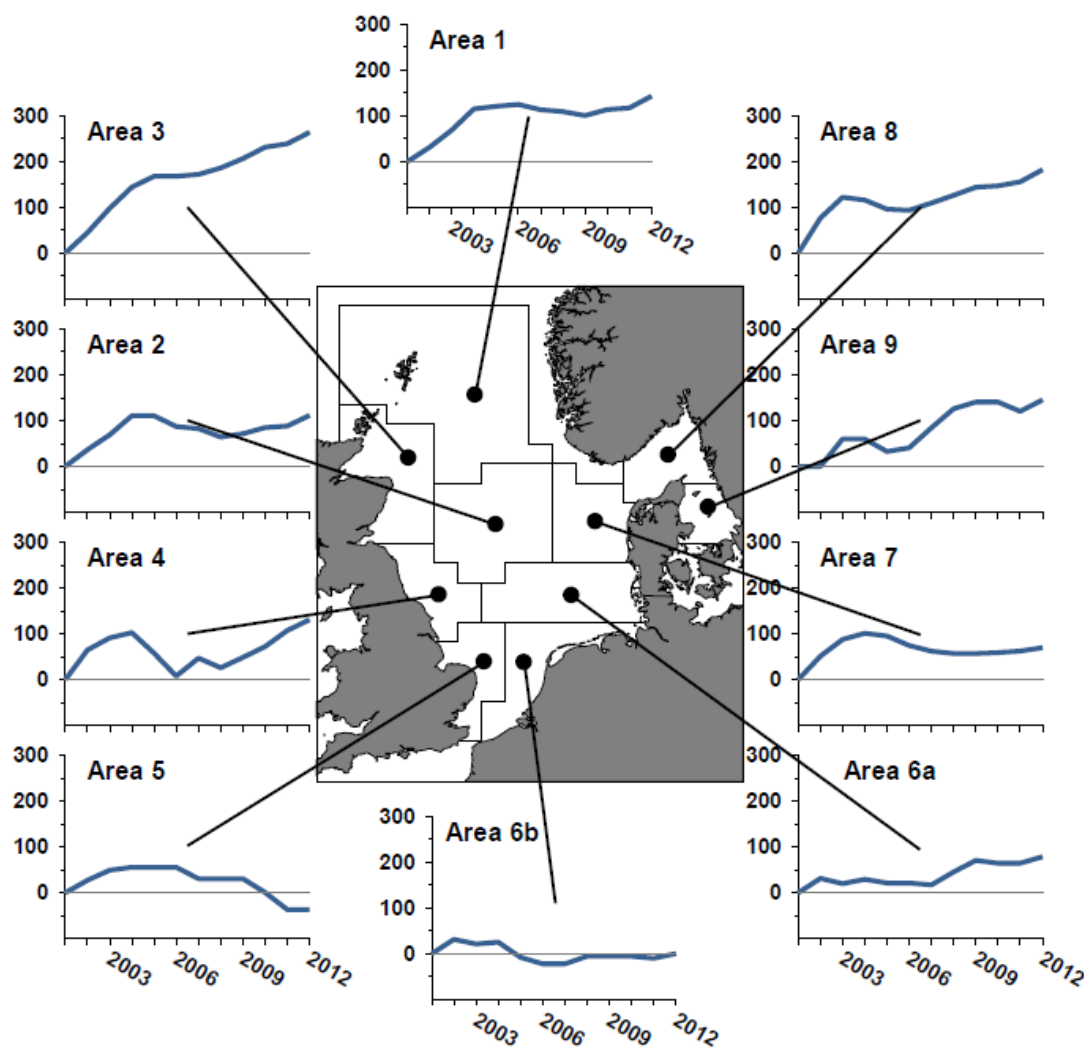
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**Figure 6.4.7.3** Haddock in Subarea IV (North Sea) and Division IIIaW (Skagerrak). Catch components (in thousand tonnes) subdivided by landings, discards, and industrial bycatches (IBC).



**Figure 6.4.7.4** Haddock in Subarea IV (North Sea) and Division IIIaW (Skagerrak). Stock–recruitment (left) and yield-per-recruit plot (right).



**Figure 6.4.7.5** Haddock in Subarea IV and Division IIIa. Results of the 2012 North Sea Stock Survey abundance index (Napier, 2012). Each plot presents a summary of the responses by North Sea roundfish reporting area.



**Table 6.4.7.1**

Haddock in **Subarea IV (North Sea)**. ICES advice, management, and catch. . The landings in Subarea IV are calculated as 94% of the combined area total.

Year	ICES Advice	Predicted landings corresp. to advice	Agreed TAC	Off. Indgs.	ICES catches			
					Hum. 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 consideration / F should be below $F_{pa}$	No forecast <sup>2</sup>	85	48	47	17	1	65
2005	Mixed-fisheries consideration / F should be below $F_{pa}$	92 <sup>2</sup>	66	31	48	10	0	57
2006	Mixed-fisheries consideration / F < 0.3	39 <sup>2</sup>	52	36	36	17	0	55
2007	Mixed-fisheries consideration / F < 0.3	55.4 <sup>2</sup>	55	31	31	30	0	61
2008	Mixed-fisheries consideration / 15% TAC reduction	49.3 <sup>1-2</sup>	46	30	29	13	0	42
2009	Mixed-fisheries consideration / Apply management plan	44.7 <sup>1-2</sup>	42	31	31	10	0	41
2010	Mixed-fisheries consideration / Apply management plan	38 <sup>1-2</sup>	36	28	28	10	0	38
2011	See scenarios	-	34	26	34	11	0	46
2012	Apply management plan	41.575 <sup>1-2</sup>	39	30	30	4	1	35
2013	Apply management plan	47.811 <sup>1-2</sup>	45.041					
2014	Apply management plan	38.201 <sup>2</sup>						

Weights in thousand tonnes.

<sup>1</sup> Including industrial bycatch.

<sup>2</sup> The exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits.

**Table 6.4.7.2**

Haddock in **Division IIIaW (Skagerrak)**. ICES advice, management, and landings. The landings in Division IIIa are calculated as 6% of the combined area total.

Year	ICES Advice	Predicted landings corresp. to advice	Agreed TAC	Official Landings	ICES Catches			
					Hum. Cons.	Disc Slip.	Indust. 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	-	2.77					
2014	Apply management plan North Sea	2.438						

Weights in thousand tonnes.

n/a = not available.

**Table 6.4.7.3**

Haddock in Subarea IV (North Sea) and Division IIIaW (Skagerrak). Landings and catches by country and area.

COUNTRY	DIVISION	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Belgium	III a	0	0	0	0	0	0	0	0	0	0	0
Denmark	III a	3791	1741	1116	615	1001	1054	1052	1263	1139	1648	1916
Germany	III a	239	113	69	69	186	206	87	105	65	102	117
Netherlands	III a	0	6	1	0	0	0	0	0	1	0	0
Norway	III a	149	211	154	93	113	152	170	121	125	125	239
Portugal	III a	0	0	0	0	30	37	0	0	0	0	0
Sweden	III a	393	165	158	180	246	278	276	166	126	198	209
UK -E+W+NI	III a	0	0	0	0	0	0	0	0	0	0	0
UK - Scot	III a	0	0	0	0	0	0	0	0	0	0	0
Official landings	III a	4572	2236	1498	957	1576	1727	1585	1655	1456	1841	2481
ICES landings	III a	4137	1808	1443	764	1537	1515	1374	1515	1287	9850	2620
ICES discards	III a		195	112	217	970	816	646	556	608	1744	730
ICES total catch	III a	4137	2003	1555	981	2507	2332	2020	2072	1896	11595	3350
TAC	III a	6300	3150	4940	4018	3189	3360	2856	2590	2201	2095	2770
Belgium	IV	559	374	373	190	105	179	113	108	78	105	79
Denmark	IV	5123	3035	2075	1274	759	645	501	553	725	698	947
Faeroe Islands	IV	25	12	22	22	4	0	3	32	5	0	0
France	IV	914	1108	552	439	444	498	448	125	277	237	175
Germany	IV	852	1562	1241	733	725	727	393	657	634	575	512
Netherlands	IV	359	187	104	64	33	55	29	24	41	72	191
Norway	IV	2404	2196	2258	2089	1798	1706	1482	1278	1119	1188	1033
Poland	IV	17	16	0	0	8	8	16	0	0	0	0
Portugal	IV	0	0	0	0	76	0	0	0	0	0	0
Sweden	IV	572	477	188	135	100	130	83	141	90	128	103
UK - E+W+NI	IV	3647	1561	1159	651	485	1799	1378	2155	2362		
UK – Scot	IV	39624	31527	39339	25319	31905	24919	25987	26238	22622		
UK – all	IV									24984	22648	27341
Official landings	IV	54096	42055	47311	30916	36442	30666	30433	31311	27953	25651	30381
ICES landings	IV	54171	40140	47253	47616	36074	29418	28893	31264	27770	26275	30348
ICES discards	IV	45892	23499	15439	8416	16943	27805	12532	9986	9515	10249	3738
ICES IBC	IV	3717	1150	554	168	535	48	199	52	431	23	0.039
ICES total catch	IV	103780	64788	63246	56200	53551	57271	41624	41302	37717	36547	34086
TAC	IV	104000	51735	77000	66000	51850	54640	46444	42110	35794	34057	45040
ICES landings	IV & IIIa	58308	41948	48697	48380	37611	30934	30267	32779	29058	36125	33059
ICES discards	IV & IIIa	45892	23694	15550	8633	17913	28621	13178	10543	10124	11993	4501
ICES IBC	IV & IIIa	3717	1150	554	168	535	48	199	52	431	23	1
ICES total catch	IV & IIIa	107917	66792	64800	57181	56058	59603	43644	43374	39612	48141	37561
TAC	IV & IIIa	110300	54885	81940	70018	55039	58000	49300	44700	37995	36152	41575
ICES quota uptake		53%	76%	59%	69%	68%	53%	61%	73%	76%	100%	80%

**Table 6.4.7.4** Haddock in Subarea IV (North Sea) and Division IIIaW (Skagerrak). Summary of stock assessment.

	Recruitment	TSB	SSB	Catch	Landings	Discards	Bycatch	Yield/SSB	Mean F(2-4)
1963	2314960	3412683	137050	271851	68821	189330	13700	0.502	0.745
1964	9155373	1281817	417713	379915	131006	160309	88600	0.314	0.794
1965	26286878	1080997	521738	299343	162418	62325	74600	0.311	0.639
1966	68923101	1480495	427838	346349	226184	73465	46700	0.529	0.662
1967	388349879	5527432	224790	246664	147742	78222	20700	0.657	0.626
1968	17114655	6851991	259396	301821	105811	161810	34200	0.408	0.597
1969	12133703	2477668	810542	930043	331625	260065	338353	0.409	1.121
1970	87603165	2541724	900215	805776	524773	101274	179729	0.583	1.152
1971	78183136	2546129	420392	446824	237502	177776	31546	0.565	0.773
1972	21423632	2181798	302958	353084	195545	127954	29585	0.645	1.119
1973	72899283	4085944	297087	307594	181592	114735	11267	0.611	0.867
1974	132782108	4708422	260633	366992	153057	166429	47505	0.587	0.963
1975	11403696	2383875	238058	453205	151349	260370	41487	0.636	1.104
1976	16381746	1096449	309033	375305	172680	154462	48163	0.559	0.976
1977	26150710	1066970	241589	224516	145118	44376	35022	0.601	1.039
1978	39744556	1134862	137248	179375	91683	76789	10903	0.668	1.066
1979	72494671	1348844	116074	145019	87069	41710	16240	0.75	0.992
1980	15762259	1466405	167440	222127	105041	94614	22472	0.627	0.91
1981	32573237	993166	255403	213240	136132	60067	17041	0.533	0.667
1982	20481167	1088498	318717	233283	173335	40564	19383	0.544	0.664
1983	66907115	2249316	273915	244212	165337	65977	12898	0.604	0.892
1984	17177582	1687290	221318	218946	133568	75298	10080	0.604	0.881
1985	23909178	1185101	258408	255366	164119	85249	5998	0.635	0.877
1986	48938701	1937034	234848	223081	168236	52203	2643	0.716	1.206
1987	4142071	1094118	165079	173852	110299	59143	4410	0.668	1.027
1988	8335950	628563	158854	173124	106973	62148	4002	0.673	1.11
1989	8599596	622238	126905	106526	78439	25677	2410	0.618	0.957
1990	28285263	1578502	79776	88934	53780	32565	2589	0.674	1.125
1991	27405410	1548619	62403	93287	47715	40185	5386	0.765	0.898
1992	41659387	1356841	102106	131650	72790	47934	10927	0.713	0.983
1993	13021649	1011378	137116	172551	82176	79609	10766	0.599	0.902
1994	55427392	1470832	159452	151020	82074	65370	3576	0.515	0.841
1995	13954774	1155066	160348	142524	77458	57371	7695	0.483	0.747
1996	21227007	1041768	197709	156609	79148	72461	5000	0.4	0.71
1997	12600705	959556	219424	141347	82574	52089	6684	0.376	0.557
1998	9874593	776833	195019	131316	81054	45160	5101	0.416	0.627
1999	133501618	3546973	148698	112021	65588	42598	3835	0.441	0.745
2000	25617352	3429716	126118	104457	47553	48770	8134	0.377	0.801
2001	2728460	1185703	298022	166960	40856	118225	7879	0.137	0.517
2002	3585892	849841	493227	107923	58348	45857	3717	0.118	0.241
2003	3749453	738293	485657	66805	41964	23691	1150	0.086	0.212
2004	3608535	735324	415791	64839	48734	15551	554	0.117	0.28
2005	42003728	2787581	359286	57162	48357	8637	168	0.135	0.334
2006	9049360	1393103	285459	56056	37613	17908	535	0.132	0.556
2007	5523197	770942	208556	59643	30939	28657	48	0.148	0.43
2008	4090983	589255	210380	43640	30248	13193	199	0.144	0.239
2009	30449019	1811890	185258	43407	32807	10548	52	0.177	0.207
2010	2173968	610507	177868	39640	29054	10155	431	0.163	0.23
2011	770959	393263	194942	46378	34840	11515	23	0.179	0.331
2012	2506199	438587	258458	37558	33052	4505	1	0.128	0.176
2013	3103226*		257701**						

\* Geometric mean of the five lowest recruitment values over the period 1994–2010

\*\* Estimated FLXSA survivors from 2012

#### **Annex 6.4.7 EU and Norway Management plan**

*“The plan shall consist of the following elements:*

- 1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass greater than 100,000 tonnes (Blim).*
- 2. For 2009 and subsequent years the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of no more than 0.3 for appropriate age-groups, when the SSB in the end of the year in which the TAC is applied is estimated above 140,000 tonnes (Bpa).*
- 3. Where the rule in paragraph 2 would lead to a TAC, which deviates by more than 15 % from the TAC of the preceding year, the Parties shall establish a TAC that is no more than 15 % greater or 15 % less than the TAC of the preceding year.*
- 4. Where the SSB referred to in paragraph 2 is estimated to be below Bpa but above Blim the TAC shall not exceed a level which will result in a fishing mortality rate equal to  $0.3 - 0.2 * (Bpa - SSB) / (Bpa - Blim)$ . This consideration overrides paragraph 3.*
- 5. Where the SSB referred to in paragraph 2 is estimated to be below Blim the TAC shall be set at a level corresponding to a total fishing mortality rate of no more than 0.1. This consideration overrides paragraph 3.*
- 6. In the event that ICES advises that changes are required to the precautionary reference points Bpa (140,000t) or Blim, (100,000t) the Parties shall meet to review paragraphs 1-5.*
- 7. In order to reduce discarding and to increase the spawning stock biomass and the yield of haddock, the Parties agreed that the exploitation pattern shall, while recalling that other demersal species are harvested in these fisheries, be improved in the light of new scientific advice from inter alia ICES.*
- 8. No later than 31 December 2013, the parties shall review the arrangements in paragraphs 1 to 7 in order to ensure that they are consistent with the objective of the plan. This review shall be conducted after obtaining inter alia advice from ICES concerning the performance of the plan in relation to its objective.*
- 9. This arrangement enters into force on 1 January 2009.”*