

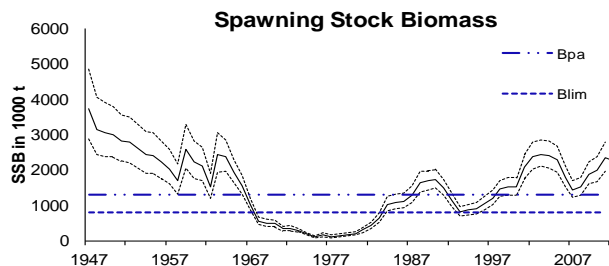
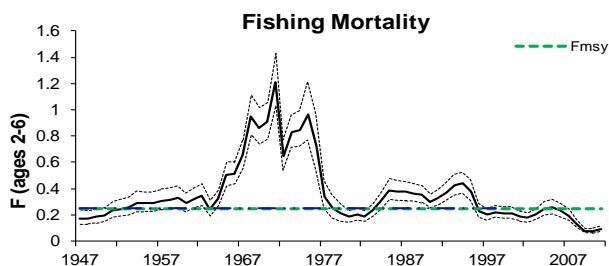
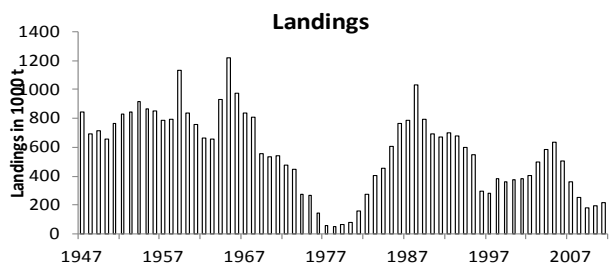
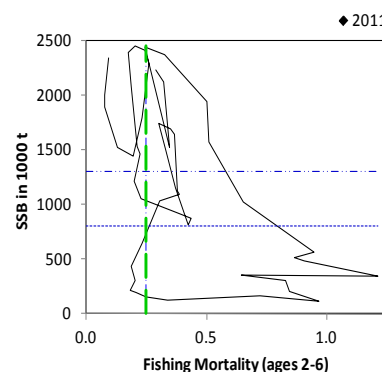
**ECOREGION North Sea**  
**STOCK Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners)**

**Advice for 2013**

ICES advises a revision of the EU–Norway management plan. Until then, ICES advises on the basis of the agreed EU–Norway management plan that catches in 2013 should be no more than 480 200 t, including 465 750 t for the A-fleet. ICES advises that no bottom disturbing activities, e.g. aggregate extraction, should occur in areas with spawning grounds during the spawning season and within 1 month before and after this period.

**Stock status**

F (Fishing Mortality)			
	2009	2010	2011
MSY ( $F_{MSY}$ )	✓	✓	✓ Below target
Precautionary approach ( $F_{pa}$ )	✓	✓	✓ Harvested sustainably
Management plan ( $F_{MP}$ )	✓	✓	✓ Below target
SSB (Spawning-Stock Biomass)*			
* at spawning time in autumn.	2010	2011	2012
MSY ( $B_{trigger}$ )	?	?	? Undefined
Precautionary approach ( $B_{pa}, B_{lim}$ )	✓	✓	✓ Full reproductive capacity
Management plan ( $SSB_{MP}$ )	✓	✓	✓ Above trigger



**Figure 6.4.16.1** 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.

The assessment was benchmarked in 2012 and a new assessment methodology was accepted which changed the perception of the stock. ICES classifies the stock as being at full reproductive capacity and as being harvested sustainably, below the current management plan and  $F_{MSY}$  targets. The year classes from 2002 to 2007 are estimated to be among the weakest since the late 1970s. The year classes 2008 and 2009 are estimated to be around the long-term geometric mean; however, 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 6.4.16). ICES has evaluated this management plan and concluded that the plan is consistent with the precautionary approach and the MSY approach. A full revision of the existing management plan is needed; until then, the current management plan is considered precautionary.

## 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 (age >2) can be observed where natural mortality has increased over the period 1963–1978, decreased over 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

Six poor year classes occurred between 2002 and 2007, something that had never before been observed when SSB was above the  $B_{lim}$  (800 000 t). The poor recruitment is attributed to reduced survival during the larval stage (Payne *et al.*, 2009). The productivity of the stock (in terms of recruits-per-spawner and larval survival) in the most recent years remains low. 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.

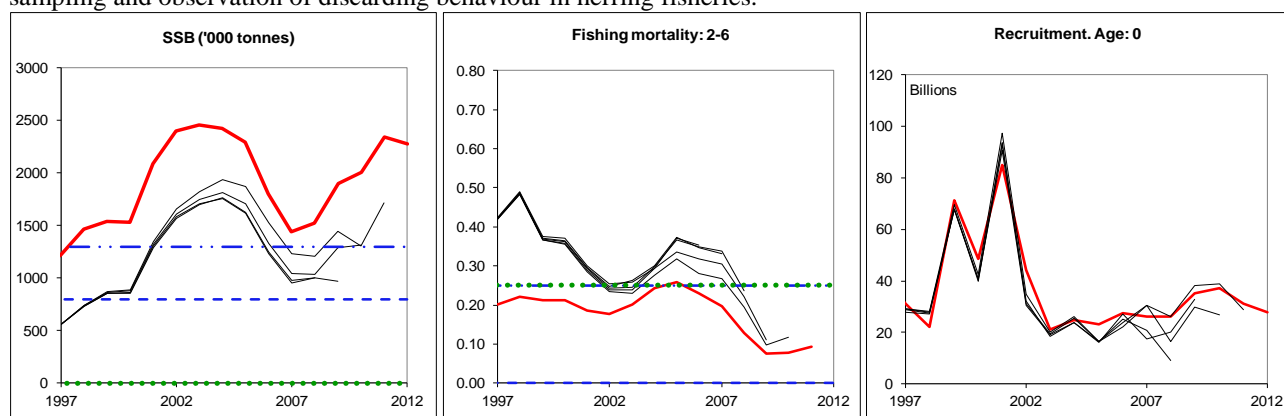
**Catch distribution** Total landings (2011) are 209 kt directed NS fisheries – fleet A, 9 kt bycatches – fleet B, 7 kt directed Division IIIa fisheries – fleet C, and 2 kt bycatch in Division IIIa fisheries – fleet D.

## 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 suggest that discarding of herring is not wide-spread and bycatch of sea mammals is low. Juvenile herring are caught as bycatch in the industrial fisheries.

## Quality considerations

The assessment was benchmarked in 2012 and the perception of the stock changed through this process. The assessment is considered to be an improvement to previous assessments. The absolute values of SSB compared to the estimates of 2011 have changed due to revisions in the estimated selection of the fishery and natural mortality. Sampling and estimation of stock identity of herring in the transfer area in the eastern North Sea should be improved as well as the sampling and observation of discarding behaviour in herring fisheries.



**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 (SAM).
<b>Input data</b>	Commercial catches and four survey indices (IBTS Q1 1–wr, IBTS0, SCAI, 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>

ECOREGION  
STOCK

North Sea  
Herring in Subarea IV and Divisions IIIa and VIIId (North Sea autumn spawners)

#### Reference points

	Type	Value	Technical basis
Management plan	$F_{MP}$	$F_{0-1} = 0.05$ $F_{2-6} = 0.25$	SSB is greater than the $SSB_{MP}$ upper trigger of 1.5 million t (based on simulations).
		$F_{0-1} = 0.05$ $F_{2-6} = 0.25 - (0.15 * (1500000 - SSB) / 700000)$	SSB is between the $SSB_{MP}$ triggers of 0.8 and 1.5 million t (based on simulations).
		$F_{0-1} = 0.04$ $F_{2-6} = 0.10$	SSB is less than the $SSB_{MP}$ lower trigger of 0.8 million t (based on simulations).
MSY Approach	MSY $B_{trigger}$	not defined	
	$F_{MSY}$	0.25	Simulations under different productivity regimes, research between 1996 and 2010.
Precautionary approach	$B_{lim}$	800 000 t	< 0.8 million t; poor recruitment has been experienced. Defined in 1997/2008.
	$B_{pa}$	1.3 million t	$B_{trigger}$ in the previous harvest control rule.
	$F_{lim}$	not defined	
	$F_{pa}$	$F_{2-6} = 0.25$	Target $F_s$ in the harvest control rule.

(Unchanged since 2011).

Reference points in the table above are based on the pre-benchmark perception of the stock. The benchmark assessment (ICES, 2012b) revised the perception of the stock (Figure 6.4.16.4) and the current management plan is based on the former perception of the stock. A full revision of the existing management plan is needed.

#### Outlook for 2013

Since 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 2013. 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:

- i. No fishing.
- ii. The EU–Norway management plan (which invokes a 15% limit on TAC change).
- iii. A roll-over TAC from 2012 to 2013 of 405 000 t for the A-fleet.
- iv. MSY approach ( $F_{MSY}$ ); this is also the option for the EU–Norway Harvest Control Rule as implemented within the management plan (no restriction on TAC change) and  $F_{pa}$ .
- v. A 15% decrease in the A-fleet TAC in 2012.
- vi. Fishing mortality  $F = 0.3$  in the human consumption fishery.

For the intermediate year, no overshoot for the A-fleet was assumed, as the catches corresponded closely to the TAC in 2011. However, an additional 18 500 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 2011 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 (2012) with catch constraint for fleet A, and for fleet B assuming the same proportion of the bycatch ceiling that is taken in 2011. Recruitment (2012) = 27.7 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	Catch fleet B	Catch fleet C	Catch fleet D	SSB 2012
0.181	0.026	0.001	0.006	0.03	0.18	423.5 <sup>1</sup>	9.7	7.6	1.6	2271

<sup>1</sup> Includes a transfer of 50% of the Norwegian quota in Division IIIa to the A-fleet and an additional 50% of the remaining Division IIIa TAC from the C-fleet to the A-fleet.

#### Scenarios for prediction year (2013)

	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 2013	SSB 2014 <sup>4)</sup>	%SSB change <sup>2)</sup>	%TAC change fleet A <sup>3)</sup>
<b>i</b>	No fishing	0	0	0	0	0	0	0	0	0	0	2362	2484	+4%	-100%
<b>ii</b>	Management plan	0.220	0.040	0.002	0.007	0.05	0.22	465.75	14.4	9.6	2.1	2047	1805	-10%	+15%
<b>iii</b>	No change in TAC	0.188	0.040	0.002	0.007	0.05	0.19	405.0	14.4	9.6	2.1	2088	1884	-8%	0%
<b>iv</b>	MSY approach <sup>5)</sup>	0.246	0.040	0.002	0.007	0.05	0.25	514.7	14.4	9.6	2.1	2013	1742	-11%	+27%
<b>v</b>	TAC reduction of 15%	0.158	0.040	0.002	0.007	0.05	0.16	344.25	14.4	9.6	2.1	2129	1965	-6%	-15%
<b>vi</b>	Human consumption fishing mortality = 0.3	0.296	0.040	0.002	0.007	0.05	0.30	606.2	14.4	9.6	2.1	1950	1628	-14%	+50%

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 (2013) relative to SSB (2012).

<sup>3)</sup> Calculated landings (2013) relative to TAC 2012 for the A-fleet.

<sup>4)</sup> Assuming same F in 2014 as in 2013.

<sup>5)</sup> The analysis carried out by the benchmark (ICES, 2012b) has revised the perception of the stock, and F<sub>MSY</sub> needs to be re-evaluated.

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 implies imposing the maximum 15% increase in TAC as the stock is estimated to be above the trigger biomass which results in a TAC of 465 750 t for the A-fleet in 2013 (Scenario ii), which would lead to an SSB of around 2.0 million tonnes at spawning time in 2013.

The agreed management plan (Annex 6.4.16) 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, and thus a full revision of the existing management plan for North Sea autumn spawners is needed. The use of the current management plan is considered precautionary.

### ***MSY approach***

As no MSY  $B_{\text{trigger}}$  has been identified for this stock, the ICES MSY framework has been applied with  $F_{\text{MSY}}$  without considering SSB in relation to MSY  $B_{\text{trigger}}$ .

Following the ICES MSY framework implies raising the fishing mortality to 0.25, resulting in catches of less than 514 700 t in 2013 (Scenario iv). This is expected to lead to an SSB of around 2.0 million tonnes in 2013.

The analysis carried out by the benchmark workshop (ICES, 2012b) has revised the perception of the stock, and  $F_{\text{MSY}}$  needs to be re-evaluated.

### ***Precautionary approach***

The fishing mortality in 2013 should be no more than  $F_{\text{pa}}$ , corresponding to catches of less than 514 700 t in 2013 (Scenario iv). The SSB is expected to remain above  $B_{\text{pa}}$  in 2013.

The analysis carried out by the benchmark workshop (ICES, 2012b) has revised the perception of the stock, and precautionary reference points need to be re-evaluated.

### **Additional considerations**

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. An interim evaluation of the EU-Norway management plan took place in 2011 to evaluate alternative TAC setting procedures (ICES, 2011b), each of which were shown to be precautionary. With the current rate of increase in the stock size, the main unsatisfactory issue relative to achieving simultaneous stable and high yields appears to be the 15% inter annual variability limit on TAC change. The analysis carried out by the benchmark workshop (ICES, 2012b) has revised the perception of the stock, and reference points and the existing management plan need to be re-evaluated.

ICES still considers the stock to be in a low productivity phase as the survival ratio between newly hatched larvae and recruits remains much lower than prior to 2001. The management plan has proven an effective tool in maintaining sustainable exploitation and conserving the North Sea herring stock during this lower productivity regime.

The fishing mortality is reliably estimated by the stock assessment. The absolute values of SSB compared to the estimates of 2011 have changed due to revisions in the estimated selection of the fishery and natural mortality, but the trends remain similar.

Essential fish habitat for herring spawning is gravel substrate. Herring spawning and nursery areas are sensitive and vulnerable to anthropogenic influences. Extraction of marine aggregates (such as gravel and sand) and other activity (e.g. construction) that have an impact on the seabed may be expected to have a negative impact on herring 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 enough scientific information to support the advice that no bottom disturbing activities, e.g. aggregate extraction, should occur in areas with spawning grounds during the spawning season or within 1 month before or after this period, as this coincides with herring spawning in the area and egg and larval development.

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 2012 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 has changed over time: in recent years the relative contribution of the spawning components has been stable (Figure 6.4.16.5).

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 6.4.16.5; 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.

#### *Information from the fishing industry*

The fishing industry has commented that the stock is migrating further north, out of the North Sea in summer. If this is the case both the assumptions associated with the catch information and the acoustic survey would be compromised. ICES, at present, has no evidence to support these comments. The fishery reports that the fleets have been operating further west in recent years.

#### *Changes in fishing patterns*

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

#### *Changes in the ecosystem*

There is still a low productivity regime although absolute recruitment has increased in 2008 and 2009. The survival ratio of recruits to newly hatched larvae is low. A large population of herring in the North Sea may repress cod recruitment (Speirs *et al.*, 2010).

#### *Data issues*

The quality of the biomass estimates has been substantially affected by uncertainty in the estimation of recruitment. It is probably caused by the increasing Downs component which is poorly represented in the survey catches. The IBTS 0 index, in its current form, does not provide any information about the individual components.

Estimation of stock identity of herring from the transfer area in Subdivision 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*

In 2012, the assessment of the North Sea herring stock was benchmarked and a new assessment model was adopted (ICES, 2012b). Changes in both the input data and the model configuration have led to a change in the perception of SSB and F compared to previous assessments of this stock. Generally speaking, absolute estimates of the SSB are higher throughout the time-series and the fishing mortality lower, but the trends remain similar; recruitment estimates have remained unchanged. SSB has been revised up by 35%, from 1.3 million tonnes to 2.0 million tonnes in 2010. F has been revised down by 33%, from 0.12 to 0.08 in 2010.

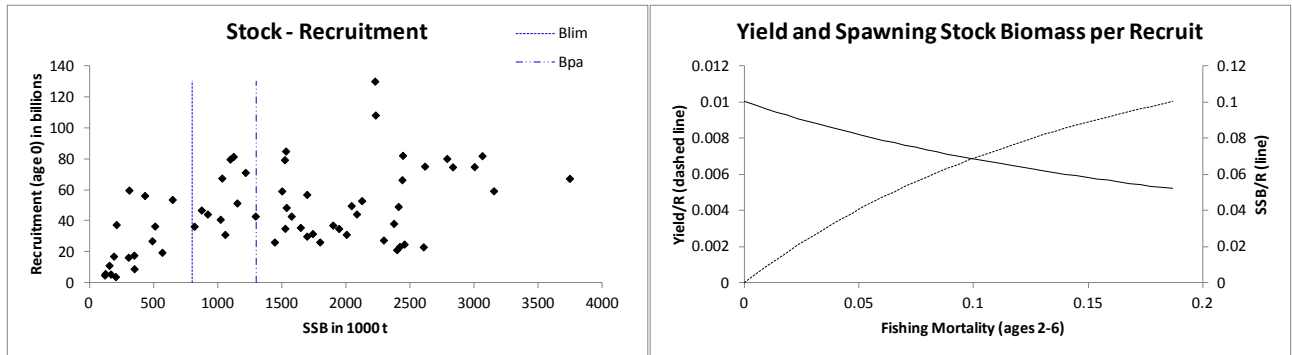
A summary of the quality improvements of the assessment is given below. See ICES (2012b) for a complete list.

- Natural mortality is assumed to be variable over age and time. Natural mortality estimates are obtained from the North Sea multispecies model (SMS) key-run evaluated in 2011 (ICES, 2011c). The estimated time-varying natural mortality is pre-smoothed prior to being used in the assessment.
- The time series of catch-at-age data has been extended to also cover the period 1947–1959. The entire time-series used within the assessment now spans 1947–2011.
- The catch-at-age data in years 1977–1978 have been excluded from the assessment. There were strong indications that catch data during the full closure of the fishery were not reliable.
- The plus-group was re-defined to age 8. Examination of the biological data suggested that there was no evidence to support an older plus group. Analyses also showed that there was insufficient information present in the data to provide reliable estimates of fishing mortality on the older ages when a 9+ age-group was used.
- The multiplicative larval abundance (MLAI) tuning index has been replaced by the spawning-component abundance (SCAI) tuning index, allowing spawning component dynamics to be monitored.
- IBTS quarter 1 ages 2–5+ indices have been excluded from the assessment. A suite of analyses suggest that the signal in the IBTS-Q1 ages 2–5+ is very poor and therefore does not contribute to the tuning of the assessment.
- The ICA assessment model has been replaced with the state-space assessment model (SAM: [www.stockassessment.org](http://www.stockassessment.org)). The SAM model provides a flexible and fully statistical framework for the analysis of the inputs and refinement of the model.

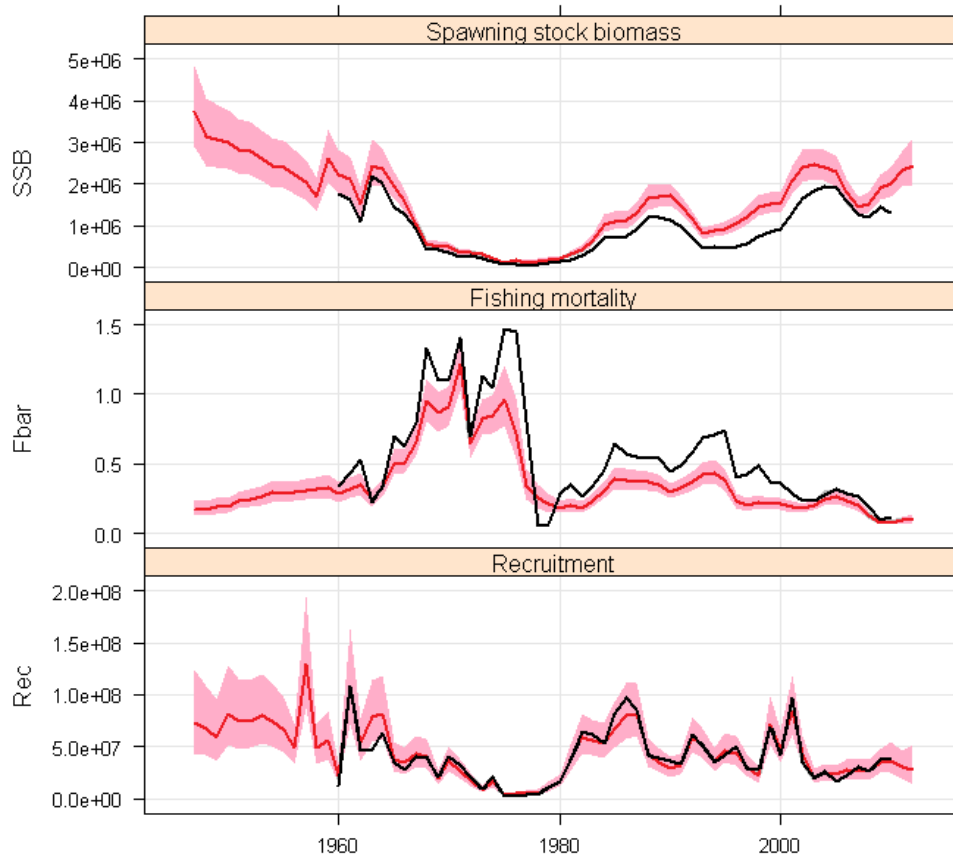
The basis for the advice is the management plan, which is the same as last year.

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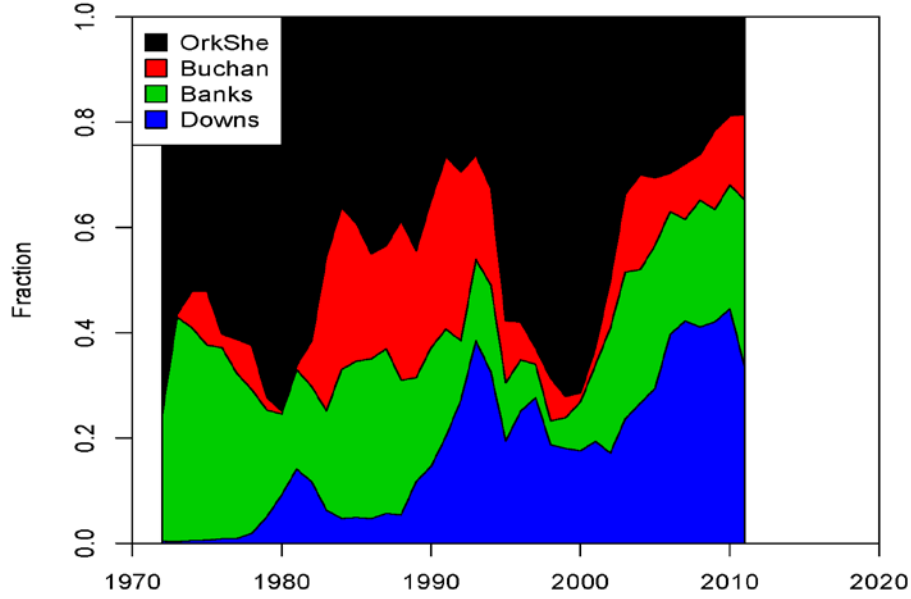
**Figure 6.4.16.3** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). Stock-recruitment plot and yield-per-recruit analysis.



**Figure 6.4.16.4** Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners). Comparison between the 2011 assessment (black line) and the 2012 benchmarked assessment (red line with 95% confidence intervals (pink)) over the full assessment period.

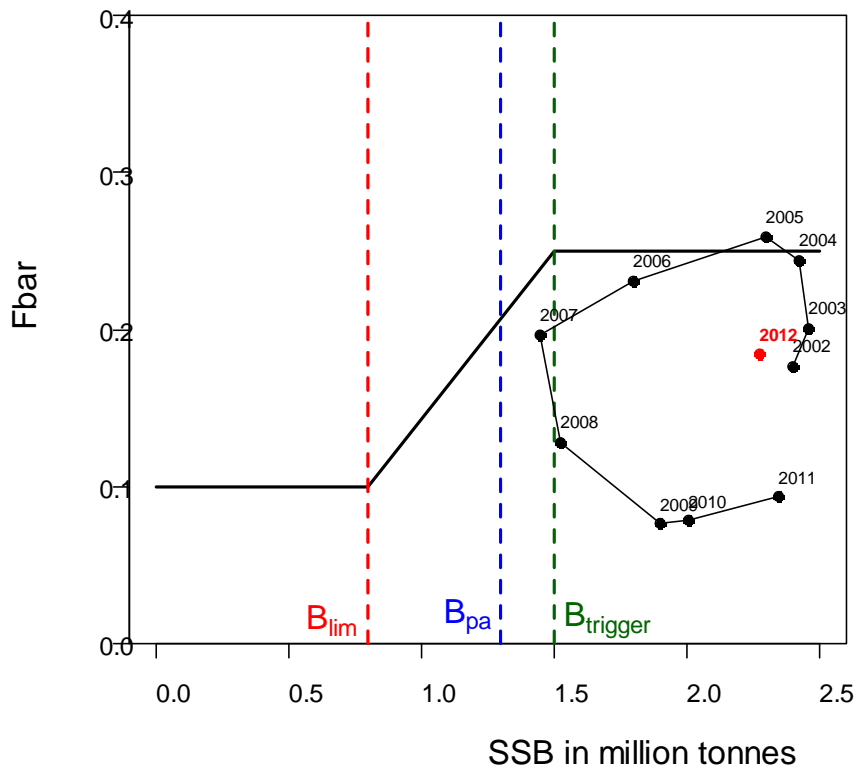


**Trends in contribution of the spawning components to the stock**



**Figure 6.4.16.5** 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.

**Management plan North Sea |**



**Figure 6.4.16.6** 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 2011. Fishing mortality in 2012 (red dot) is estimated from the short-term prediction, based on the agreed TACS for the A-fleet.

**Table 6.4.16.1** 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 Lndgs. <sup>4</sup> IV, VIIId	ICES Catch <sup>5</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>3</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			
2013	Management plan	See scenario					

Weights in thousand tonnes.

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

<sup>2</sup>Revision of advice given in 1995.

<sup>3</sup>Revised in June 1996, down from 263.

<sup>4</sup>Landings are provided by the working group and do not in all cases correspond to official statistics.

<sup>5</sup>ICES catch includes unallocated and misreported landings, discards, and slipping.

**Table 6.4.16.2**

Herring caught in the North Sea (Subarea IV and Division VIIId). Catch in tonnes by country, 2002–2011. These figures do not in all cases correspond to the official statistics and cannot be used for legal purposes.

Country	2002	2003	2004	2005	2006
Belgium	23	5	8	6	3
Denmark <sup>6</sup>	70825	78606	99037	128380	102322
Faroe Islands	1413	627	402	738	1785
France	25422	31544	34521	38829	49475
Germany	27213	43953	41858	46555	40414
Netherlands	55257	81108	96162	81531	76315
Norway <sup>1</sup>	74974	112481	137638	156802	135361
Poland	-	-	-	458	-
Sweden	3418	4781	5692	13464	10529
USSR/Russia	-	-	-	99	-
UK (England)	13757	18639	20855	25311	22198
UK (Scotland)	30926	40292	45331	73227	48428
UK (N.Ireland)	944	2010	2656	2912	3531
Unallocated landings	31552 <sup>5</sup>	31875 <sup>5</sup>	48898 <sup>5</sup>	57788	18764
Total landings	335724	445921	533058	626101	509125
Discards	17093	4125	17059	12824	1492
<b>Total catch</b>	<b>352817</b>	<b>450046</b>	<b>550117</b>	<b>638925</b>	<b>510617</b>
Estimates of the parts of the catches which have been allocated to spring spawning stocks					
WBSS	6652	2821	7079	7039	10954
Thames estuary <sup>2</sup>	60	84	62	74	65
Others <sup>3</sup>	0	308	0	0	0
Norw. Spring Spawners <sup>4</sup>	4069	979	452	417	626
Country	2007	2008	2009	2010	2011
Belgium	1	-	-	-	4
Denmark <sup>6</sup>	84697	62864	46238	45869	58726
Faroe Islands	2891	2014	1803	3014	-
France	24909	30347	18114	17745	16693
Germany	14893	8095	5368	7670	9427
Netherlands	66393	23122	24552	23872	34708
Norway <sup>1</sup>	100050	59321	50445	46816	60705
Lithuania	-	-	-	90	-
Sweden	15448	13840	5299	4395	8086
Russia	-	-	-	-	-
UK (England)	15993	11717	652	10770	11468
UK (Scotland)	35115	16021	14006	14373	18564
UK (N.Ireland)	638	331	-	-	17
Unallocated landings	26641	17151	-726	0	0
Total landings	387669	244823	165751	174614	218398
Discards	93	224	91	13	0
<b>Total catch</b>	<b>387762</b>	<b>245047</b>	<b>165842</b>	<b>174627</b>	<b>218398</b>
Estimates of the parts of the catches which have been allocated to spring spawning stocks					
WBSS	1070	124	3941	774	308
Thames estuary <sup>2</sup>	2	7	48	85	2
Others <sup>3</sup>	0	0	0	0	0
Norw. Spring Spawners <sup>4</sup>	685	2721	44560	56900	12178

<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 6.4.16.3**

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

Country	2002	2003	2004	2005	2006
Denmark <sup>1</sup>	26422	48358	48128	80990	60462
Faroe Islands	-	95	-		580
France	10522	11237	10941	13474	18453
Germany	15189	25796	17559	22278	18605
Netherlands	18289	25045	43876	36619	39209
Norway	10836	34443	36119	66232	38363
Poland	-	-	-	458	-
Sweden	2397	2647	2178	8261	4957
Russia	-	-	-	99	-
UK (England)	10142	12030	13480	15523	12031
UK (Scotland)	30014	39970	43490	71941	47368
UK (N. Ireland)	944	2010	2656	2912	3531
Unallocated landings	14201 <sup>2</sup>	14115 <sup>2</sup>	28631 <sup>2</sup>	39324 <sup>2</sup>	10981 <sup>2</sup>
Misreporting from VIa North					
Total Landings	138956	215746	247058	358111	253048
Discards	17093	4125	15794	10861	1492
<b>Total catch</b>	<b>156049</b>	<b>219871</b>	<b>262852</b>	<b>368972</b>	<b>254540</b>
Country	2007	2008	2009	2010	2011
Denmark <sup>1</sup>	45948	28426	16550	25092	26523
Faroe Islands	1118	2	288	1110	-
France	8570	13068	7067	6412	7885
Germany	4985	498	-	505	2642
Netherlands	42622	11634	11017	13593	15202
Norway	40279	40304	25926	38897	45200
Lithuania	-	-	-	90	-
Sweden	7658	7025	1435	2310	5121
Russia	-	-	-	-	-
UK (England)	11833	8355	578	7384	4555
UK (Scotland)	35115	14727	10249	13567	17909
UK (N. Ireland)	638	331	-	-	17
Unallocated landings	22215	14952	-977	0	0
Misreporting from VIa North					
Total Landings	220981	139322	72133	108960	125054
Discards	93	194	91	13	0
<b>Total catch</b>	<b>221074</b>	<b>139516</b>	<b>72224</b>	<b>108973</b>	<b>125054</b>

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

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

**Table 6.4.16.4** 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	2002	2003	2004	2005	2006
Denmark 1	17846	7401	16278	5761	8614
Faroe Islands	1365	359	-	738	975
France	-	-	-	-	-
Germany	81	54	888	-	34
Netherlands	-	-	-	-	-
Norway 2	63482	62306	100443	89925	90065
UK (Scotland)	-	-	-	-	83
Sweden	568	1529	1720	3510	2857
Unallocated landings	3959	9988	0	0	0
Total landings	87301	81637	119329	99934	102628
Discards	-	-	-	-	-
<b>Total catch</b>	<b>89303</b>	<b>83640</b>	<b>119329</b>	<b>99934</b>	<b>102628</b>
Norw. Spring Spawners 4	4069	979	452	417	626
Country	2007	2008	2009	2010	2011
Denmark 1	2646	1587	499	-	1590
Faroe Islands	577	400	700	719	-
France	-	-	-	-	-
Germany	-	-	-	-	-
Netherlands	263	-	-	-	-
Norway 2	54424	17474	6981	7362	12922
UK (Scotland)	-	-	-	-	167
Sweden	640	-	1735	1505	150
Unallocated landings	-96 3	0	0	0	0
Total landings	58454	19461	9915	9586	14829
Discards	-	-	-	-	-
<b>Total catch</b>	<b>58454</b>	<b>19461</b>	<b>9915</b>	<b>9586</b>	<b>14829</b>
Norw. Spring Spawners 4	685	2721	44560	56900	12178

<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 6.4.16.5** 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	2002	2003	2004	2005	2006
Denmark <sup>1</sup>	26387	22574	33857	41423	32277
Faroe Islands	48	173	402	-	200
France	4214	7918	10592	10205	17385
Germany	7577	12116	13823	14381	14222
Netherlands	13154	19115	23649	10038	13363
Norway	656	15732	1076	645	6933
Sweden	453	605	1794	1694	2715
UK (England)	317	2632	2864	3869	4924
UK (Scotland)	289	322	1841	1286	977
Unallocated landings <sup>3</sup>	4052	-2401	8300	10233	2364
Total landings	57147	78786	98198	93774	95360
Discards <sup>2</sup>			1265	1963	
<b>Total catch</b>	<b>57147</b>	<b>78786</b>	<b>99463</b>	<b>95737</b>	<b>95360</b>
Country	2007	2008	2009	2010	2011
Denmark <sup>1</sup>	35990	32230	29164	19671	30498
Faroe Islands	1196	1612	815	1185	-
France	8421	9687	4316	2349	1687
Germany	2205	2415	1061	1994	1778
Netherlands	8550	904	3164	830	7314
Norway	5347	1543	17538	557	2537
Sweden	7150	6815	2129	580	2815
UK (England)	577	833	2	1577	4748
UK (Scotland)	-	1293	3757	805	488
Unallocated landings <sup>3</sup>	-203	-904	-166	0	0
Total landings	69233	56428	61780	29548	51865
Discards <sup>2</sup>		30			
<b>Total catch</b>	<b>69233</b>	<b>56458</b>	<b>61780</b>	<b>29548</b>	<b>51865</b>

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

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

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

**Table 6.4.16.6** Herring caught in the North Sea. Catch in tonnes in Divisions IVc and VIId. These figures do not in all cases correspond to the official statistics and cannot be used for legal purposes.

Country	2002	2003	2004	2005	2006
Belgium	23	5	8	6	3
Denmark	170	273	774	206	969
Faroe Islands					30
France	10686	12389	12988	15150	13637
Germany	4366	5987	9588	9896	7553
Netherlands	23814	36948	28637	34874	23743
UK (England)	3298	3977	4511	5919	5243
UK (Scotland)	623	-	-	-	-
Unallocated landings	5336	8170	9963	8231	5419
Total landings	50318	67749	68473	74282	56597
Discards 2	-	-	-	-	-
<b>Total catch</b>	<b>50318</b>	<b>67749</b>	<b>68473</b>	<b>74282</b>	<b>56597</b>
Coastal spring spawners included above 1	60	84	62	74	65
Country	2007	2008	2009	2010	2011
Belgium	1	-	-	-	4
Denmark	113	621	25	1106	115
France	7918	7592	6731	8984	7121
Germany	7703	5182	4307	5171	5007
Netherlands	14958	10584	10371	9449	12192
Norway	-	-	-	-	46
UK (England)	3583	2529	72	1809	2165
UK (Scotland)	-	1	-	1	-
Unallocated landings	4725	3103	417	0	0
Total landings	39001	29612	21923	26520	26650
Discards 2	-	-			
<b>Total catch</b>	<b>39001</b>	<b>29612</b>	<b>21923</b>	<b>26520</b>	<b>26650</b>
Coastal spring spawners included above 1	2	7	48	85	2

<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.

**Table 6.4.16.7** (“The Wonderful Table”). Herring caught in the North Sea. Catch in thousand tonnes in Subarea IV and in Divisions VIIId and IIIa.

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<b>Sub-Area IV and Division VIIId: TAC (IV and VIIId)</b>														
Recommended Divisions IVa, b	265	265	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	-	-
Recommended Divisions IVc, VIIId	- 11	- 11	- 11	- 11	- 11	- 11	- 11	- 11	- 11	- 11	- 11	- 11	-	-
Expected catch of spring spawners														
Agreed Divisions IVa,b 1	240	240	240	223	340.5	393.9	460.7	404.7	303.5	174.6	147.4	149.0	173.5	360.4
Agreed Div. IVc, VIIId	25	25	25	42.7	59.5	66.1	74.3	50.0	37.5	26.7	23.6	15.3	26.5	44.6
Bycatch ceiling in the small mesh fishery	30	36	36	36	52.0	38.0	50.0	42.5	31.9	18.8	16.0	13.6	16.5	17.9
<b>CATCH (IV and VIIId)</b>														
National landings Divisions IVa,b 2	261	261	272	261	354.5	427.7	502.3	439.2	326.8	201.2	145.0	148.1	191.7	
Unallocated landings Divisions IVa,b	22	35	2	24	23.7	36.9	49.6	13.3	21.9	14.0	-1.1	0.0	0.0	
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	
Total catch Divisions IVa,b 4	283	296	273	303	382.3	481.6	564.6	454.0	348.8	215.4	143.9	148.1	191.7	
National landings Divisions IVc, VIIId 3	29	23	24	43	59.5	56.5	66.1	51.2	34.3	26.5	21.5	26.5	26.7	
Unallocated landings Divisions IVc,VIIId	22	27	26	7	8.2	12.0	8.2	5.4	4.7	3.1	0.4	0	0	
Discard/slipping Divisions IVc, VIIId 3	-	-	-	0	-	-	-	-	-	-	-	-	-	
Total catch Divisions IVc, VIIId	50	50	50	50	67.7	68.5	74.3	56.6	39.0	29.6	21.9	26.5	26.7	
<b>Total catch IV and VIIId as used by ICES 4</b>	<b>333</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>CATCH BY FLEET/STOCK (IV and VIIId) 7</b>														
North Sea autumn spawners directed fisheries (Fleet A)	313	322	296	323	434.9	529.5	610.0	487.1	379.6	236.3	152.1	164.8	209.2	
North Sea autumn spawners industrial (Fleet B)	15	18	20	22	12.3	13.6	21.8	11.9	7.1	8.6	9.8	9.1	8.9	
<b>North Sea autumn spawners in IV and VIIId total</b>	<b>329</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>	
Baltic-IIIa-type spring spawners in IV	5	7	6	7	2.8	7.1	7.0	11.0	1.1	0.1	3.9	0.8	0.3	
Coastal-type spring spawners	0.1	0.1	1.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	
Norw. Spring Spawners caught under a separate quota in IV 14	32	26	7	4	1.0	0.5	0.4	0.6	0.7	2.7	44.6	56.9	12.2	16
<b>Division IIIa: TAC (IIIa)</b>														
Predicted catch of autumn spawners	43	53	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15
Recommended spring spawners	- 12	- 12	- 12	- 12	- 12	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15	- 15
Recommended mixed clupeoids	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agreed herring TAC	80	80	80	80	80.0	70.0	96.0	81.6	69.4	51.7	37.7	33.9	30.0	45.0
Agreed mixed clupeoid TAC														
Bycatch ceiling in the small mesh fishery	19	21	21	21	21.0	21.0	24.2	20.5	15.4	11.5	8.4	7.5	6.7	6.7
<b>CATCH (IIIa)</b>														
National landings	86	108	90	79	76.0	61.1	90.8	88.9	47.3	38.2	38.8	37.3	20.0	
Catch as used by ICES	79	99	82	73	68.1	52.7	69.6	51.2	47.4	38.2	38.8	37.3	20.0	
<b>CATCH BY FLEET/STOCK (IIIa) 7</b>														
Autumn spawners human consumption (Fleet C)	28	36	34	17	24.1	13.4	22.9	11.6	16.4	9.2	5.1	12.0	6.6	
Autumn spawners mixed clupeoid (Fleet D) 13	8	13	12	9	8.4	10.8	9.0	3.4	3.4	3.7	1.5	1.8	1.8	
Autumn spawners other industrial landings (Fleet E)														
<b>Autumn spawners in IIIa total</b>	<b>34</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>	
Spring spawners human consumption (Fleet C)	40	45	33	38	31.6	16.8	32.5	30.2	25.3	23.0	29.4	23.0	10.8	
Spring spawners mixed clupeoid (Fleet D) 13	3	5	3	9	4.0	11.2	5.1	5.9	2.3	2.2	2.9	0.5	0.8	
Spring spawners other industrial landings (Fleet E)														
<b>Spring spawners in IIIa total</b>	<b>43</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>North Sea autumn spawners Total as used by ICES</b>	<b>363</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>	
<p>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.</p>														



**Table 6.4.16.8** 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) Mean	Total biomass (tonnes)		Spawning biomass (tonnes)		Landings (tonnes)		Yield / SSB (ratio) Mean	Mean F ages 2-6 Mean	Mean F ages 0-1					
		Low	High	Low	High	Low	High			Low	High				
1947	72492959	42611895	123327750	6983076	5657519	8619210	3745254	2890236	4853211	846614	0.226	0.175	0.126	0.242	0.002
1948	67254871	41609506	108706354	6280750	5090108	7749899	3153426	2444274	4068322	689002	0.218	0.172	0.128	0.231	0.002
1949	59233629	36842064	95234154	6022422	4925148	7364157	3063290	2395584	3917101	712831	0.233	0.186	0.138	0.249	0.002
1950	81899218	52171306	128566495	6095126	5015279	7407477	3002633	2378302	3790857	657368	0.219	0.196	0.148	0.258	0.005
1951	74850249	48311259	115967994	6205832	5139879	7492851	2833434	2259423	3553274	762990	0.269	0.234	0.182	0.302	0.016
1952	74700698	48798474	114351821	6064726	5040517	7297051	2788460	2220207	3502156	829020	0.297	0.246	0.191	0.317	0.029
1953	80117110	53520387	119930960	5950584	4965601	7130950	2615589	2072751	3300593	843234	0.322	0.261	0.202	0.337	0.041
1954	75150250	50970786	110799941	5821101	4870879	6956694	2438759	1919220	3098940	915293	0.375	0.292	0.224	0.380	0.054
1955	66386216	45253945	97386641	5471153	4590753	6520395	2409669	1900941	3054543	866312	0.360	0.289	0.223	0.375	0.083
1956	49130963	33412759	72243405	4911058	4134604	5833325	2226630	1753587	2827281	850007	0.382	0.292	0.228	0.374	0.078
1957	129994149	86938367	194373087	5576099	4604647	6752500	2043143	1609208	2594093	784655	0.384	0.306	0.239	0.393	0.099
1958	49674387	34004873	72564443	5267150	4400026	6305161	1696368	1328328	2166381	790958	0.466	0.315	0.247	0.403	0.085
1959	56911045	38393272	84360277	5460222	4591829	6492843	2605148	2048113	3313682	1131438	0.434	0.329	0.257	0.422	0.107
1960	23068993	15233227	34935372	4439268	3755204	5247943	2231088	1760269	2827837	839029	0.376	0.287	0.225	0.366	0.120
1961	108146787	71938346	162579879	5050511	4210081	6058711	2124400	1699050	2656235	756910	0.356	0.322	0.258	0.402	0.065
1962	52904555	35933278	77891361	4699657	3954726	5584905	1522707	1202341	1928435	666636	0.438	0.346	0.274	0.437	0.056
1963	79319932	55289059	113795598	5362817	4546312	6325965	2443642	1954755	3054799	658026	0.269	0.244	0.194	0.308	0.071
1964	82145285	57154164	118063975	5677378	4918211	6553727	2373794	1961772	2872351	931918	0.393	0.324	0.268	0.392	0.133
1965	38186782	26492748	55042623	5020299	4429213	5690266	1945442	1644672	2301217	1217122	0.626	0.501	0.418	0.601	0.122
1966	34935009	24499459	49815583	3886424	3445763	4383438	1575369	1335860	1857820	976764	0.620	0.510	0.433	0.602	0.112
1967	42926504	30273606	60867699	3169232	2808426	3576393	1021722	871943	1197230	835679	0.818	0.654	0.557	0.767	0.145
1968	40873807	28728379	58153929	2755198	2410356	3149377	567502	484586	664607	806936	1.422	0.948	0.808	1.113	0.153
1969	19560054	13533740	28269770	2137185	1852825	2465187	510936	416945	626116	556821	1.090	0.864	0.735	1.015	0.150
1970	36506468	26018844	51221422	2063677	1790364	2378714	489432	397927	601978	532853	1.089	0.905	0.777	1.054	0.149
1971	26990621	19401435	37548440	1947389	1695082	2237250	348363	286856	423058	540906	1.553	1.212	1.030	1.426	0.279
1972	17716377	12784177	24551443	1684535	1472877	1926608	350109	287692	426067	472598	1.350	0.645	0.541	0.769	0.296
1973	8966446	6379917	12601601	1292385	1139492	1465792	304370	253177	365915	443743	1.458	0.827	0.711	0.962	0.325
1974	16387018	11610634	23128311	949794	831115	1085418	204434	170717	244810	274581	1.343	0.845	0.718	0.995	0.257
1975	3870909	2575654	5817528	783871	666639	921719	119491	96889	147367	265136	2.219	0.968	0.773	1.211	0.302
1976	4901246	3185980	7539976	543617	453031	652316	166708	125745	221015	147709	0.886	0.723	0.539	0.972	0.116
1977	5520616	3524877	8646317	408399	329561	560697	124492	91657	169091	61023	0.490	0.337	0.245	0.464	0.091
1978	5826925	3662428	9270642	462777	369858	579040	154817	116730	205331	52680	0.340	0.250	0.178	0.350	0.097
1979	11172880	7297147	17107132	590662	480429	726188	190042	148023	243989	65578	0.345	0.207	0.151	0.286	0.104

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

**Table 6.4.16.8 Continued**

Year	Recruits Age 0 (Thousands) Mean	Total biomass (tonnes) Mean		Spawning biomass (tonnes) Mean		Landings (tonnes) Mean <sup>(1)</sup>		Yield / SSB (ratio) Mean	Mean F ages 2-6 Mean	Mean F ages 0-1					
		Low	High	Low	High	Low	High			Low	High				
1980	17072849	11954673	24382280	811792	671051	982053	210660	168623	263176	81064	0.385	0.183	0.144	0.233	0.111
1981	37468083	26829592	52324957	1405635	1166582	1693676	309589	248541	385632	159213	0.514	0.201	0.160	0.252	0.283
1982	59709399	43561958	81842334	2128653	1771783	2557403	431922	349974	533058	271848	0.629	0.185	0.148	0.231	0.255
1983	56232194	41516919	76163157	2861911	2419243	3385576	647582	526540	796448	403124	0.623	0.231	0.187	0.285	0.288
1984	53650428	39361565	73126370	3602001	3092088	4196002	1034057	841173	1271168	453613	0.439	0.304	0.249	0.371	0.198
1985	67456938	48712391	93414394	4093865	3545157	4727500	1097999	908402	1327167	606221	0.552	0.388	0.316	0.475	0.199
1986	79717524	57435343	110644133	4685579	4047927	5423677	1123546	938366	1345269	766048	0.682	0.379	0.311	0.460	0.191
1987	81409294	59664156	111079642	4615820	4018764	5301578	1294972	1080393	1552170	785441	0.607	0.374	0.310	0.451	0.247
1988	42926504	31341674	58793438	4538014	3976434	5178904	1646233	1375865	1969729	1033023	0.628	0.365	0.303	0.440	0.298
1989	35640743	26070663	48723830	3801856	3375412	4282177	1696368	1451320	1982791	794923	0.469	0.350	0.292	0.420	0.242
1990	29978769	21677738	41458505	3704282	3300011	4158078	1741052	1497012	2024874	695231	0.399	0.300	0.250	0.361	0.234
1991	31642129	23121706	43302356	3433189	3058624	3853623	1501537	1292924	1743811	672663	0.448	0.329	0.275	0.393	0.207
1992	59174425	44617754	78480253	3460764	3070918	3900101	1151988	985034	1347240	698716	0.607	0.369	0.308	0.442	0.295
1993	51392356	38699189	68248827	3191495	2800386	3637227	818313	691752	968029	680784	0.832	0.422	0.351	0.508	0.324
1994	36397112	27153041	48788266	2827773	2478992	3225626	874144	743482	1027768	598391	0.685	0.437	0.362	0.527	0.202
1995	46828381	34660817	63267327	2746945	2398378	3146171	921723	777939	1092082	544705	0.591	0.379	0.308	0.465	0.204
1996	44233811	32210827	60744482	2934360	2534492	3397316	1058115	892554	1254387	297747	0.281	0.229	0.182	0.288	0.107
1997	31108760	22300802	43395521	3131429	2704621	3625590	1217122	1028476	1440371	284077	0.233	0.201	0.162	0.249	0.033
1998	22098052	15968210	30581004	3325066	2899227	3813451	1467396	1252733	1718843	384231	0.262	0.222	0.180	0.274	0.058
1999	71128595	51403067	98423642	3412651	2987781	3897939	1536473	1307959	1804911	361494	0.235	0.212	0.173	0.259	0.040
2000	48496394	35120852	66965921	4329662	3745390	5005078	1531870	1307614	1794587	373249	0.244	0.212	0.173	0.259	0.043
2001	84901303	61266172	117654345	4852478	4214505	5587024	2084418	1774048	2449087	385001	0.185	0.187	0.152	0.229	0.040
2002	44278067	31971825	61321091	5626510	4879269	6488189	2397651	2046761	2808696	407176	0.170	0.176	0.144	0.217	0.030
2003	21274080	15412928	29364082	5962498	5173494	6871832	2455891	2110996	2857134	495836	0.202	0.201	0.164	0.246	0.040
2004	24865702	18011504	34328237	5040420	4398405	5776147	2419327	2075752	2819771	584201	0.241	0.244	0.197	0.303	0.042
2005	23277552	16957568	31952954	4231216	3709107	4826819	2294441	1956166	2691214	635394	0.277	0.260	0.210	0.321	0.077
2006	27480851	19984365	37789400	3513067	3081548	4005013	1797667	1529505	2112843	507372	0.282	0.231	0.186	0.286	0.046
2007	26245366	18430075	37374739	2996633	2610917	3439333	1444105	1223784	1704090	363669	0.252	0.197	0.158	0.245	0.036
2008	26192928	18131244	37839073	3051061	2639813	3526376	1525755	1298957	1792152	252458	0.165	0.128	0.104	0.158	0.037
2009	35039971	25039321	49034858	3509556	3021796	4076047	1899308	1612966	2236483	183506	0.097	0.076	0.060	0.096	0.027
2010	37095269	25236977	54525509	4085685	3505761	4761541	2004690	1678666	2394033	192336	0.096	0.078	0.063	0.097	0.027
2011	31139884	20526868	47240154	4231216	3594376	4980889	2343134	1963435	2796262	217075	0.093	0.093	0.074	0.118	0.026
2012	27757038						2271364*								

\* predicted.

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

## **Annex 6.4.16 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.*