

### 9.3.17 Herring (*Clupea harengus*) in Subareas I, II, and V and Divisions IVa and XIVa (Northeast Atlantic) (Norwegian spring-spawning herring)

#### ICES stock advice

ICES advises that when the EU, Faroe Islands, Iceland, Norway, and Russia management plan is applied, catches in 2016 should be no more than 316 876 tonnes.

#### Stock development over time

The stock is declining and estimated to be below  $B_{pa}$  in 2014. Since 1998 five large year classes have been produced (1998, 1999, 2002, 2003, and 2004). Year classes 2005–2012 are estimated to be small. The 2013 year class is estimated to be larger than the 2005–2012 year classes but close to average (1988–2012); however, the estimate is still uncertain. Fishing mortality in 2014 was below  $F_{pa}$  and  $F_{MSY}$  and the management plan target  $F$ .

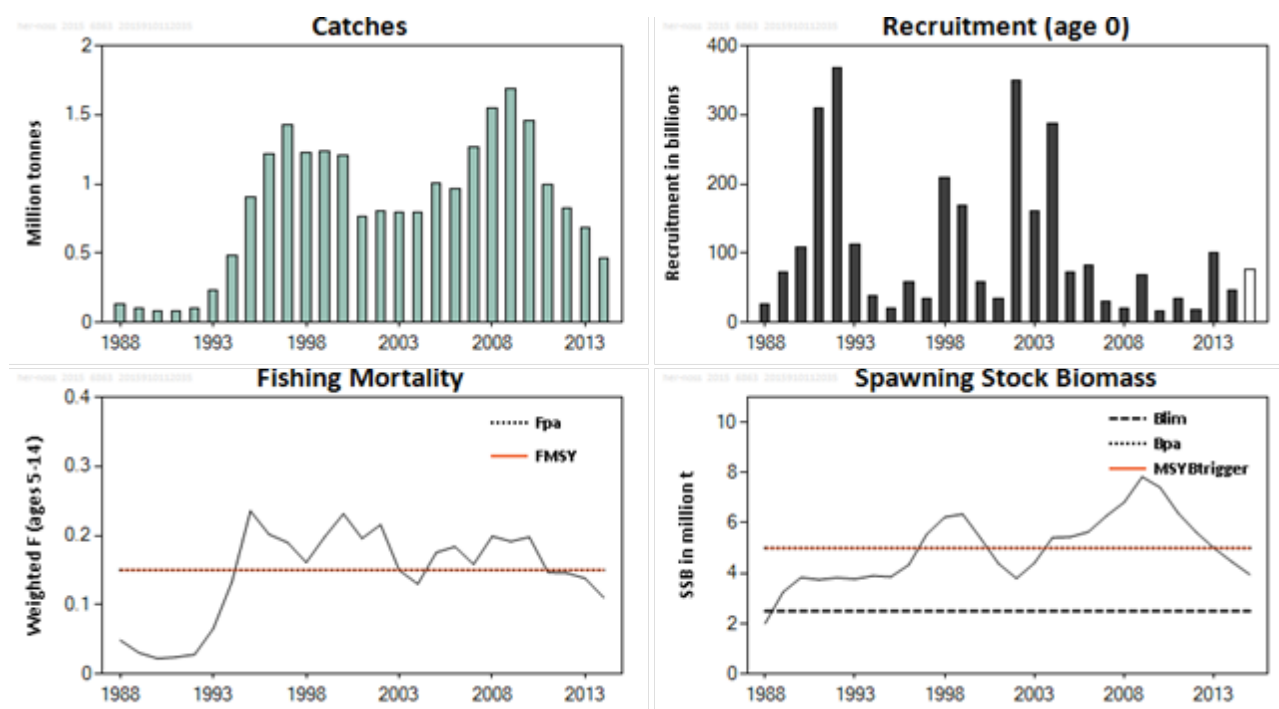


Figure 9.3.17.1 Herring in Subareas I, II, and V and Divisions IVa and XIVa. Summary of stock assessment (weights in million tonnes). Predicted values are not shaded.

#### Stock and exploitation status

Table 9.3.17.1 Herring in Subareas I, II, and V and Divisions IVa and XIVa. State of the stock and fishery relative to reference points.

		Fishing pressure			Stock size					
		2012	2013	2014	2013	2014	2015			
Maximum sustainable yield	$F_{MSY}$	✓	✓	✓	Appropriate	MSY	✓	✗	✗	Below $B_{trigger}$
Precautionary approach	$F_{pa}$	✓	✓	✓	Harvested sustainably	$B_{pa}, B_{lim}$	✓	○	○	Increased risk
Management plan	$F_{MGT}$	✗	✗	✓	Appropriate	$SSB_{MGT}$	✓	✗	✗	Below trigger

## Catch options

**Table 9.3.17.2** Herring in Subareas I, II, and V and Divisions IVa and XIVa. The basis for the catch options.

Variable	Value	Source	Notes
F ages 5–14 (2015)	0.085	ICES (2015a)	Based on estimated catches 2015.
SSB (2016)	3 586 000 t	ICES (2015a)	
R <sub>age0</sub> (2015)	76.8	ICES (2015a)	GM over the years 1988–2011 in billions.
R <sub>age1</sub> (2015)	19.274	ICES (2015a)	GM over the years 1988–2011 in billions.
R <sub>age0</sub> (2016)	76.8	ICES (2015a)	GM over the years 1988–2011 in billions.
Catch (2015)	328 206 t	ICES (2015a)	Sum of declared national quotas.

**Table 9.3.17.3** Herring in Subareas I, II, and V and Divisions IVa and XIVa. The catch options.

Rationale	Catches (2016)	Basis	F <sub>w</sub> (2016)*	SSB(2017)	% SSB change**	% Catch change***
Agreed management plan	316876	F <sub>MP</sub>	0.083	3566000	-1	-3
MSY approach	406787	F <sub>MSY</sub> × (SSB <sub>2016</sub> /MSY B <sub>trigger</sub> = 0.717)	0.108	3489000	-3	24
Zero catch <sup>^</sup>	0	F = 0	0	3836000	7	-100
Other options	322874	F <sub>2015</sub>	0.085	3560000	-1	-2

Weights in tonnes.

\* F<sub>w</sub> = Fishing mortality weighted by population numbers (age groups 5–14).

\*\* SSB 2017 relative to SSB 2016.

\*\*\* Catches 2016 relative to catch 2015.

<sup>^</sup> Zero catch will not bring SSB above B<sub>pa</sub> in 2017.

## Basis of the advice

**Table 9.3.17.4** Herring in Subareas I, II, and V and Divisions IVa and XIVa. The basis of the advice.

Advice basis	Management plan.
Management plan	A long-term management plan was agreed by the EU, Faroe Islands, Iceland, Norway, and Russia in 1999 ( <a href="#">ICES, 2014</a> ; see Annex 9.3.11.1). The management plan aims to constrain harvesting within safe biological limits and is designed to provide sustainable fisheries in the long term. ICES has evaluated the plan and concluded that it is consistent with the precautionary approach (ICES, 2013a).

## Quality of the assessment

Previous assessments have shown a retrospective pattern that overestimates SSB and underestimates F. However, the revision this year is smaller than in previous years. Estimates of recruiting year-class strength are uncertain; however, this does not have a large influence on the short-term forecasts.

In 2015, the survey on the spawning grounds in February/March was carried out again for the first time since 2008 and was included in the assessment. The 2015 Norwegian spring-spawning herring larvae survey index on the Norwegian shelf was not included in the assessment due to poor spatial coverage.

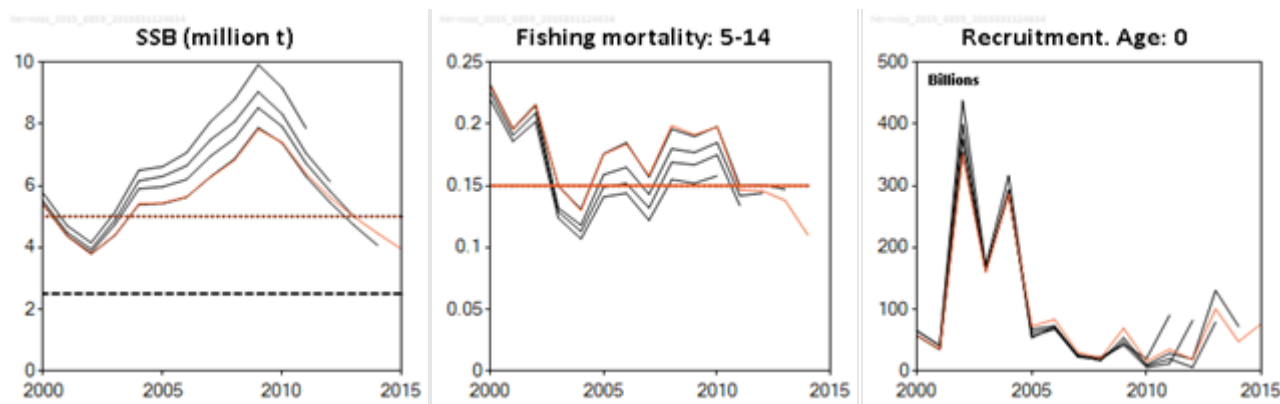


Figure 9.3.17.2 Herring in Subareas I, II, and V and Divisions IVa and XIVa. Historical assessment results (final-year recruitment estimates included).

**Issues relevant for the advice**

There is no information to present for this stock.

**Reference points**

Table 9.3.17.5 Herring in Subareas I, II, and V and Divisions IVa and XIVa. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	5.0 million t	$B_{pa}$	
	$F_{MSY}$	0.15	Stochastic equilibrium analysis using a Beverton–Holt stock–recruitment relationship with data from 1950 to 2009.	ICES (2013a)
Precautionary approach	$B_{lim}$	2.5 million t	MBAL (accepted in 1998).	ICES (2013a)
	$B_{pa}$	5.0 million t	$B_{lim} \times \exp(0.4 \times 1.645)$ .	ICES (2013a)
	$F_{lim}$	Not defined.	-	
	$F_{pa}$	0.15	Based on medium-term simulations.	ICES (2013a)
Management strategy	$SSB_{MGT}$	5.0 million t	Medium-term simulations conducted in 2001 and 2014.	ICES (2014)
	$F_{MGT}$	0.125	Medium-term simulations conducted in 2001 and 2014.	ICES (2014)

**Basis of the assessment**

Table 9.3.17.6 Herring in Subareas I, II, and V and Divisions IVa and XIVa. The basis of the assessment.

ICES stock data category	Category 1 (ICES, 2015b).
Assessment type	Age-based analytical assessment (TASACS; ICES, 2015a) that uses catches in the model and in the forecast.
Input data	Assessment period 1988–2015: Commercial catches-at-age (stock weight-at-age from surveys and since 2009 from catch sampling). Eight survey indices: Norwegian herring larvae survey on the Norwegian shelf (NHLS, 1988–2014), Eco-NoRu-Q3 (Acoustic) providing indices for recruitment (1989–2014) and juveniles (2000–2014), Norwegian acoustic survey on spawning grounds in February/March (NASF, 1994–2005, 2015); International Ecosystem Survey in the Nordic Seas (IESNS) covering the adult stock in the Nordic seas (1996–2015) and the juvenile stock in the Barents Sea (1991–2015), Norwegian acoustic survey in November/December (NASN, 1992–2001); and Norwegian acoustic survey in January (NASJ, 1991–1999). Maturity ogive variable by year-class strength. Natural mortalities are fixed values from historical analyses (ages 0–2 = 0.9, ages greater than 3 = 0.15).
Discards and bycatch	Not included, considered negligible.
Indicators	None.
Other information	This stock was benchmarked in 2008 and a new benchmark is planned for 2016.
Working group	Working Group on Widely Distributed Stocks (WGWIDE).

### Information from stakeholders

Norwegian fishers have reported good catches so far. The Danish fishery for Norwegian spring-spawning herring is normally executed in the beginning of the year. Because there was no agreement with Norway for 2015, the fishery is now planned for the end of the year in international waters.

### History of advice, catch, and management

**Table 9.3.17.7** Herring in Subareas I, II, and V and Divisions IVa and XIVa. History of ICES advice, the agreed TAC, and ICES estimates of catch.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC	ICES catch
1987	TAC	150	115	127
1988	TAC	120–150	120	135
1989	TAC	100	100	104
1990	TAC	80	80	86
1991	No fishing from a biological point of view	0	76	85
1992	No fishing from a biological point of view	0	98	104
1993	No increase in F	119	200	232
1994	Gradual increase in F towards $F_{0.1}$ ; TAC suggested	334	450	479
1995	No increase in F	513	900*	906
1996	Keep SSB above 2.5 million t	-	1425*	1220
1997	Keep SSB above 2.5 million t	-	1500	1427
1998	Do not exceed the harvest control rule	-	1300	1223
1999	Do not exceed the harvest control rule	1263	1300	1235
2000	Do not exceed the harvest control rule	Max 1500	1250	1207
2001	Do not exceed the harvest control rule	753	850	766
2002	Do not exceed the harvest control rule	853	850	808
2003	Do not exceed the harvest control rule	710	711*	790
2004	Do not exceed the harvest control rule	825	825*	794
2005	Do not exceed the harvest control rule	890	1000*	1003
2006	Do not exceed the harvest control rule	732	967*	969
2007	Do not exceed the harvest control rule	1280	1280	1267
2008	Do not exceed the harvest control rule	1518	1518	1546
2009	Do not exceed the harvest control rule	1643	1642	1687
2010	Do not exceed the harvest control rule	1483	1483	1457
2011	See scenarios	988–1170	988	993
2012	Follow the management plan	833	833	826
2013	Follow the management plan	619	692*	685
2014	Follow the management plan	418	436*	461
2015	Follow the management plan	283	328*	
2016	Follow the management plan	≤ 316.876		

Weights in thousand tonnes.

\* There was no agreement on the TAC; the number is the sum of autonomous quotas from the individual Parties.

### History of catch and landings

**Table 9.3.17.8** Herring in Subareas I, II, and V and Divisions IVa and XIVa. Catch distribution by fleet in 2014 as estimated by ICES.

Total catch	Landings		Discards
	53% purse seine	47% pelagic trawl	
461 306 t	461 306 t		Considered to be negligible, but some slippage is known to occur

**Table 9.3.17.9** Herring in Subareas I, II, and V and Divisions IVa and XIVa. History of the catch. ICES estimated values are presented by country.

Year	Norway	USSR/ Russia	Denmark	Faroes	Iceland	Ireland	Nether- lands	Green- land	UK (Scotland)	Germany	France	Poland	Sweden	Total
1986	199256	26000	-	-	-	-	-	-	-	-	-	-	-	225256
1987	108417	18889	-	-	-	-	-	-	-	-	-	-	-	127306
1988	115076	20225	-	-	-	-	-	-	-	-	-	-	-	135301
1989	88707	15123	-	-	-	-	-	-	-	-	-	-	-	103830
1990	74604	11807	-	-	-	-	-	-	-	-	-	-	-	86411
1991	73683	11000	-	-	-	-	-	-	-	-	-	-	-	84683
1992	91111	13337	-	-	-	-	-	-	-	-	-	-	-	104448
1993	199771	32645	-	-	-	-	-	-	-	-	-	-	-	232457
1994	380771	74400	-	2911	21146	-	-	-	-	-	-	-	-	479228
1995	529838	101987	30577	57084	174109	-	7969	2500	881	556	-	-	-	905501
1996	699161	119290	60681	52788	164957	19541	19664	-	46131	11978	-	-	22424	122028
1997	860963	168900	44292	59987	220154	11179	8694	-	25149	6190	1500	-	19499	142650
1998	743925	124049	35519	68136	197789	2437	12827	-	15971	7003	605	-	14863	122313
1999	740640	157328	37010	55527	203381	2412	5871	-	19207	-	-	-	14057	123543
2000	713500	163261	34968	68625	186035	8939	-	-	14096	3298	-	-	14749	120720
2001	495036	109054	24038	34170	77693	6070	6439	-	12230	1588	-	-	9818	766136
2002	487233	113763	18998	32302	127197	1699	9392	-	3482	3017	-	1226	9486	807795
2003	477573	122846	14144	27943	117910	1400	8678	-	9214	3371	-	-	6431	789510
2004	477076	115876	23111	42771	102787	11	17369	-	1869	4810	400	-	7986	794066
2005	580804	132099	28368	65071	156467	-	21517	-	-	17676	0	561	680	100324
2006*	567237	120836	18449	63137	157474	4693	11625	-	12523	9958	80	-	2946	968958
2007	779089	162434	22911	64251	173621	6411	29764	4897	13244	6038	0	4333	0	126699
2008	961603	193119	31128	74261	217602	7903	28155	3810	19737	8338	0	0	0	154565
2009	101667	210105	32320	85098	265479	10014	24021	3730	25477	14452	0	0	0	168737
2010	871113	199472	26792	80281	205864	8061	26695	3453	24151	11133	0	0	0	145701
2011	572641	144428	26740	53271	151074	5727	8348	3426	14045	13296	0	0	0	992997
2012	491005	118595	21754	36190	120956	4813	6237	1490	12310	11945	0	0	705	826000
2013	359458	78521	17160	10503	90729	3815	5626	11788	8342	4244	0	0	23	684743
2014	263253	60292	12513	38529	58828	706	9175	13108	4233	669	0	0	0	461306

\* In 2006 Scotland and Northern Ireland combined.

## Summary of the assessment

**Table 9.3.17.10** Herring in Subareas I, II, and V and Divisions IVa and XIVa. Assessment summary; weights in tonnes and recruitment in thousands.

Year	Recruitment (Age 0)	SSB	Landings	Mean weighted F (Ages 5–14)
1988	26073900	2002000	135301	0.049
1989	71555300	3253000	103830	0.031
1990	109336800	3833000	86411	0.022
1991	308890700	3741000	84683	0.024
1992	368283300	3823000	104448	0.028
1993	113172700	3769000	232457	0.065
1994	38661700	3898000	479228	0.133
1995	19594700	3857000	905501	0.235
1996	58595400	4333000	1220283	0.202
1997	33552200	5547000	1426507	0.19
1998	208990500	6229000	1223131	0.161
1999	167923200	6347000	1235433	0.198
2000	57648300	5390000	1207201	0.231
2001	34915000	4381000	766136	0.196
2002	350093900	3796000	807795	0.216
2003	159927700	4408000	789510	0.15
2004	286574800	5413000	794066	0.13
2005	72271900	5445000	1003243	0.176
2006	83338500	5641000	968958	0.184
2007	30173000	6276000	1266993	0.158
2008	20350400	6820000	1545656	0.199
2009	69104000	7829000	1687373	0.191
2010	15306800	7408000	1457014	0.198
2011	34827200	6392000	992998	0.147
2012	18199600	5634000	825999	0.146
2013	100480500	5000000	684743	0.138
2014	47406000	4455000	461306	0.11
2015	76800000*	3946000		
<b>Average</b>	<b>106501714</b>	<b>4959500</b>	<b>833193</b>	<b>0.145</b>

\*GM over the years 1988–2011.

## Sources and references

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