

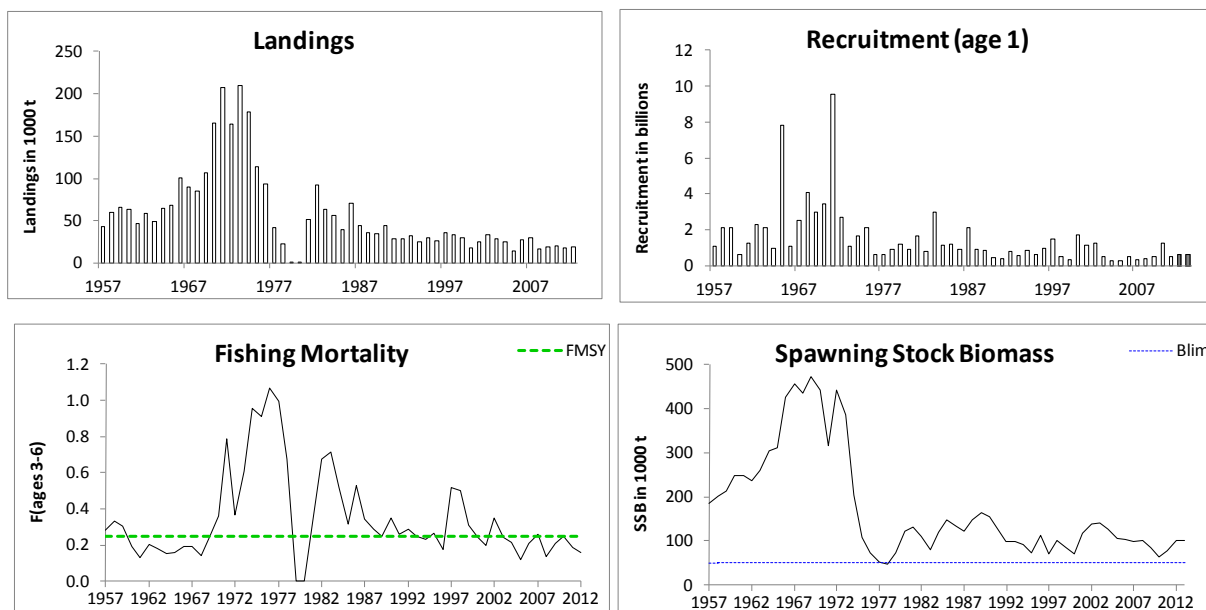
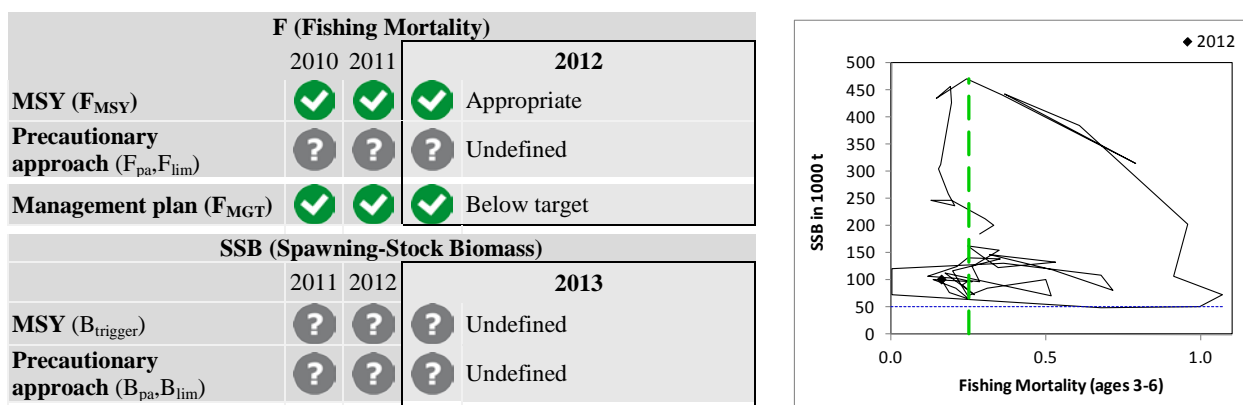
**ECOREGION** Celtic Seas  
**STOCK** Herring in Division VIa (North)

**Advice summary for 2014**

ICES advises on the basis of the agreed West of Scotland herring management plan that landings should be no more than 28 067 t in 2014. Discards are considered to be low and all catches are therefore 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 marine construction on the spawning grounds, should not occur.

**Stock status**



**Figure 5.4.12.1** Herring in Division VIa (North). Summary of stock assessment (weights in thousand tonnes). Estimates are shaded. Top right: SSB and F over the time-series used in the assessment.

Since 1977, the stock has been fluctuating at a considerable lower biomass than in the previous 20 years. Fishing mortality has fluctuated around  $F_{MSY}$  in recent years, and recruitment is lower than in the historical period.

**Management plans**

A management plan has been adopted by the EU in 2008 ([Council Regulation \(EC\) 1300/2008](#), Annex 5.4.12). The main aim of the plan is to manage the fisheries on the basis of maximum sustainable yield. ICES has evaluated the plan and concludes that it is in accordance with the precautionary approach.

## Biology

This autumn-spawning stock is considered part of the Malin Shelf stock complex. Components of the neighbouring herring stocks to the south are known to be present seasonally in Division VIa (North). Studies in the acoustic survey are ongoing to evaluate the level of mixing. 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 area available for successful spawning.

### Environmental influence on the stock

Temperatures and salinity in this area have been increasing over recent decades. Similar environmental changes have affected North Sea herring. Productivity of the Division VIa (North) stock has been reduced since the late 1980s.

### The fisheries

The fishery is conducted by single and pair Refrigerated Sea Water (RSW) trawlers and single-trawl freezer trawlers. Prior to 2006 there was a fairly even distribution of effort, both temporally and spatially. Since 2006 the majority has been fished in the northern part of Division VIa (North) in the 3rd quarter.

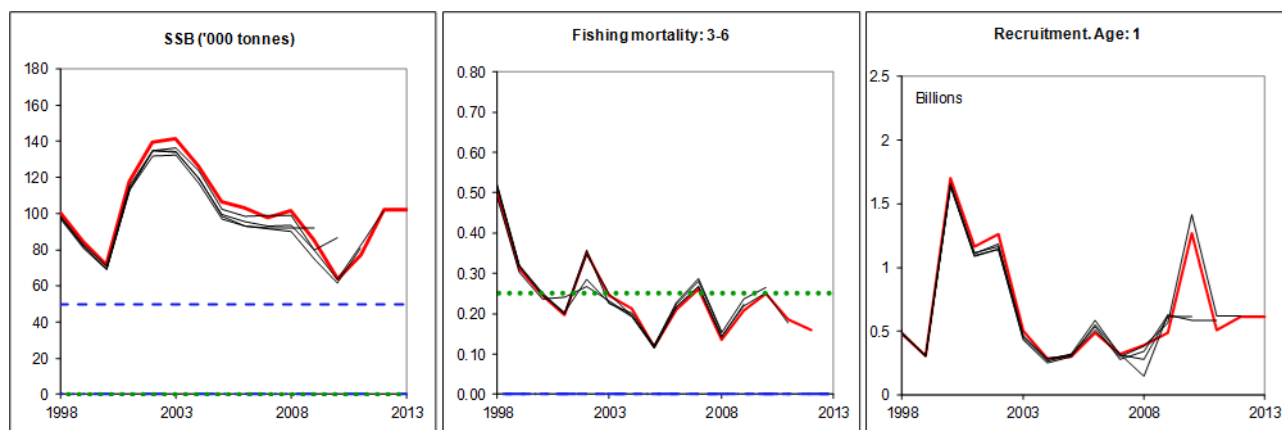
**Catch distribution** Catch (2012) = 18 516 t (42% pelagic freezer trawlers and 58% pelagic RSW trawlers).

### Effects of the fisheries on the ecosystem

Herring fisheries tend to be clean with little bycatch of other fish. Scottish discard observer programmes since 1999 indicate that discarding of herring in these directed fisheries are at a low level. These discard observer programmes have recorded occasional catches of seals and zero catches of cetaceans.

### Quality considerations

The assessment is considered to be noisy, but unbiased. Area misreporting has been a problem in the past. Minimum sampling requirements have been met only in quarter four in 2012. Sampling in the other quarters was not adequate and does not represent the major fishery in the area. Samples from all quarters where there is fishing activity would improve allocation of sampled métiers in the stock-raising process.



**Figure 5.4.12.2** Herring in Division VIa North. Historical assessment results (final-year recruitment estimates not included).

### Scientific basis

<b>Assessment type</b>	Age-based analytical (FLICA).
<b>Stock data category</b>	Category 1.
<b>Input data</b>	Commercial catches (international landings, weights, ages and length frequencies from catch sampling); one acoustic survey index (MSHAS_N); weights in the stock and annual maturity ogives from MSHAS_N. Natural mortality values correspond to estimates for North Sea herring based on recommendations by the Multispecies WG (ICES, 1987a) that were applied to adjacent areas (ICES, 1987b).
<b>Discards and bycatch</b>	Discards are not included in the assessment and are considered to be low.
<b>Indicators</b>	None.
<b>Other information</b>	Last informal full range of model settings tested in 2009. A benchmark is planned for 2015.
<b>Working group report</b>	<a href="#">HAWG</a> (ICES, 2013).

**ECOREGION** Celtic Seas  
**STOCK** Herring in Division VIa (North)

**Reference points**

	Type	Value	Technical basis
Management plan	SSB <sub>MGT</sub>	Not defined.	
	F <sub>MGT</sub>	F <sub>3-6</sub> = 0.25.	If SSB in TAC year $\geq 75\,000$ t ((EC) 1300/2008, Art. 3).
		F <sub>3-6</sub> = 0.20.	If SSB in TAC year $< 75\,000$ t and $\geq 50\,000$ t ((EC) 1300/2008, Art. 3).
	F <sub>3-6</sub> = 0.00.	If SSB in TAC year $< 50\,000$ t ((EC) 1300/2008, Art. 3).	
MSY Approach	MSY B <sub>trigger</sub>	Not defined.	
	F <sub>MSY</sub>	0.25	Simulations under different productivity regimes (Simmonds and Keltz, 2007; ICES, 2010).
Precautionary approach	B <sub>lim</sub>	50 000 t.	Lowest reliable estimate of SSB.
	B <sub>pa</sub>	Not defined.	
	F <sub>lim</sub>	Not defined.	
	F <sub>pa</sub>	Not defined.	

(unchanged since: 2010)

**Outlook for 2014**

Basis:  $F(2013)^1 = F_{sq}$  (avg 2010–2012) = 0.20,  $SSB(2013)^2 = 101\,920$ ; catch (2013) = 22 057; R (2012–2014) = GM (1991–2011) = 616 million.

Rationale	Catch (2014)	SSB (2014) <sup>2</sup>	Basis	F (2014)	SSB (2015)	SSB change <sup>3</sup>	TAC change <sup>4</sup>
Management plan	28 067	100 984	$F_{sq} \times 1.26$	0.25	97 875	-3%	2%
MSY approach	28 067	100 984	F <sub>MSY</sub>	0.25	97 875	-3%	2%
Zero catch	0	117 927	F = 0	0	138 454	+17%	-100%
Other options	21 984	104 753	$F_{2012} \times 0.96$	0.19	106 120	+1%	-20%
	27 480	101 358	$F_{2012} \times 1.23$	0.24	98 674	-3%	0%
	32 976	97 895	$F_{2012} \times 1.51$	0.30	91 441	-7%	+20%

Weights in tonnes.

<sup>1</sup> The assumption about F (2013) reflects the amount of TAC undershoot observed in recent years (around 20%).

<sup>2</sup> For autumn-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries between 1 January and spawning.

<sup>3</sup> SSB 2015 relative to SSB 2014.

<sup>4</sup> Catch 2014 relative to TAC 2013.

**Management plan**

The EU management plan (Council Regulation (EC) 1300/2008) is based on the following rule.

SSB in the year of the TAC	Fishing mortality	Maximum TAC variation
SSB $> 75\,000$ t	F = 0.25	20%
SSB $< 75\,000$ t	F = 0.2	20%
SSB $< 62\,500$ t	F = 0.2	25%
SSB $< 50\,000$ t (B <sub>lim</sub> )	F = 0	-

Following the agreed management plan implies a TAC of 28 067 t in 2014 which is equivalent to a TAC increase of 2%. SSB in 2014 is estimated to be above 75 000 t implying an F target of F = 0.25, constrained by a maximum 20% TAC increase.

A similar management plan was evaluated by ICES in 2005 and found to be consistent with the precautionary approach. In 2008 ICES checked that the changes in stock dynamics and the changes to the plan had not significantly increased the risks.

Discards are considered to be low and all catches are therefore assumed to be landed.

### ***MSY approach***

Following the ICES MSY approach implies a fishing mortality at  $F_{MSY} = 0.25$ , resulting in catches of no more than 28 067 t in 2014. This is expected to lead to an SSB of 100 984 t in 2014. As no MSY  $B_{trigger}$  has been identified for this stock, the ICES MSY approach has been applied with  $F_{MSY}$  without consideration of SSB in relation to MSY  $B_{trigger}$ . Discards are considered to be low and all catches are therefore assumed to be landed.

### ***Precautionary approach***

The SSB is well above  $B_{lim}$ . In the short term, SSB is expected to stay above  $B_{lim}$ .  $F_{pa}$  is undefined, but the current  $F$  is below  $F_{MSY}$ .

### **Additional considerations**

Gravel substrate is an 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 in the marine environment, can impact spawning. Herring regularly abandon and repopulate spawning grounds and absence of spawning in any particular year does not mean that the spawning ground is not required to maintain a resilient herring population. Scientific information (Groot, 1979, 1996) supports the advice that no gravel extraction should occur in areas with spawning grounds.

### ***Ecosystem changes***

Grey seal abundance is significant to the west of Scotland and they are known to feed on herring, among other species. The latest estimates of grey seal abundance over time show that the population in the area has remained stable since the mid-1990s (Thomas, 2011). The contribution of seal predation to total herring mortality may be significant, but data are limited. Because the consumption of herring by seals is estimated with great uncertainty, the impact on the stock cannot be estimated accurately.

### ***Fishing patterns and fishing technology changes***

Prior to 2006 there was a fairly even seasonal and spatial distribution of effort. Since 2006 the majority of the fishery has taken place in quarter 3 west and north of the Hebrides and to the north of Scotland.

### ***Uncertainties in assessment and catch options***

The assessment is noisy, leading to annual revisions of SSB and  $F$ . The management plan has been designed to cope with this by applying a constraint on year-on-year change in TAC. Revisions in SSB can be upwards or downwards, so it is important to maintain the restrictions on change in TAC both when the stock is revised upwards and downwards. Asymmetrical responses have not been tested and may be significantly more risky.

The stock identity of herring west of the British Isles was reviewed by the EU-funded project WESTHER. This identified Division VIa (North) as an area where acoustic survey catches contain a mixture of fish from Divisions VIa (North), VIa (South), VIIb,c, and VIIa (North). The extent of stock mixing in Division VIa (North) catches is unknown. In 2008 ICES began to evaluate the management for Divisions VIa (South), VIIb,c, and Division VIIa (North). ICES is working to produce an assessment that takes mixing into account. Efforts to split the Malin Shelf acoustic survey according to stock component are underway and should continue.

Minimum sampling requirements have been met only in quarter four in 2012. Sampling in the other quarters was not adequate and does not represent the major fishery in the area. Samples from all quarters where there is fishing activity would improve allocation of sampled métiers in the stock-raising process.

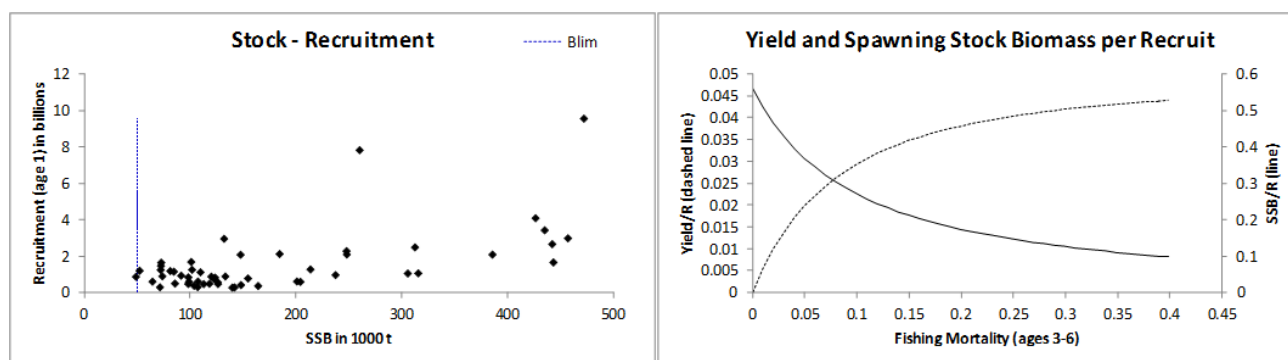
### ***Comparison with previous assessment and advice***

Compared to the assessment in 2012, SSB(2011) was revised downwards by 6% and  $F$ (2011) upwards by 5%.

The basis for the advice (the agreed Division VIa (North) herring management plan) is the same as last year.

## Sources

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- Thomas, L. 2011. Estimating the size of the UK grey seal population between 1984 and 2010. SCOS Briefing Paper 11/02.



**Figure 5.4.12.3** Herring in Division VIa North. Stock–recruitment relationship and yield- and SSB-per-recruit plot.

**Table 5.4.12.1** Herring in Division VIa (North). ICES advice, management, and catches.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Disc. slip.	ICES atch <sup>1</sup>
1987	Reduce F to $F_{0.1}$ / <i>status quo</i> F	38–55	49.7		44
1988	TAC	46	49.8		36
1989	TAC	58	58	1.6	34
1990	TAC	61	75	1.3	45
1991	TAC	57	62	1.2	29
1992	TAC	62	62	0.2	29
1993	Catch at <i>status quo</i> F	54–58	62	0.8	32
1994	Catch at <i>status quo</i> F	50–60	62	0.7	24
1995	No specific advice	60 <sup>2</sup>	77		30
1996	No advice because of misreporting	-	83.57		26
1997	Catch at <i>status quo</i> F		83.57	0.1	33 <sup>3</sup>
1998	Catch at <i>status quo</i> F	59	80.37	0.9	33
1999	Average catches, 1991–1996	28	68		30
2000	Average catches, 1991–1996	28	42		18 <sup>4</sup>
2001	Average catches, 1991–1999	30	36.36		24 <sup>4</sup>
2002	Average catches, 1991–1999	30	36.36		33 <sup>4</sup>
2003	Catch at <i>status quo</i> F	30	30		28 <sup>4</sup>
2004	F=0.30	41	30	0.1	25 <sup>4</sup>
2005	Catch at <i>status quo</i> F	30	30.1	0.8	14 <sup>4</sup>
2006	Catch at <i>status quo</i> F	34	34	0.2	27
2007	<i>Status quo</i> TAC advice	34	34		30
2008	F = 0.2 (proposed management plan)	15	27.2		16
2009	F = 0.2 (proposed management plan)	13	21.76		19
2010	F = 0.25 (management plan)	24	24.42	0.1	20
2011	See scenarios	22.48	22.48		18
2012	F = 0.25 (management plan)	< 22.9	22.0		19
2013	Management plan	< 27.48	27.48		
2014	Management plan	< 28.067			

Weights in thousand tonnes.

<sup>1)</sup> Adjusted for misreporting.<sup>2)</sup> Catch at *status quo* F.<sup>3)</sup> Revised in 1999.<sup>4)</sup> Revised in 2007.

**Table 5.4.12.2** Herring in Division VIa (North). Catch in tonnes by country. These figures do not correspond in all cases to the official statistics and cannot be used for management purposes.

Country	1989	1990	1991	1992	1993	1994	1995	1996
Denmark								
Faroes		326	482			274		2 297
France	1 342	1 287	1 168	119	818	5 087	3 672	7 836
Germany	4 290	7 096	6 450	5 640	4 693	7 938	3 733	9 721
Ireland	8 000	10 000	8 000	7 985	8 236	6 093	3 548	9 396
Netherlands	5 860	7 693	7 979	8 000	6 132	8 183	7 808	6 223
Norway		1 607	3 318	2 389	7 447	30 676	4 840	46 639
UK	29 874	38 253	32 628	32 730	32 602	-4 287	42 661	-17 753
Unallocated	2 123	2 397	-10 597	-5 485	-3 753	700	-4 541	
Discards	1 550	1 300	1 180	200				64 359
Total	53 039	69 959	50 608	51 578	56 175	54 664	61 271	-38 254
Area-Misreported	-19 013	-25 266	-22 079	-22 593	-24 397	-30 234	-32 146	26 105
ICES Estimate	34 026	44 693	28 529	28 985	31 778	24 430	29 575	1 997

Country	1997	1998	1999	2000	2001	2002	2003	2004
Faroes						800	400	228
France	3 093	1 903	463	870	760	1 340	1 370	625
Germany	8 873	8 253	6 752	4 615	3 944	3 810	2 935	1 046
Ireland	1 875	11 199	7 915	4 841	4 311	4 239	3 581	1 894
Netherlands	9 873	8 483	7 244	4 647	4 534	4 612	3 609	8 232
Norway	4 962	5 317	2 695					
UK	44 273	42 302	36 446	22 816	21 862	20 604	16 947	17 706
Unallocated	-8 015	-11 748	-8 155			878	-7	
Discards	62	90						123
Total	64 995	65 799	61 514	37 789	35 411	36 283	28 835	29 854
Area-Misreported	-29 766	-32 446	-23 623	-19 467	-11 132	-8 735	-3 581	-7 218
ICES Estimate	35 233	33 353	29 736	18 322	24 556	32 914	28 081	25 021

Country	2005	2006	2007	2008	2009	2010	2011	2012
Faroes	1 810	570	484	927	1 544	70		
France	613	701	703	564	1 049	511	504	244
Germany	2 691	3 152	1 749	2 526	27	3 583	3 518	1 829
Ireland	2 880	4 352	5 129	3 103	1 935	2 728	3 956	3 451
Netherlands	5 132	7 008	8 052	4 133	5 675	3 600	1 684	3 523
Norway								
UK	17 494	18 284	17 618	13 963	11 076	12 018	11 696	12 249
Unallocated								
Discards	772	163				95		
Total	31 392	34 230	33 735	25 216	21 306	22 510	21 358	
Area-Misreported	-17 263	-6 884	-4 119	-9 162	-2 798	-2 728	-3 599	-2 780
ICES Estimate	14 129	27 346	29 616	16 054	18 508	19 877	17 759	18 516

Table 5.4.12.3

Herring in Division VIa (North). Summary of stock assessment.

Year	Recruitment Age 1 Thousands)	TSB Tonnes	SSB	Fbar (Ages 3–6)	Landings Tonnes
1957	1 088 006	405 110	184 234	0.2834	43 438
1958	2 101 199	495 444	200 601	0.3305	59 669
1959	2 136 613	532 906	213 380	0.3028	65 221
1960	626 496	427 963	247 465	0.1948	63 759
1961	1 285 229	435 271	247 715	0.1294	46 353
1962	2 293 268	540 413	237 068	0.2059	58 195
1963	2 110 018	572 370	259 863	0.1833	49 030
1964	978 157	522 945	305 370	0.1535	64 234
1965	7 839 269	1 115 364	312 179	0.1592	68 669
1966	1 066 330	848 510	426 183	0.1932	100 619
1967	2 498 686	829 562	456 838	0.1903	90 400
1968	4 100 166	952 511	434 826	0.1435	84 614
1969	2 998 773	980 072	471 939	0.2419	107 170
1970	3 439 855	1 000 107	441 946	0.3587	165 930
1971	9 570 759	1 514 872	315 271	0.7883	207 167
1972	2 675 642	1 115 411	443 058	0.3651	164 756
1973	1 074 227	802 001	385 421	0.6056	210 270
1974	1 672 447	576 306	203 879	0.9572	178 160
1975	2 102 769	434 633	107 030	0.9101	114 001
1976	606 435	263 563	73 358	1.0693	93 642
1977	620 881	162 765	51 826	0.995	41 341
1978	911 556	170 356	48 384	0.6777	22 156
1979	1 216 825	215 739	72 243	0.0007	60
1980	885 161	252 021	121 982	0.0004	306
1981	1 660 162	364 259	131 719	0.3632	51 420
1982	769 613	305 358	109 385	0.6767	92 360
1983	2 971 919	426 039	80 836	0.7156	63 523
1984	1 132 803	352 884	119 689	0.518	56 012
1985	1 200 030	348 143	147 291	0.3164	39 142
1986	891 147	314 164	132 897	0.5284	70 764
1987	2 096 144	379 992	123 159	0.3454	44 360
1988	902 230	334 343	147 692	0.2855	35 591
1989	838 396	317 626	163 914	0.2474	34 026
1990	431 693	269 463	154 325	0.3485	44 693
1991	378 816	207 886	125 735	0.2593	28 529
1992	792 035	192 409	97 898	0.2864	28 985
1993	580 238	182 555	98 523	0.2492	31 778
1994	852 565	177 308	91 108	0.23	24 430
1995	606 827	156 988	72 006	0.2673	29 575
1996	945 694	194 589	112 492	0.1727	26 105
1997	1 478 749	207 795	71 103	0.5168	35 233
1998	483 440	186 104	100 631	0.5001	33 353
1999	309 652	143 978	84 196	0.3107	29 736
2000	1 699 208	205 590	71 766	0.2453	18 322
2001	1 163 240	231 314	117 823	0.1969	24 556
2002	1 261 566	271 054	139 460	0.3503	32 914
2003	500 703	229 446	141 591	0.2452	28 081
2004	289 252	180 050	125 948	0.2129	25 021
2005	299 687	150 525	106 730	0.1176	14 129
2006	487 235	168 782	103 289	0.2112	27 346
2007	321 578	151 578	97 849	0.2609	29 616
2008	393 522	143 883	101 432	0.1363	16 054
2009	490 750	164 109	85 295	0.2072	18 508
2010	1 267 874	167 515	64 021	0.2507	19 877
2011	513 121	160 497	76 985	0.187	17 759
2012*	616 136	197 434	102 008	0.1606	18 516
2013*	616 136		101 920		
Average	1 493 700				

\*Geometric mean 1989–2011; 2013 predicted SSB.



**Annex 5.4.12      Agreed management plan for Division VIa (North) herring: Council Regulation (EC) 1300/2008**

1. *Each year, the Council, acting by qualified majority on the basis of a proposal from the Commission, shall fix for the following year the TAC applicable to the herring stock in the area west of Scotland, in accordance with paragraphs 2 to 6.*
2. *When STECF considers that the spawning stock biomass level will be equal or superior to 75 000 tonnes in the year for which the TAC is to be fixed, the TAC shall be set at a level which, according to the advice of STECF, will result in a fishing mortality rate of 0.25 per year. However, the annual variation in the TAC shall be limited to 20%.*
3. *When the STECF considers that the spawning stock biomass level will be less than 75 000 tonnes but equal or superior to 50 000 tonnes in the year for which the TAC is to be fixed, the TAC shall be set at a level which, according to the advice of STECF, will result in a fishing mortality rate of 0.2 per year. However, the annual variation of the TAC shall be limited to:*
  - (a) *20% if the spawning stock biomass level is estimated to be equal or superior to 62 500 tonnes but less than 75 000 tonnes;*
  - (b) *25% if the spawning stock biomass level is estimated to be equal or superior to 50 000 tonnes but less than 62 500 tonnes.*
4. *When STECF considers that the spawning stock biomass level will be less than 50 000 tonnes in the year for which the TAC is to be fixed, the TAC shall be set at 0 tonnes.*
5. *For the purposes of the calculation to be carried out in accordance with paragraphs 2 and 3, STECF shall assume that the stock will experience a fishing mortality rate of 0.25 in the year prior to the year for which the TAC is to be fixed.*
6. *By way of derogation from paragraphs 2 or 3, if STECF considers that the herring stock in the area west of Scotland is failing properly to recover, the TAC shall be set at a level lower than that provided for in those paragraphs.*