

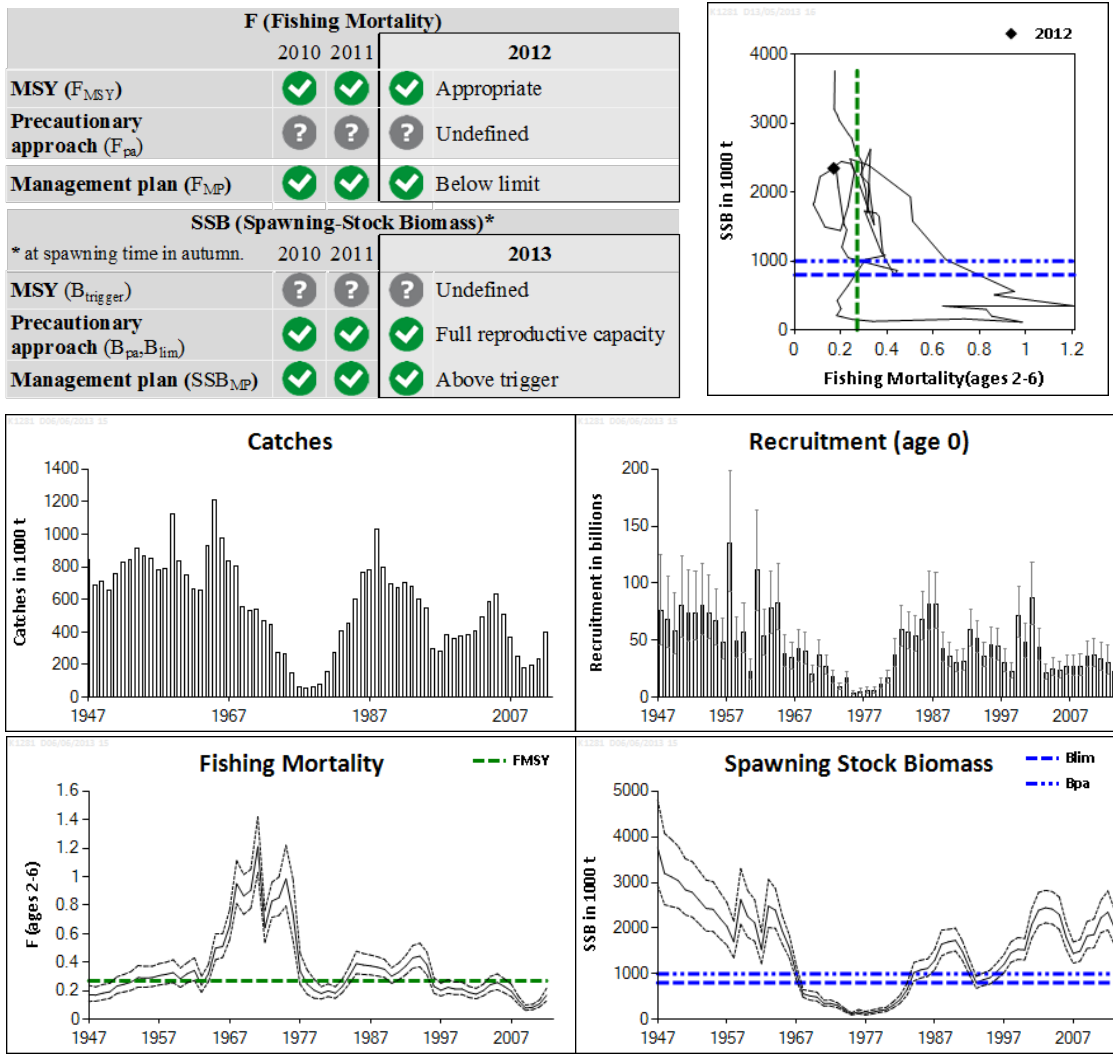
**6.4.9** **Advice May 2013**

**ECOREGION** North Sea  
**STOCK** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners)

**Advice for 2013**

ICES advises on the basis of the agreed EU–Norway management plan that catches in 2014 should be no more than 482 477 t, including 470 037 t for the A-fleet. All catches are assumed to be landed. ICES advises that activities that have a negative impact on the spawning habitat of herring, such as extraction of marine aggregates and construction on the spawning grounds, should not occur.

**Stock status**



**Figure 6.4.9.1** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). Summary of stock assessment with 95% confidence intervals, predicted recruitment value is shaded. Top right: SSB and F for the time-series used in the assessment.

Since 2007 SSB has been increasing and it is currently well above  $B_{pa}$ . Fishing mortality has been low for the past five years, and while it has increased recently it is still below  $F_{MSY}$ . The year classes from 2002 onwards are estimated to be among the weakest since the late 1970s. The recruits per spawner in the last decade are the lowest observed. Thus, ICES considers that the stock is still in a low productivity phase.

**Management plans**

A management plan was agreed by EU and Norway in 2008 (see Annex 6.4.9). ICES has evaluated this management plan and concluded that the plan is consistent with the precautionary approach and the MSY approach. ICES has evaluated the current and new options of the management plan in 2012. ICES concludes that all management plans tested included precautionary options (see ICES Advice 2012, Section 6.3.3.6 ).

## Biology

Herring is considered to have a major impact on other fish stocks as prey and predator and is itself prey for seabirds and marine mammals. Trends in natural mortality-at-age can be observed where natural mortality has increased over the period 1963–1978, decreased in 1979–1990, and increased again in the period 1991–2007. Spawning and nursery areas are sensitive and vulnerable to anthropogenic influences. Gravel extraction or disturbance in the close vicinity of any herring spawning will disturb that spawning activity and will reduce the available area for successful spawning. Herring abandon and repopulate spawning grounds and an absence of spawning in any particular year does not mean that the spawning ground is not required to maintain a resilient herring population.

### Environmental influence on the stock

Year-class strength has been consistently weak since 2002, something that has never been observed before when SSB was above the  $B_{lim}$  (800 000 t). The poor recruitment is attributed to reduced survival during the larval stage. The productivity of the stock (in terms of recruits-per-spawner and larval survival) in the last decade are the lowest on record. Environmental variability is hypothesized to underlie these changes, but a mechanistic understanding remains elusive.

### The fisheries

North Sea herring is caught for human consumption and as a bycatch in industrial fisheries. In the transfer area in the eastern North Sea and Division IIIa it is caught mixed with western Baltic spring-spawning herring. The fishery is seasonal, taking place mostly in the late spring and summer in the central and northern North Sea, and in the autumn and winter in the southern North Sea.

#### Catch distribution

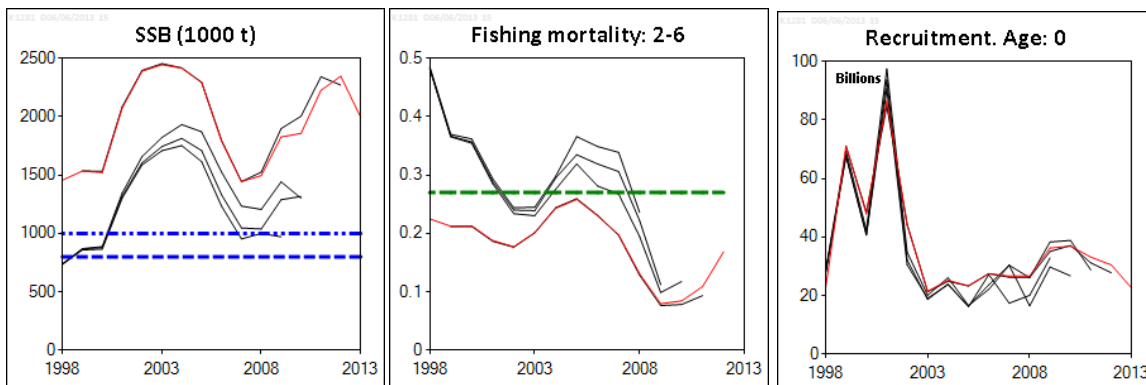
Total landings (2012) are 405 kt directed NS fisheries – fleet A, 18 kt bycatches – fleet B, 8 kt directed Division IIIa fisheries – fleet C, and 4 kt bycatch in Division IIIa fisheries – fleet D. Most of the catches are taken by pelagic trawl.

### Effects of the fisheries on the ecosystem

The human consumption fisheries for herring have little bycatch of other fish and cause almost no disturbance to the seabed. Evidence from observer programmes on human consumption fisheries suggests that discarding of herring is not wide-spread. Interactions between the human consumption North Sea herring fishery with marine mammals, sharks and sea birds are considered to be rare. Juvenile herring are caught as bycatch in industrial fisheries.

### Quality considerations

Both the spawning stock biomass and the fishing mortality are reliably estimated by the stock assessment. The consistent underestimation of spawning stock biomass observed over the past years has not been observed this year. There is limited knowledge about the present rate of discarding.



**Figure 6.4.16.2** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). Historical assessment results (final-year recruitment estimates included). The stock was benchmarked in 2012.

### Scientific Basis

<b>Assessment type</b>	Age-based analytical model (SAM).
<b>Stock data category</b>	Category 1
<b>Input data</b>	Commercial catches; One trawl survey (IBTS Q1 1-wr), two larval surveys (SCAI and IBTS0), and an acoustic survey (HERAS); Annual maturity ogives from HERAS; Natural mortality from North Sea multispecies stock assessment (SMS); Annual stock weights from HERAS.
<b>Discards and bycatch</b>	Included in the assessment.
<b>Indicators</b>	None.
<b>Other information</b>	The last benchmark for this stock occurred in 2012
<b>Working group report</b>	<a href="#">HAWG</a>

**6.4.9** **Supporting information May 2013**  
**ECOREGION**      **North Sea**  
**STOCK**            **Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners)**

**Reference points**

	Type	Value	Technical basis
Management plan	F <sub>MP</sub>	F <sub>0-1</sub> = 0.05 F <sub>2-6</sub> = 0.25	SSB is greater than the SSB <sub>MP</sub> upper trigger of 1.5 million t (based on simulations).
		F <sub>0-1</sub> = 0.05 F <sub>2-6</sub> = 0.25 – (0.15 × (1 500 000 – SSB) / 700 000)	SSB is between the SSB <sub>MP</sub> triggers of 0.8 and 1.5 million t (based on simulations).
		F <sub>0-1</sub> = 0.04 F <sub>2-6</sub> = 0.10	SSB is less than the SSB <sub>MP</sub> lower trigger of 0.8 million t (based on simulations).
MSY Approach	MSY B <sub>trigger</sub>	Not defined.	
	F <sub>MSY</sub>	0.27 [0.24 – 0.3]	Stochastic simulations with Beverton & Holt and Ricker stock–recruitment curve.
Precautionary approach	B <sub>lim</sub>	800 000 t.	< 0.8 million t; poor recruitment has been experienced.
	B <sub>pa</sub>	1.0 million t.	Based on 5% risk of falling below B <sub>lim</sub> and the terminal year spawning stock biomass CV from the SAM assessment.
	F <sub>lim</sub>	Not defined.	
	F <sub>pa</sub>	Not defined.	

(Changed in 2013, WKHELP (ICES, 2012c).

The current management plan is based on the pre-benchmarked perception of the stock.

ICES suggests a range for F<sub>MSY</sub> between 0.24 and 0.3, based on two different stock–recruitment relationship assumptions. As either stock–recruit relationship assumption is equally likely, the point estimate of F<sub>MSY</sub> (0.27) can be derived by equally weighting the 0.24 and 0.3 estimates.

**Outlook for 2014**

Because the current management plan only stipulates overall fishing mortalities for juveniles and adults, making fleet-wise predictions for the four fleets that are more or less independent provides different options for 2014. The consequence of other combinations of catch options can be explored on request. Fleet definitions are given below the outlook table.

Catch forecasts and resulting total fishing mortality are presented below for six different scenarios of sharing the catch amongst fleets. The six scenarios presented are based on an interpretation of the harvest control rule as well as other options and are only illustrative of the wide ranges of possible scenarios:

1. No fishing.
2. The EU–Norway management plan (which invokes a 15% limit on TAC change).
3. A roll-over TAC from 2013 to 2014 of 478 000 t for the A-fleet.
4. A 15% increase in the A-fleet TAC in 2014
5. A 15% decrease in the A-fleet TAC in 2014.
6. MSY approach (F<sub>MSY</sub>).

For the intermediate year, no overshoot for the A-fleet was assumed, as the catches corresponded closely to the TAC in 2012. However, an additional 22 000 t was included to account for the Division IIIa TAC transfer agreement.

For the B-fleet (small-meshed EU fleet in the North Sea) the same proportion of the uptake of the bycatch ceiling as observed in 2012 was used. For the C- and D-fleets the same fraction of the North Sea autumn spawners (NSAS) in the catch as last year was assumed.

Basis: Intermediate year (2013) with catch constraint for fleet A, and for fleet B assuming the same proportion of the bycatch ceiling that is taken in 2012. Recruitment (2013) = 22.5 billion.

F fleet A	F fleet B	F fleet C	F fleet D	F <sub>0-1</sub>	F <sub>2-6</sub>	Catch fleet A <sup>1</sup>	Catch fleet B	Catch fleet C	Catch fleet D	SSB 2013
0.23	0.02	0.01	0.01	0.04	0.24	497.1	8.6	11.8	2.5	1996

<sup>1</sup> Includes a transfer of 2095 tonnes of the Norwegian quota and 40% of Division IIIa TAC from the C-fleet to the A-fleet.

## Scenarios for prediction year (2014)

Basis		F-values by fleet and total						Catches by fleet				Biomass <sup>1)</sup>			
		Fleet A	Fleet B	Fleet C	Fleet D	F <sub>0-1</sub>	F <sub>2-6</sub>	Fleet A	Fleet B	Fleet C	Fleet D	SSB 2014	SSB 2015 <sup>4)</sup>	%SSB change <sup>2)</sup>	%TAC change fleet A <sup>3)</sup>
1	No fishing	0	0	0	0	0	0	0	0	0	0	2101	2183	5%	-100%
2	Management plan	0.25	0.03	0.01	0.01	0.05	0.25	470.0	12.4	11.2	2.4	1780	1508	-11%	-2%
3	No change in TAC	0.25	0.03	0.01	0.01	0.05	0.25	478.0	12.4	11.2	2.4	1774	1498	-11%	0%
4	TAC increase of 15%	0.29	0.03	0.01	0.01	0.05	0.30	549.7	12.4	11.2	2.4	1724	1411	-14%	15%
5	TAC reduction of 15%	0.21	0.03	0.01	0.01	0.05	0.21	406.3	12.4	11.2	2.4	1824	1590	-9%	-15%
6	MSY approach	0.27	0.03	0.01	0.01	0.05	0.27	503.4	12.4	11.2	2.4	1757	1467	-12%	5%

Weights in thousand tonnes.

All numbers apply to North Sea autumn-spawning herring only.

<sup>1)</sup> For autumn-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries between 1st January and spawning.

<sup>2)</sup> SSB (2014) relative to SSB (2013).

<sup>3)</sup> Calculated landings (2014) relative to TAC 2013 for the A-fleet.

<sup>4)</sup> Assuming same F in 2015 as in 2014.

### Fleet definitions:

Fleet A: Directed herring fisheries with purse-seiners and trawlers (32 mm minimum mesh size) in the North Sea. Bycatches in the Norwegian industrial fisheries are included.

Fleet B: Herring taken as bycatch in the small-mesh fisheries in the North Sea under EU regulations (mesh size less than 32 mm).

Fleet C: Directed herring fisheries in Skagerrak and Kattegat with purse-seiners and trawlers (32 mm minimum mesh size).

Fleet D: Bycatches of herring caught in the small-mesh fisheries (mesh size less than 32 mm) in Skagerrak and Kattegat.

### Management plan

Following the agreed management plan between EU and Norway ( $F = 0.25$ ) implies a decrease in TAC of 2% which results in a TAC of 470 037 t for the A-fleet in 2014 (Scenario 2), which would lead to an SSB of around 1.8 million tonnes at spawning time in 2014.

The agreed management plan (Annex 6.4.9) between EU and Norway has been evaluated (ICES, 2011a) and ICES concluded that the plan is consistent with the precautionary approach and the MSY approach. The management plan has primacy over the ICES MSY framework when providing advice. The analysis carried out by the benchmark workshop (ICES, 2012b) has revised the perception of the stock.

ICES has evaluated the current and new options of the management plan in 2012. ICES concludes that all management plans tested included precautionary options (see ICES Advice 2012, Section 6.3.3.6-0)

### MSY approach

As no MSY  $B_{trigger}$  has been identified for this stock, the ICES MSY approach has been applied without considering SSB in relation to MSY  $B_{trigger}$ . Following the ICES MSY approach implies an increase in fishing mortality to 0.27, resulting in catches of less than 503 399 t in 2014 (Scenario 6). This is expected to lead to an SSB of around 1.8 million tonnes in 2014

### Precautionary approach

The SSB is expected to remain above  $B_{pa}$  in 2013.

Under the revised reference points,  $F_{pa}$  is no longer considered an operational reference point for the fisheries management of the North Sea herring stock.

### Additional considerations

ICES considers the stock to be in a low productivity phase. The survival ratio between newly hatched larvae and recruits during the most recent decade is much lower than in prior periods (Figure 6.4.9.4). Recruits-per-spawner are the lowest in the time-series (Figure 6.4.9.4). The management plan has proven an effective tool in maintaining sustainable exploitation and conserving the North Sea herring stock during this low-productivity regime. Any deviation from this plan would result in an increased risk of falling below  $B_{lim}$ .

The fishery is managed according to the EU–Norway management agreement which was updated in November 2008. In 2011 ICES re-examined the management plan and concluded that the management plan appears to operate well in relation to the objectives of consistency with the precautionary approach and a rational exploitation pattern.

The EU–Norway agreement calls for a review of the current plan no later than December 2011. WKHELP (ICES, 2012c) has re-evaluated the management plan, including a set of new management plan options.

Both SSB and the fishing mortality are reliably estimated by the stock assessment.

Gravel substrate is important fish habitat for herring spawning. Herring spawning and nursery areas are sensitive and vulnerable to anthropogenic influences. Activities that have an impact on the spawning habitat of herring, such as extraction of marine aggregates (e.g. gravel and sand) and construction, can impact spawning. Herring abandon and repopulate spawning grounds and an absence of spawning in any particular year does not mean that the spawning ground is not required to maintain a resilient herring population. There is scientific information (Groot, 1979; 1996), and ICES advice (ICES, 2003), to support the advice that no gravel extraction should occur in areas with spawning grounds, both within and outside of the spawning time.

Fisheries on North Sea herring and western Baltic spring-spawning herring (WBSS) are managed under mixed quotas in some areas of the North Sea, Skagerrak, and Kattegat. With the decline of the WBSS herring, conservation of this stock needs to be considered when setting TACs. With the mixing of stocks within a fishery, primary consideration should be given to protection of the stock most vulnerable to exploitation in the area of overlap. ICES recommends that the TAC setting between Subarea IV and Division IIIa be based on the status of the weaker stock, which is now the WBSS.

The options selected for the C- and D-fleets of North Sea autumn-spawning herring for 2014 are compatible with the advised exploitation of western Baltic spring spawners for the C- and D- fleets.

#### *North Sea herring components*

The composition of the NSAS herring population changes over time: in recent years the relative contribution of the spawning components has been stable (Figure 6.4.9.5).

The sub-TAC for Divisions IVc and VIIId was established for the conservation of the spawning aggregation of Downs herring. The Downs herring is now again a major component of the stock (Figure 6.4.9.5; Payne, 2010). It is probable that exploitation of Downs herring has been relatively high. In the absence of data to the contrary ICES proposes that a share of 11% of the total North Sea TAC (average share 1989–2002) would still be appropriate for Downs herring. The protection of the various components should be considered in the evaluation of the long-term management plan.

#### *Changes in fishing patterns*

Apart from a reduction in area misreporting of catch, there have been no major changes to fishing patterns.

#### *Changes in the ecosystem*

Temperatures on the spawning grounds have increased in the recent decades (Payne *et al.*, 2009). Substantial changes in the plankton community are known to have occurred in the North Sea in the late 1990s (Weijerman *et al.*, 2005, Alvarez-Fernandez *et al.*, 2012). The contemporary regime consists of a more diversified warmer water community (Beaugrand, 2004; Edwards *et al.*, 2007). However, the implications for herring, if any, are unclear.

Herring is considered to have a major impact on the ecosystem as prey for seabirds, marine mammals, and other fish. Young age groups of herring are primarily eaten by cod, saithe, and whiting. The contribution of saithe and cod alone makes up for nearly 90% of the predation mortality from age 4 onwards. It is therefore likely that predation mortality on herring changes with the abundance of saithe and cod as has been observed over the past two decades (ICES, 2011c).

Herring is also an important predator for some species; a large population of herring in the North Sea may repress cod recruitment (Speirs *et al.*, 2010).

#### *Information from the fishing industry*

Information from the fishing industry shows that discarding occurs in the B fleet as the landing of herring bycatches above a certain limit by area in the industrial fisheries is not permitted. The landing obligation that is foreseen in the EU pelagic fishery may change the fleet behavior.

#### *Data and methods*

The quality of the recruitment estimates are influenced by the IBTS0 index: in recent years, this survey index has exhibited systematic biases. This is most likely due to increases in recruitment from the Downs component, which is excluded from the calculation of the survey index.

Estimation of stock identity of herring from the transfer area in Division IVa East is still poor and ICES recommends increasing and/or redesigning sampling for determination of stock affiliation of herring catches in ICES Divisions IVa,b and IIIa. This is likely to affect the quality of the western Baltic spring-spawning herring assessment. There have been no revisions of the data or the methods used.

Bycatch data from industrial fisheries are available from Denmark. Discard information (including slippage and highgrading) is monitored in the Dutch, English, and German fisheries. ICES is concerned about the lack of information on unallocated removals in all herring fisheries; effort should be made to maintain observer coverage across fleets that catch a substantial proportion of pelagic fish and to report on these issues.

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

The 2013 assessment is consistent with last year's assessment: SSB in 2011 has been revised slightly downwards by 5% and F in 2011 upwards by 17%.

The basis for the advice is the management plan, which is the same as last year.

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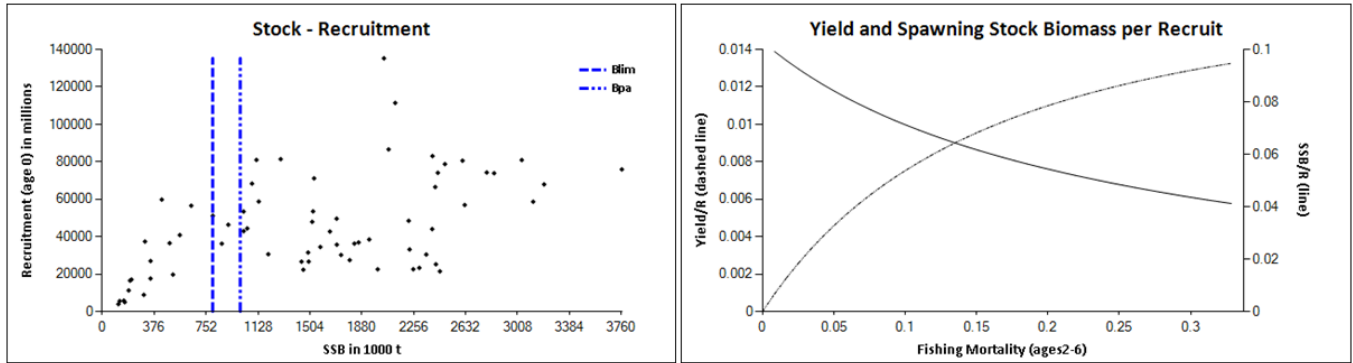
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**Figure 6.4.9.3** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). Stock–recruitment plot and yield-per-recruit analysis.

**Table 6.4.9.1** Herring caught in the North Sea (Subarea IV and Division VIIId). ICES advice, management, and catch/landings.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC <sup>1</sup>	Bycatch ceiling Fleet B	ICES Landings <sup>3</sup> IV, VIIId	ICES Catch <sup>4</sup> IV, VIIId	ICES Catch Autumn spawners IIIa, IV, VIIId
1987	TAC	610	600		625	625	792
1988	TAC	515	530		710	710	888
1989	TAC	514	514		669	717	787
1990	TAC	403	415		523	578	646
1991	TAC	423	420		537	588	657
1992	TAC	406	430		518	572	716
1993	No increase in yield at $F > 0.3$	340 <sup>1</sup>	430		495	540	671
1994	No increase in yield at $F > 0.3$	346 <sup>1</sup>	440		463	498	571
1995	Long-term gains expected at lower F	429 <sup>1</sup>	440		510	516	579
1996	50% reduction of agreed TAC <sup>2</sup>	156 <sup>1</sup>	156 <sup>2</sup>	44	207	233	275
1997	$F = 0.2$	159 <sup>1</sup>	159	24	175	238	264
1998	$F(\text{adult}) = 0.2, F(\text{juv}) < 0.1$	254 <sup>1</sup>	254	22	268	338	392
1999	$F(\text{adult}) = 0.2, F(\text{juv}) < 0.1$	265 <sup>1</sup>	265	30	290	333	363
2000	$F(\text{adult}) = 0.2, F(\text{juv}) < 0.1$	265 <sup>1</sup>	265	36	284	346	388
2001	$F(\text{adult}) = 0.2, F(\text{juv}) < 0.1$	See scenarios	265	36	296	323	363
2002	$F(\text{adult}) = 0.2, F(\text{juv}) < 0.1$	See scenarios	265	36	304	353	372
2003	$F(\text{adult}) = 0.25, F(\text{juv}) = 0.12$	See scenarios	400	52	414	450	480
2004	$F(\text{adult}) = 0.25, F(\text{juv}) = 0.1$	See scenarios	460	38	484	550	567
2005	$F(\text{adult}) = 0.25, F(\text{juv}) = 0.1$	See scenarios	535	50	568	639	664
2006	$F(\text{adult}) = 0.25, F(\text{juv}) = 0.12$	See scenarios	455	43	490	511	515
2007	Bring SSB above $B_{pa}$ by 2008	See scenarios	341	32	361	388	407
2008	$F(\text{adult}) = 0.17, F(\text{juv}) = 0.08$ (MP)	See scenarios	201	19	228	245	258
2009	Adopt one of the new proposed HCRs	See scenarios	171	16	167	166	168
2010	$F(\text{adult}) = 0.15, F(\text{juv}) = 0.05$ (MP)	See scenarios	164	14	175	175	188
2011	See scenarios	See scenarios	200	16	218	218	226
2012	Management plan	See scenarios	405	18	424.287	424.608	434.647
2013	Management plan	See scenarios	478	14.4			
2014	Management plan	See scenarios					

Weights in thousand tonnes.

<sup>1</sup> Catch in directed fishery in Subarea IV and Division VIIId.

<sup>2</sup> Revised in June 1996, down from 263.

<sup>3</sup> Landings are provided by the working group and do not in all cases correspond to official statistics.

<sup>4</sup> ICES catch includes unallocated and misreported landings, discards, and slipping.



**Table 6.4.9.2** Herring caught in the North Sea (Subarea IV and Division VIIId). Catch in tonnes by country, 2003–2012. These figures do not in all cases correspond to the official statistics and cannot be used for legal purposes.

Country	2003	2004	2005	2006	2007
Belgium	5	8	6	3	1
Denmark <sup>6</sup>	78606	99037	128380	102322	84697
Faroe Islands	627	402	738	1785	2891
France	31544	34521	38829	49475	24909
Germany	43953	41858	46555	40414	14893
Netherlands	81108	96162	81531	76315	66393
Norway <sup>1</sup>	112481	137638	156802	135361	100050
Poland	-	-	458	-	-
Sweden	4781	5692	13464	10529	15448
USSR/Russia	-	-	99	-	-
UK (England)	18639	20855	25311	22198	15993
UK (Scotland)	40292	45331	73227	48428	35115
UK (N.Ireland)	2010	2656	2912	3531	638
Unallocated landings	31875 <sup>5</sup>	48898 <sup>5</sup>	57788	18764	26641
Total landings	445921	533058	626101	509125	387669
Discards	4125	17059	12824	1492	93
<b>Total catch</b>	<b>450046</b>	<b>550117</b>	<b>638925</b>	<b>510617</b>	<b>387762</b>
Estimates of the parts of the catches which have been allocated to spring-spawning stocks					
WBSS	2821	7079	7039	10954	1070
Thames estuary <sup>2</sup>	84	62	74	65	2
Others <sup>3</sup>	308	0	0	0	0
Norw. spring spawners <sup>4</sup>	979	452	417	626	685
Country	2008	2009	2010	2011	2012
Belgium	-	-	-	4	3
Denmark <sup>6</sup>	62864	46238	45869	58726	105707
Faroe Islands	2014	1803	3014	-	-
France	30347	18114	17745	16693	23819
Germany	8095	5368	7670	9427	24515
Netherlands	23122	24552	23872	34708	72344
Norway <sup>1</sup>	59321	50445	46816	60705	119253
Lithuania	-	-	90	-	-
Sweden	13840	5299	4395	8086	14092
Russia	-	-	-	-	-
UK (England)	11717	652	10770	11468	25346
UK (Scotland)	16021	14006	14373	18564	34414
UK (N.Ireland)	331	-	-	17	4794
Unallocated landings	17151	-726	0	0	321
Total landings	244823	165751	174614	218398	424608
Discards	224	91	13	0	0
<b>Total catch</b>	<b>245047</b>	<b>165842</b>	<b>174627</b>	<b>218398</b>	<b>424608</b>
Estimates of the parts of the catches which have been allocated to spring-spawning stocks					
WBSS	124	3941	774	308	2095
Thames estuary <sup>2</sup>	7	48	85	2	63
Others <sup>3</sup>	0	0	0	0	0
Norw. spring spawners <sup>4</sup>	2721	44560	56900	12178	9619

<sup>1</sup> Catches of Norwegian spring spawners removed (taken under a separate TAC).

<sup>2</sup> Landings from the Thames estuary area are included in the North Sea catch figure for UK (England).

<sup>3</sup> Caught in the whole North Sea, partly included in the catch figure for The Netherlands.

<sup>4</sup> These catches (including some local fjord-type spring spawners) are taken by Norway under a separate quota south of 62°N and are not included in the Norwegian North Sea catch figure for this area.

<sup>5</sup> May include misreported catch from Division VIaN and discards.

<sup>6</sup> Including any bycatches in the industrial fishery.

**Table 6.4.9.3** Herring caught in the North Sea. Catch in tonnes in Division IVa West. These figures do not in all cases correspond to the statistics and cannot be used for legal purposes.

Country	2003	2004	2005	2006	2007
Denmark <sup>1</sup>	48 358	48 128	80 990	60 462	45 948
Faroe Islands	95	-		580	1 118
France	11 237	10 941	13 474	18 453	8 570
Germany	25 796	17 559	22 278	18 605	4 985
Netherlands	25 045	43 876	36 619	39 209	42 622
Norway	34 443	36 119	66 232	38 363	40279
Poland	-	-	458	-	-
Sweden	2 647	2 178	8 261	4 957	7 658
Russia	-	-	99	-	-
UK (England)	12 030	13 480	15 523	12 031	11 833
UK (Scotland)	39 970	43 490	71 941	47 368	35 115
UK (N. Ireland)	2 010	2 656	2 912	3 531	638
Unallocated landings	14 115 <sup>2</sup>	28 631 <sup>2</sup>	39 324 <sup>2</sup>	10 981 <sup>2</sup>	22 215

#### Misreporting from VIa North

Total Landings	215 746	247 058	358 111	253 048	220 981
Discards	4 125	15 794	10 861	1 492	93
<b>Total catch</b>	<b>219871</b>	<b>262852</b>	<b>368972</b>	<b>254540</b>	<b>221074</b>
Country	2008	2009	2010	2011	2012
Denmark <sup>1</sup>	28 426	16 550	25 092	26 523	42 867
Faroe Islands	2	288	1 110	-	-
France	13 068	7 067	6 412	7 885	11 131
Germany	498	-	505	2 642	13 060
Netherlands	11 634	11 017	13 593	15 202	46 654
Norway	40 304	25 926	38 897	45 200	72 581
Lithuania	-	-	90	-	-
Sweden	7 025	1 435	2 310	5 121	6 065
Russia	-	-	-	-	-
UK (England)	8 355	578	7 384	4 555	18 289
UK (Scotland)	14 727	10 249	13 567	17 909	33 352
UK (N. Ireland)	331	-	-	17	4 794
Unallocated landings	14 952	-977	0	0	-3 416

#### Misreporting from VIa North

Total Landings	139 322	72 133	108 960	125 054	245 377
Discards	194	91	13	0	0
<b>Total catch</b>	<b>139 516</b>	<b>72 224</b>	<b>108 973</b>	<b>125 054</b>	<b>245 377</b>

<sup>1</sup> Including any bycatches in the industrial fishery.

<sup>2</sup> May include misreported catch from Division VIaN and discards.

**Table 6.4.9.4** Herring caught in the North Sea. Catch in tonnes in Division IVa East. These figures do not in all cases correspond to the official statistics and cannot be used for legal purposes.

Country	2003	2004	2005	2006	2007
Denmark <sup>1</sup>	7 401	16 278	5 761	8 614	2 646
Faroe Islands	359	-	738	975	577
France	-	-	-	-	-
Germany	54	888	-	34	-
Netherlands	-	-	-	-	263
Norway <sup>2</sup>	62 306	100 443	89 925	90 065	54 424
UK (Scotland)	-	-	-	83	-
Sweden	1 529	1 720	3 510	2 857	640
Unallocated landings	9 988				- 96 <sup>3</sup>
<b>Total landings</b>	<b>81 637</b>	<b>119 329</b>	<b>99 934</b>	<b>102 628</b>	<b>58 454</b>
Discards	-	-	-	-	-
<b>Total catch</b>	<b>83 640</b>	<b>119 329</b>	<b>99 934</b>	<b>102 628</b>	<b>58 454</b>
Norwegian Spring Spawners <sup>4</sup>	979	452	417	626	685
Country	2008	2009	2010	2011	2012
Denmark <sup>1</sup>	1 587	499	-	1 590	1 822
Faroe Islands	400	700	719	-	-
France	-	-	-	-	-
Germany	-	-	-	-	-
Netherlands	-	-	-	-	-
Norway <sup>2</sup>	17 474	6 981	7 362	12 922	32 714
UK (Scotland)	-	-	-	167	-
Sweden	-	1 735	1 505	150	815
Unallocated landings					
<b>Total landings</b>	<b>19 461</b>	<b>9 915</b>	<b>9 586</b>	<b>14 829</b>	<b>35 351</b>
Discards	-	-	-	-	-
<b>Total catch</b>	<b>19 461</b>	<b>9 915</b>	<b>9 586</b>	<b>14 829</b>	<b>35 351</b>
Norwegian Spring Spawners <sup>4</sup>	2 721	44 560	56 900	12 178	9 619

<sup>1</sup> Including any bycatches in the industrial fishery.

<sup>2</sup> Catches of Norwegian spring-spawning herring removed (taken under a separate TAC).

<sup>3</sup> Negative unallocated catches due to misreporting into other areas.

<sup>4</sup> These catches (including some fjord-type spring spawners) are taken by Norway under a separate quota south of 62°N and are not included in the Norwegian North Sea catch figure for this area.

**Table 6.4.9.5** Herring caught in the North Sea. Catch in tonnes in Division IVb. These figures do not in all cases correspond to the official statistics and cannot be used for legal purposes.

Country	2003	2004	2005	2006	2007
Denmark <sup>1</sup>	22 574	33 857	41 423	32 277	35 990
Faroe Islands	173	402	-	200	1 196
France	7 918	10 592	10 205	17 385	8 421
Germany	12 116	13 823	14 381	14 222	2 205
Netherlands	19 115	23 649	10 038	13 363	8 550
Norway	15 732	1 076	645	6 933	5 347
Sweden	605	1 794	1 694	2 715	7 150
UK (England)	2 632	2 864	3 869	4 924	577
UK (Scotland)	322	1 841	1 286	977	-
Unallocated landings <sup>3</sup>	- 2 401	8 300	10 233	2 364	- 203
Total landings	78 786	98 198	93 774	95 360	69 233
Discards <sup>2</sup>		1 265	1 963		
<b>Total catch</b>	<b>78 786</b>	<b>99 463</b>	<b>95 737</b>	<b>95 360</b>	<b>69 233</b>
Country	2008	2009	2010	2011	2012
Denmark <sup>1</sup>	32 230	29 164	19 671	30 498	60 503
Faroe Islands	1 612	815	1 185	-	-
France	9 687	4 316	2 349	1 687	3 898
Germany	2 415	1 061	1 994	1 778	4 187
Netherlands	904	3 164	830	7 314	9 202
Norway	1 543	17 538	557	2 537	13 958
Sweden	6 815	2 129	580	2 815	7 212
UK (England)	833	2	1 577	4 748	3 045
UK (Scotland)	1 293	3 757	805	488	1 062
Unallocated landings <sup>3</sup>	- 904	- 166			411
Total landings	56 428	61 780	29 548	51 865	103 478
Discards <sup>2</sup>	30				
<b>Total catch</b>	<b>56 458</b>	<b>61 780</b>	<b>29 548</b>	<b>51 865</b>	<b>103 478</b>

<sup>1</sup> Including any bycatches in the industrial fishery.

<sup>2</sup> Discards partly included in unallocated.

<sup>3</sup> Negative unallocated catches due to misreporting into other areas .

**Table 6.4.9.6** Herring caught in the North Sea. Catch in tonnes in Divisions IVc and VIIId. These figures do not in all cases correspond to the official statistics and cannot be used for legal purposes.

<b>Country</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
Belgium	5	8	6	3	1
Denmark	273	774	206	969	113
Faroe Islands				30	-
France	12389	12988	15150	13637	7918
Germany	5987	9588	9896	7553	7703
Netherlands	36948	28637	34874	23743	14958
UK (England)	3977	4511	5919	5243	3583
UK (Scotland)	-	-	-	-	-
Unallocated landings	8170	9963	8231	5419	4725
Total landings	67749	68473	74282	56597	39001
Discards <sup>2</sup>	-	-	-	-	-
<b>Total catch</b>	<b>67749</b>	<b>68473</b>	<b>74282</b>	<b>56597</b>	<b>39001</b>
Coastal spring spawners <sup>84</sup> included above <sup>1</sup>		62	74	65	2
<b>Country</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
Belgium	-	-	-	4	3
Denmark <sup>3</sup>	621	25	1106	115	515
France	7592	6731	8984	7121	8790
Germany	5182	4307	5171	5007	7268
Netherlands	10584	10371	9449	12192	16488
Norway	-	-	-	46	-
UK (England)	2529	72	1809	2165	4012
UK (Scotland)	1	-	1	-	-
Unallocated landings	3103	417	0	0	3326
Total landings	29612	21923	26520	26650	40402
Discards <sup>2</sup>	-				
<b>Total catch</b>	<b>29612</b>	<b>21923</b>	<b>26520</b>	<b>26650</b>	<b>40402</b>
Coastal spring spawners <sup>7</sup> included above <sup>1</sup>		48	85	2	63

<sup>1</sup> Landings from the Thames estuary area are included in the North Sea catch figure for UK (England).

<sup>2</sup> Discards partly included in unallocated landings.

<sup>3</sup> Including any bycatches in the industrial fishery.

**Table 6.4.9.7** Herring in Subarea IV and in Divisions IIIa and VIId (autumn spawners). Summary of the assessment. Recruits age 0 = 0 winter ringer; SSB is at spawning time. Low = lower limit and High = higher limit of 95% confidence interval.

Year	Recruits Age 0 (Thousands)			Total biomass (tonnes)	Spawning biomass <sup>(2)</sup> (tonnes)		Landings (tonnes) Mean	Yield/ SSB (ratio) Mean	Mean F ages 2-6		Mean F ages 0-1				
	Mean	Low	High		Low	High			Low	High	Low	High			
1947	75905523	46077126	125043571	7088611	5810730	8647521	3764027	2943381	4813528	845768	0.225	0.173	0.126	0.238	0.002
1948	67930793	43276585	106630314	6394827	5245717	7795689	3201084	2513816	4076248	689002	0.219	0.170	0.128	0.228	0.002
1949	58644245	37515217	91673398	6089034	5039803	7356702	3122049	2472064	3942935	714258	0.229	0.183	0.137	0.245	0.002
1950	80922301	52964392	123638136	6119555	5097183	7346991	3038881	2435964	3791024	657368	0.216	0.193	0.147	0.253	0.005
1951	73883494	48982243	111443868	6174880	5174621	7368490	2839107	2289471	3520894	760704	0.268	0.233	0.182	0.299	0.016
1952	74253836	49803270	110708237	6040516	5078888	7184641	2785673	2243433	3458972	828192	0.297	0.246	0.192	0.315	0.029
1953	80599258	55145472	117801881	5944637	5016418	7044609	2610363	2092987	3255680	843234	0.323	0.261	0.204	0.335	0.041
1954	74105477	51428096	106782520	5797863	4908227	6852938	2431454	1937085	3052040	915293	0.376	0.292	0.226	0.377	0.054
1955	66519121	46380942	95401113	5460222	4630066	6439222	2412080	1926636	3019839	866312	0.359	0.289	0.225	0.372	0.084
1956	48447922	33670276	69711371	4891453	4158182	5754033	2219961	1769675	2784819	849158	0.383	0.292	0.230	0.372	0.078
1957	135299311	92181609	198585203	5649062	4705109	6782393	2041101	1626393	2561554	784655	0.384	0.307	0.241	0.391	0.099
1958	49575137	34705794	70815099	5309456	4475846	6298745	1698065	1344068	2145298	790958	0.466	0.316	0.248	0.401	0.084
1959	56911045	39325480	82360524	5487591	4653256	6471524	2626073	2087800	3303123	1129177	0.430	0.328	0.257	0.418	0.106
1960	22567018	15244144	33407601	4448155	3794568	5214317	2253511	1798922	2822975	839029	0.372	0.284	0.224	0.360	0.121
1961	111440347	75859174	163710601	5096171	4288802	6059766	2122277	1715344	2625746	753135	0.355	0.320	0.288	0.398	0.065
1962	53489718	37178889	76956924	4742144	4028247	5582561	1527282	1220488	1911241	663975	0.435	0.343	0.273	0.432	0.055
1963	78766631	56098857	110593735	5405892	4627516	6315195	2483054	2009386	3068380	658026	0.268	0.239	0.190	0.301	0.070
1964	83053871	59037630	116839809	5705836	4981007	6536140	2392860	1996746	2867586	929126	0.388	0.320	0.265	0.386	0.134
1965	38455028	27239993	54287426	5010268	4444175	5648469	1933805	1648315	2268742	1209842	0.626	0.501	0.418	0.599	0.121
1966	34449326	24641387	48161090	3886424	3462981	4361644	1580102	1349824	1849666	976764	0.618	0.510	0.434	0.600	0.111
1967	42926504	30896430	59640701	3169232	2822442	3558633	1024792	879112	1194613	837352	0.817	0.654	0.588	0.767	0.146
1968	40832954	29301017	56903488	2744200	2413770	3119863	561856	483577	652805	802912	1.429	0.951	0.812	1.115	0.153
1969	19697455	13926925	27858960	2141463	1867120	2456117	512471	421784	622657	557936	1.089	0.865	0.737	1.016	0.150
1970	36506468	26523445	50246950	2065742	1802371	2367598	488454	400878	595161	532320	1.090	0.905	0.778	1.051	0.149
1971	26963644	19738966	36832634	1945442	1702904	2222525	350109	290955	412289	540365	1.543	1.211	1.031	1.423	0.280
1972	17592795	12923713	23948724	1681169	1476312	1914482	349759	289816	422100	472598	1.351	0.642	0.539	0.764	0.297
1973	8850637	6419898	12201717	1282087	1133168	1450577	301040	252529	358872	442413	1.470	0.829	0.715	0.961	0.328
1974	16502130	11904007	22876355	946949	832034	1077735	201793	169840	239758	274581	1.361	0.853	0.729	0.999	0.259
1975	3933342	2658401	5819732	775296	661453	908732	117008	95885	142785	263287	2.250	0.985	0.795	1.221	0.302
1976	4945556	3275845	7466326	540365	452170	645763	163244	123980	214942	146239	0.896	0.736	0.552	0.981	0.112
1977	5542743	3616630	8494647	413743	335928	509583	126754	93898	171106	61267	0.483	0.338	0.246	0.464	0.091
1978	5763180	3713152	8945028	464167	375012	574518	156686	119376	205658	52365	0.334	0.247	0.176	0.346	0.097
1979	11228885	7510907	16787300	591845	487207	718956	191186	150613	242688	64991	0.340	0.204	0.148	0.282	0.103
1980	17021708	12180056	23787947	814231	681431	972913	212140	171436	262507	80660	0.380	0.181	0.143	0.229	0.110
1981	37355847	27302215	51111578	1401425	1177716	1667628	309898	251461	381916	159851	0.516	0.200	0.160	0.249	0.288
1982	59769138	44500029	80277473	2126526	1792741	2522456	431490	353455	526754	272120	0.631	0.183	0.147	0.228	0.256
1983	56514059	42494227	75159359	2856192	2440898	3342145	644996	530164	784702	403931	0.626	0.230	0.188	0.283	0.290
1984	53382845	39896645	71427764	3591211	3109954	4146942	1023767	841634	1245316	453613	0.443	0.305	0.251	0.371	0.198
1985	68339603	50261523	92920012	4085685	3565208	4682146	1084902	906856	1297905	604405	0.557	0.391	0.320	0.478	0.198
1986	81003263	59414306	110436848	4713777	4101549	5417390	1116825	941752	1324443	765282	0.685	0.381	0.315	0.462	0.188
1987	81409294	60837954	108936489	4629688	4057646	5282375	1292385	1088415	1534579	785441	0.608	0.375	0.312	0.451	0.246
1988	42712407	31796386	57376008	4538014	4002002	5148817	1649528	1391029	1956065	1031990	0.626	0.365	0.304	0.439	0.299
1989	35676401	26602888	47844695	3809468	3400476	4267651	1699764	1464147	1973298	795718	0.468	0.351	0.293	0.420	0.244
1990	30189357	22265895	40932986	3696881	3311204	4127479	1730637	1498245	1999075	693842	0.401	0.302	0.252	0.362	0.232
1991	31484314	23453024	42265850	3422904	3068059	3822528	1491063	1291970	1720837	672663	0.451	0.331	0.278	0.395	0.206
1992	58761651	45018191	76700808	3426329	3054631	3843256	1133703	974867	1318419	700115	0.618	0.374	0.313	0.447	0.298
1993	51136035	39123145	66837523	3153426	2779637	3577480	800507	679663	942337	682147	0.852	0.431	0.359	0.518	0.328
1994	36215581	27422006	47829043	2819302	2483356	3200695	866312	740101	1014046	600790	0.694	0.444	0.369	0.534	0.202
1995	46362430	34807728	61752808	2733245	2399894	3118018	913465	774035	1078011	546888	0.599	0.385	0.313	0.472	0.207
1996	44366711	32888368	59851102	2913891	2529185	3357114	1050734	890464	1239852	299539	0.285	0.231	0.183	0.291	0.108
1997	30614980	22308091	42015115	3109586	2702367	3578168	1202604	1020210	1417608	284930	0.237	0.204	0.164	0.253	0.033
1998	22297832	16355153	30344080	3305175	2897976	3769590	1457160	1250548	1697908	384616	0.264	0.225	0.182	0.278	0.059
1999	71128595	52268664	96793693	3419483	3010863	3883560	1534937	1314646	1792142	362217	0.236	0.212	0.173	0.260	0.040

2000	47917915	35242045	65153045	4295163	3739093	4933930	1521185	1305976	1771887	372503	0.245	0.213	0.175	0.260	0.044
2001	86616423	63436853	118265659	4842782	4232075	5541618	2074021	1776003	2422048	385386	0.186	0.188	0.153	0.231	0.040
2002	44013194	32289776	59993021	5632140	4912935	6456629	2390469	2053864	2762239	407176	0.170	0.177	0.144	0.217	0.030
2003	21423521	15772669	29095896	5932759	5178596	6796752	2446087	2115366	2828512	494845	0.202	0.201	0.165	0.246	0.039
2004	25191067	18544637	34219588	5045463	4426124	5751465	2416909	2086127	2800141	583034	0.241	0.243	0.196	0.301	0.042
2005	23300841	17232319	31506449	4231216	3723909	4803082	2296737	1969478	2678375	632225	0.275	0.258	0.209	0.319	0.077
2006	27425944	20256851	37132249	3502544	3084463	3977293	1792282	1532558	2096020	504842	0.282	0.230	0.186	0.284	0.046
2007	26615385	19071057	37144178	2996633	2623860	3422367	1444105	1230135	1695291	364033	0.252	0.197	0.159	0.246	0.036
2008	26642014	18899893	37555605	3011654	2619605	3462376	1495543	1277781	1750417	252206	0.169	0.131	0.106	0.161	0.037
2009	36251815	26477662	49634067	3422904	2965567	3950770	1826661	1556729	2143397	183873	0.101	0.079	0.063	0.101	0.026
2010	36873364	26512636	51282904	3929411	3405560	4533841	1857979	1566863	2203154	193687	0.104	0.084	0.067	0.105	0.026
2011	35131664	23058320	47605688	4106165	3559957	4736177	2226630	1900624	2608556	236334	0.106	0.109	0.087	0.136	0.026
2012	30431840	20053948	46180510	4077522	3483873	4772328	2347825	1959619	2812836	401515	0.171	0.168	0.130	0.219	0.035
2013	22544462	12004609	42338136				1996101	1621304	2392041						

<sup>(1)</sup> Assessment output.

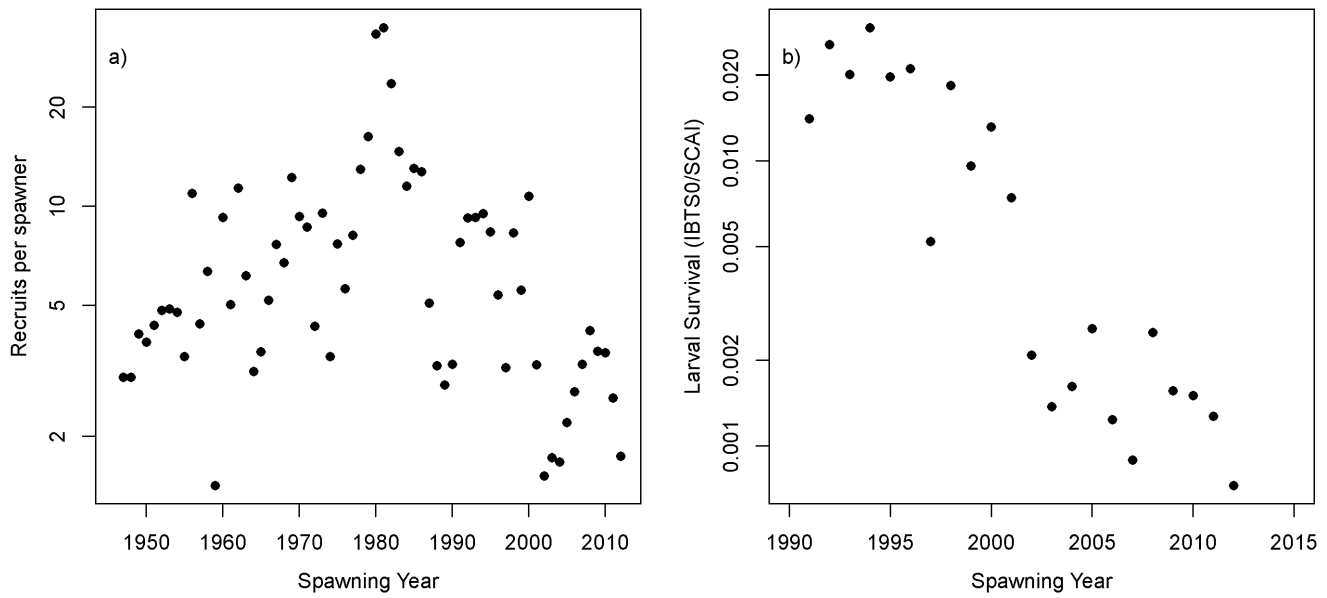
<sup>(2)</sup> At spawning time

**Table 6.4.9.8** (“The Wonderful Table”). Herring caught in the North Sea. Catch in thousand tonnes in Subarea IV and in Divisions VIIId and IIIa.

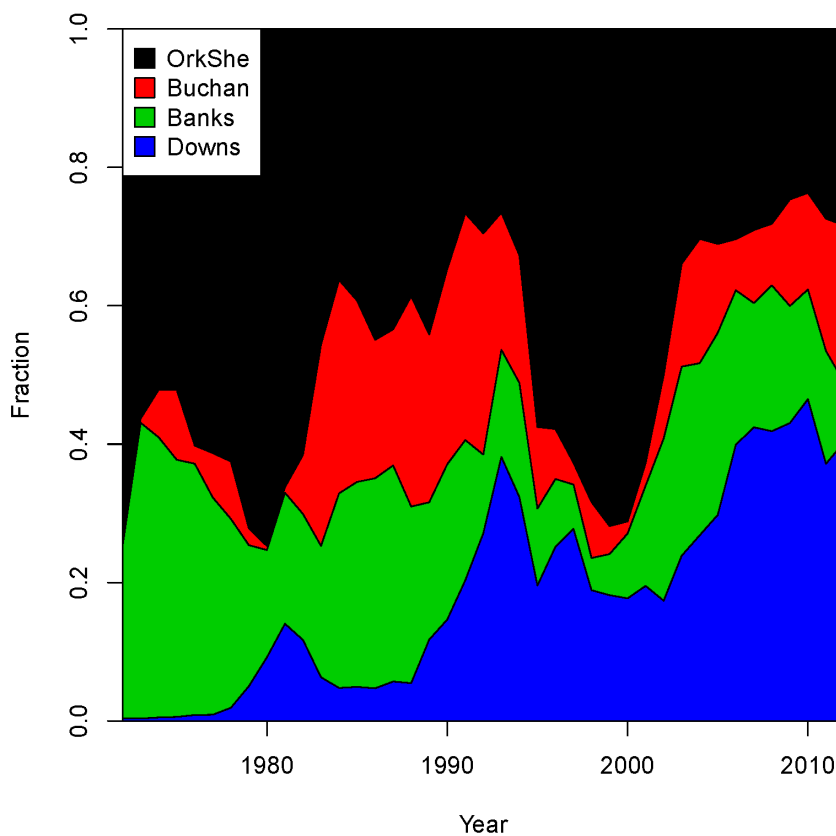
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Sub-Area IV and Division VIIId: TAC (IV and VIIId)</b>														
Recommended Divisions IVa, b	265	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	-	-	-	-
Recommended Divisions IVc, VIIId	- 11	- 11	- 11	- 11	- 11	- 11	- 11	- 11	- 11	- 11	-	-	-	-
Expected catch of spring spawners														
Agreed Divisions IVa,b 1	240	240	223	340,5	393,9	460,7	404,7	303,5	174,6	147,4	149,0	173,5	360,4	427,7
Agreed Div. IVc, VIIId	25	25	42,7	59,5	66,1	74,3	50,0	37,5	26,7	23,6	15,3	26,5	44,6	50,3
Bycatch ceiling in the small mesh fishery	36	36	36	52,0	38,0	50,0	42,5	31,9	18,8	16,0	13,6	16,5	17,9	14,4
<b>CATCH (IV and VIIId)</b>														
National landings Divisions IVa,b 2	261	272	261	354,5	427,7	502,3	439,2	326,8	201,2	145,0	148,1	191,7	387,2	
Unallocated landings Divisions IVa,b	35	2	24	23,7	36,9	49,6	13,3	21,9	14,0	-1,1	0,0	0,0	-3,0	
Discard/slipping Divisions IVa,b 3	-	-	17	4,1	17,1	12,8	1,5	0,1	0,2	0,1	0,0	0,0	0	
Total catch Divisions IVa,b 4	296	273	303	382,3	481,6	564,6	454,0	348,8	215,4	143,9	148,1	191,7	384,2	
National landings Divisions IVc, VIIId 3	23	24	43	59,5	56,5	66,1	51,2	34,3	26,5	21,5	26,5	26,7	37,1	
Unallocated landings Divisions IVc, VIIId	27	26	7	8,2	12,0	8,2	5,4	4,7	3,1	0,4	0	0	3,3	
Discard/slipping Divisions IVc, VIIId 3	-	-	0	-	-	-	-	-	-	-	-	-	-	
Total catch Divisions IVc, VIIId	50	50	50	67,7	68,5	74,3	56,6	39,0	29,6	21,9	26,5	26,7	40,4	
<b>Total catch IV and VIIId as used by ICES 4</b>	<b>346</b>	<b>323</b>	<b>353</b>	<b>450,0</b>	<b>550,1</b>	<b>638,9</b>	<b>510,62</b>	<b>387,8</b>	<b>245,0</b>	<b>165,8</b>	<b>174,6</b>	<b>218,4</b>	<b>424,6</b>	
<b>CATCH BY FLEET/STOCK (IV and VIIId) 7</b>														
North Sea autumn spawners directed fisheries (Fleet A)	322	296	323	434,9	529,5	610,0	487,1	379,6	236,3	152,1	164,8	209,2	411,8	
North Sea autumn spawners industrial (Fleet B)	18	20	22	12,3	13,6	21,8	11,9	7,1	8,6	9,8	9,1	8,9	10,6	
<b>North Sea autumn spawners in IV and VIIId total</b>	<b>339</b>	<b>317</b>	<b>346</b>	<b>447,2</b>	<b>543,0</b>	<b>631,9</b>	<b>499,0</b>	<b>386,7</b>	<b>244,9</b>	<b>161,9</b>	<b>173,9</b>	<b>218,1</b>	<b>422,5</b>	
Baltic-IIIa-type spring spawners in IV	7	6	7	2,8	7,1	7,0	11,0	1,1	0,1	3,9	0,8	0,3	2,1	
Coastal-type spring spawners	0,1	1,2	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,0	0,1	0,0	0,1	
Norw. Spring Spawners caught under a separate quota in IV 14	26	7	4	1,0	0,5	0,4	0,6	0,7	2,7	44,6	56,9	12,2	9,6	
<b>Division IIIa: TAC (IIIa)</b>														
Predicted catch of autumn spawners	53	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	-	
Recommended spring spawners	- 12	- 12	- 12	- 12	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	-	
Recommended mixed clupeoids	-	-	-	-	-	-	-	-	-	-	-	-	-	
Agreed herring TAC	80	80	80	80,0	70,0	96,0	81,6	69,4	51,7	37,7	33,9	30,0	45,0	55,0
Agreed mixed clupeoid TAC														
Bycatch ceiling in the small mesh fishery	21	21	21	21,0	21,0	24,2	20,5	15,4	11,5	8,4	7,5	6,7	6,7	6,7
<b>CATCH (IIIa)</b>														
National landings	108	90	79	76,0	61,1	90,8	88,9	47,3	38,2	38,8	37,3	20,0	27,7	
Catch as used by ICES	99	82	73	68,1	52,7	69,6	51,2	47,4	38,2	38,8	37,3	20,0	27,7	
<b>CATCH BY FLEET/STOCK (IIIa) 7</b>														
Autumn spawners human consumption (Fleet C)	36	34	17	24,1	13,4	22,9	11,6	16,4	9,2	5,1	12,0	6,6	7,8	
Autumn spawners mixed clupeoid (Fleet D) 13	13	12	9	8,4	10,8	9,0	3,4	3,4	3,7	1,5	1,8	1,8	4,4	
Autumn spawners other industrial landings (Fleet E)														
<b>Autumn spawners in IIIa total</b>	<b>49</b>	<b>46</b>	<b>26</b>	<b>32,5</b>	<b>24,2</b>	<b>31,9</b>	<b>15,0</b>	<b>19,8</b>	<b>12,9</b>	<b>6,5</b>	<b>13,8</b>	<b>8,4</b>	<b>12,2</b>	
Spring spawners human consumption (Fleet C)	45	33	38	31,6	16,8	32,5	30,2	25,3	23,0	29,4	23,0	10,8	14,5	
Spring spawners mixed clupeoid (Fleet D) 13	5	3	9	4,0	11,2	5,1	5,9	2,3	2,2	2,9	0,5	0,8	1,0	
Spring spawners other industrial landings (Fleet E)														
<b>Spring spawners in IIIa total</b>	<b>50</b>	<b>36</b>	<b>47</b>	<b>35,6</b>	<b>28,0</b>	<b>37,6</b>	<b>36,1</b>	<b>27,6</b>	<b>25,2</b>	<b>32,3</b>	<b>23,5</b>	<b>11,6</b>	<b>15,5</b>	
<b>North Sea autumn spawners Total as used by ICES</b>	<b>388</b>	<b>363</b>	<b>372</b>	<b>479,7</b>	<b>567,2</b>	<b>663,8</b>	<b>514,6</b>	<b>406,5</b>	<b>257,9</b>	<b>168,4</b>	<b>187,6</b>	<b>226,5</b>	<b>434,6</b>	

1 IVa,b and EC zone of IIa. 2 Provided by Working Group members. 3 Incomplete, only some countries providing discard information. 4 Includes spring spawners not included in assessment. 5 Based on F=0.3 in directed fishery only; TAC advised for IVc, VIIId subtracted. 6 130-180 for spring spawners in all areas. 7 Based on sum-of-products (number x mean weight at age). 8 Status quo F catch for fleet A. 9 The catch should not exceed recent catch levels. 10 During the middle of 1996 revised to 50% of its original agreed TAC. 11 Included in IVa,b. 12 Managed in accordance with autumn spawners. 13 Fleet D and E are merged from 1999 onwards. 14 These catches (including local fjord-type Spring Spawners) are taken by Norway under a separate quota south of 62°N and are not included in the Norwegian North Sea catch figure for this area. 15 See catch option tables for different fleets.

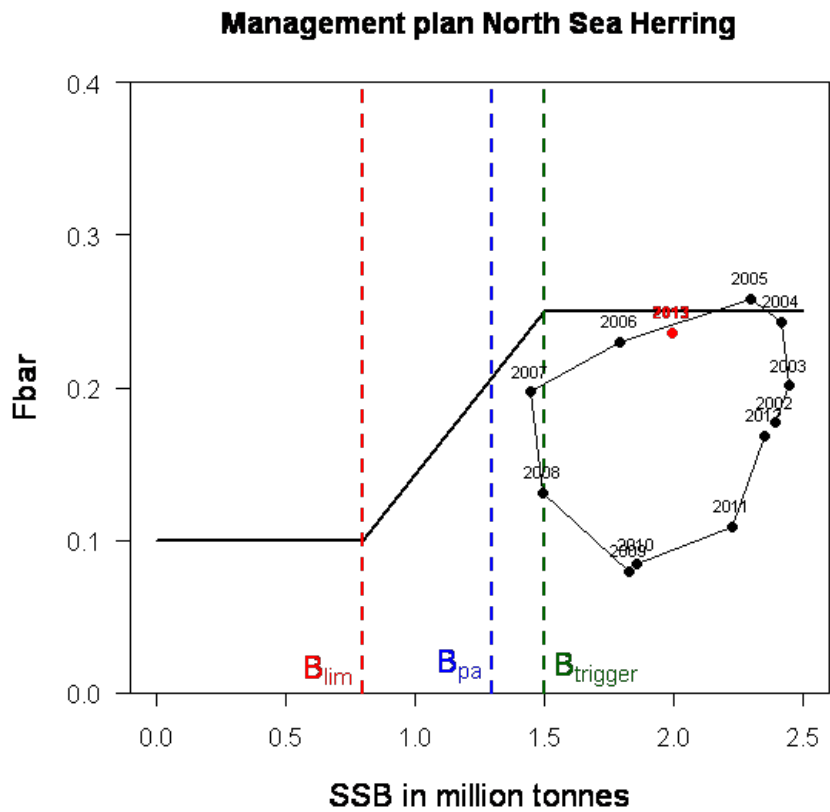




**Figure 6.4.9.4** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). Time-series of productivity indicators for the stock a) Recruits per spawner from the assessment b) Larval survival ratio (Dickey-Collas *et al.*, 2005; Payne *et al.*, 2009), defined as the ratio of the SCAI index (representing larvae less than 10–11 mm) and the IBTS0 index (representing the late larvae, of approximately 20–30 mm. Note the logarithmic scale on both vertical axes.



**Figure 6.4.9.5** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). Time-series of the contribution of each spawning component to the total stock, as estimated from the SCAI index (Payne, 2010). Areas are arranged from top to bottom according to the north-to-south arrangement of the components. Black: Orkney–Shetland component. Red: Buchan component. Green: Banks component. Blue: Downs component.



**Figure 6.4.9.6** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). Current management plan for adult fishery (A-fleet, ages 2–6) including trigger biomass points. Black dots represent realised estimated fishing mortalities from 2002 until 2012. Fishing mortality in 2013 (red dot) is estimated from the short-term prediction, based on the agreed TACS for the A-fleet.

## **Agreed Management Plan for North Sea herring**

*According to the EU–Norway agreement (November 2008):*

*The Parties agreed to continue to implement the management system for North Sea herring, which entered into force on 1 January 1998 and which is consistent with a precautionary approach and designed to ensure a rational exploitation pattern and provide for stable and high yields. This system consists of the following*

- 1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass (SSB) greater than 800,000 tonnes (Blim).*
- 2. Where the SSB is estimated to be above 1.5 million tonnes the Parties agree to set quotas for the directed fishery and for bycatches in other fisheries, reflecting a fishing mortality rate of no more than 0.25 for 2 ringers and older and no more than 0.05 for 0 - 1 ringers.*
- 3. Where the SSB is estimated to be below 1.5 million tonnes but above 800,000 tonnes, the Parties agree to set quotas for the direct fishery and for bycatches in other fisheries, reflecting a fishing mortality rate on 2 ringers and older equal to:  
 $0.25 - (0.15 * (1,500,000 - SSB) / 700,000)$  for 2 ringers and older,  
and no more than 0.05 for 0 - 1 ringers*
- 4. Where the SSB is estimated to be below 800,000 tonnes the Parties agree to set quotas for the directed fishery and for bycatches in other fisheries, reflecting a fishing mortality rate of less than 0.1 for 2 ringers and older and of less than 0.04 for 0-1 ringers.*
- 5. Where the rules in paragraphs 2 and 3 would lead to a TAC which deviates by more than 15 % from the TAC of the preceding year the parties shall fix a TAC that is no more than 15 % greater or 15 % less than the TAC of the preceding year.*
- 6. Notwithstanding paragraph 5 the Parties may, where considered appropriate, reduce the TAC by more than 15 % compared to the TAC of the preceding year.*
- 7. Bycatches of herring may only be landed in ports where adequate sampling schemes to effectively monitor the landings have been set up. All catches landed shall be deducted from the respective quotas set, and the fisheries shall be stopped immediately in the event that the quotas are exhausted.*
- 8. The allocation of the TAC for the directed fishery for herring shall be 29 % to Norway and 71 % to the Community. The bycatch quota for herring shall be allocated to the Community.*
- 9. A review of this arrangement shall take place no later than 31 December 2011.*
- 10. This arrangement enters into force on 1 January 2009.*