

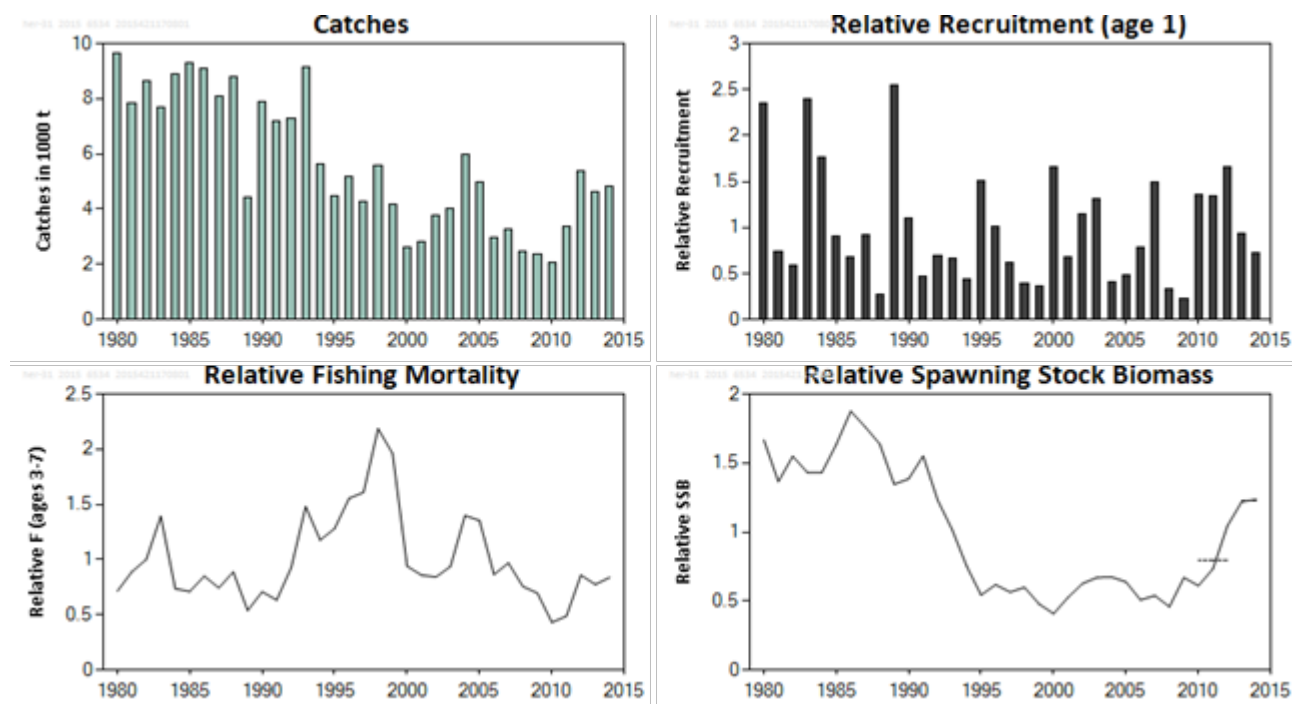
### 8.3.11 Herring (*Clupea harengus*) in Subdivision 31 (Bothnian Bay)

#### ICES stock advice

ICES advises that when the precautionary approach is applied, catches in 2016 should be no more than 6641 tonnes.

#### Stock development over time

An exploratory assessment shows that the spawning-stock biomass (SSB) has increased since 2008. The fishing mortality showed a decreasing trend in 2004–2010, increased in 2011–2012, and has remained stable in 2013–2014. Abundant year classes have appeared in 2010–2012.



**Figure 8.3.11.1** Herring in Subdivision 31. Summary of the exploratory stock assessment (catch weights in thousand tonnes). Recruitment, fishing mortality, and SSB are relative in relation to the average of the time-series. Bottom right panel: relative SSB, regarded as an indicator of the recent development of the stock. The dashed lines in the SSB plot indicate the average values of the respective years.

#### Stock and exploitation status

**Table 8.3.11.1** Herring in Subdivision 31. State of the stock and fishery, relative to reference points.

Fishing in Subdivision 01: state of the stock and fishery, relative to reference points.										
		Fishing pressure				Stock size				
		2012	2013	2014		2012	2013	2014		
Maximum Sustainable Yield	F <sub>MSY</sub>	?	?	?	Undefined	MSY	?	?	?	Undefined
Precautionary approach	F <sub>pa</sub> , F <sub>li</sub> m	?	?	?	Undefined	B <sub>pa</sub> , B <sub>lim</sub>	?	?	?	Undefined
Management Plan	F <sub>MGT</sub>	-	-	-	Not applicable	SSB <sub>MGT</sub>	-	-	-	Not applicable
Qualitative evaluation	-	↗	➡	➡	Stable	-	↗	↗	➡	Stable

### Catch options

The ICES framework for category 3 stocks was applied (ICES, 2012). The SSB trends are used as the index of stock development. The advice is based on a comparison of the two latest index values (index A) with the three preceding values (index B), multiplied by the recent advised catch.

The index is estimated to have increased by more than 20% and thus the uncertainty cap was applied to calculate the catch advice. The stock status relative to candidate reference points is unknown. Considering that the SSB increase is more than 50% and that effort has decreased substantially (Figure 8.3.11.2), no additional precautionary buffer was applied.

**Table 8.3.11.2** Herring in Subdivision 31. For stocks in ICES data categories 3–6, one catch option is provided.

Index A (2013, 2014)		1.23
Index B (2010, 2011, 2012)		0.80
Index ratio (A/B)		1.54
Uncertainty cap	Applied	1.2
Recent advised catch (2014)		5 534 t
Discard rate		Negligible
Precautionary buffer	Not applied	-
Catch advice*		6 641 t

\*(recent advised catch × cap).

### Basis of the advice

**Table 8.3.11.3** Herring in Subdivision 31. The basis of the advice.

Advice basis	Precautionary approach.
Management plan	There is no management plan for herring in this area.

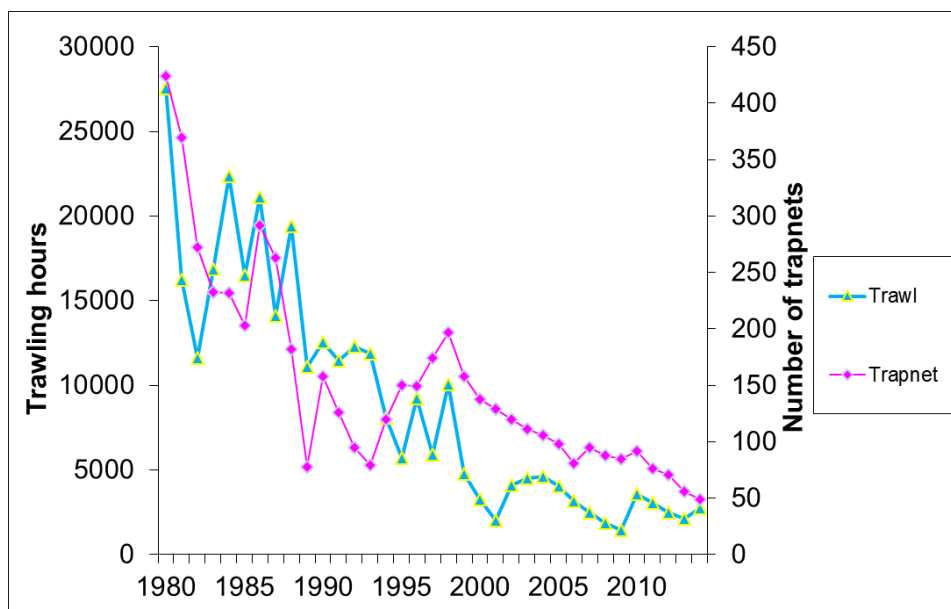
### Quality of the assessment

The advice is based on an exploratory assessment as an indicator of SSB. The uncertainties of these indices are not available.

The methods applied to derive quantitative advice for stocks without an analytical assessment are expected to evolve as they are further developed and validated.

### Issues relevant for the advice

Stock boundaries are still under debate and should be discussed in a future benchmark, including the herring stocks in SDs 30 and 31.



**Figure 8.3.11.2** Herring in Subdivision 31. Effort by fishery (i.e. trawl and trapnet), regarded as representative for the variation of fishing pressure over time.

### Reference points

No reference points are defined for this stock.

### Basis of the assessment

**Table 8.3.11.4** Herring in Subdivision 31. The basis of the assessment.

ICES stock data category	3.2.0 (ICES, 2015a).
Assessment type	Exploratory age-based assessment (XSA; ICES, 2015b).
Input data	Commercial fleet indices (trawl fleet and trapnet); commercial catches (international landings, age and length frequencies from catch sampling); two commercial indices (trapnet cpue, trawlers cpue); annual maturity data (commercial catch, from quarters 1 and 2 in the year before spawning).
Discards and bycatch	Not included and are assumed negligible.
Indicators	None.
Other information	None.
Working group	Baltic Fisheries Assessment Working Group ( <a href="#">WGBFAS</a> ).

## Information from stakeholders

There is no available information.

## History of advice, catch and management

**Table 8.3.11.5** Herring in Subdivision 31. History of ICES advice, the agreed TAC, and ICES estimates of catch. Weights in thousand tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC*	ICES catch
1987		9.0		8.1
1988		13.0		8.8
1989		7.0		4.4
1990		9.0		7.8
1991	TAC for eastern part of SD, allowance for western part	9+	84.0	6.8
1992	<i>Status quo</i> F	8.0	84.0	6.5
1993	Increase in yield by increasing F	-	90.0	9.2
1994	Increase in yield by increasing F	-	90.0	5.8
1995	Increase in yield by increasing F	18.4	110.0	4.7
1996	Increase in yield by increasing F	18.4	110.0	5.2
1997	Increase in yield by increasing F	-	110.0	4.3
1998	Increase in yield by increasing F	-	110.0	5.6
1999	Increase in yield by increasing F	-	94.0	4.2
2000	Increase in yield by increasing F	-	85.0	2.5
2001	Exploitation rate should not be increased	-	72.0	2.8
2002	Exploitation rate should be decreased	-	64.0	3.8
2003	No increase in catches	3.0	60.0	4.0
2004	No increase in catches	3.0	61.2	6.0
2005	No increase in catches	3.5	64.0	5.0
2006	Less than average catches (2002–2004)	4.6	91.6	3.0
2007	Less than average catches (2002–2005)	4.7	82.8	3.2
2008	No increase in catch	< 3.0	87.0	2.5
2009	Same advice as last year	< 3.0	82.7	2.4
2010	Same advice as last year	< 3.0	103.3	2.1
2011	No basis for advice	< 3.0	104.4	3.4
2012	No increase in catches	< 3.0	106.0	5.4
2013	Reduce catches by more than 20%	< 2.1	106.0	4.6
2014	Increase catches by no more than 20%	< 4.3	137.8	4.8
2015	Increase catches by no more than 20%	< 5.534	158.5	
2016	Precautionary approach ( $\leq$ 20% increase in catch)	$\leq$ 6.641		

\*TAC for Subdivisions 29N, 30, and 31 (IBSFC Management Unit 3), and from 2005 for Subdivisions 30 and 31.

## History of catch and landings

**Table 8.3.11.6** Herring in Subdivision 31. Catch distribution by fleet in 2014 as estimated by ICES.

Table 2: 2014: Harvesting in the southern sea lochs (continued) by month in 2014 as estimated by 2014.				
Total catch (2014)	Landings			Discards
4 832 t	91% trawls	8% trapnets	1% gillnets	Negligible
	4 832 t			

**Table 8.3.11.7** Herring in Subdivision 31. History of official landings, presented for each country participating in the fishery. Weights in tonnes.

Year	Finland	Sweden	Total
1980	8 899	760	9 659
1981	7 206	620	7 826
1982	7 982	670	8 652
1983	7 011	696	7 707
1984	8 322	594	8 916
1985	8 595	717	9 312
1986	8 754	336	9 090
1987	7 788	320	8 108
1988	8 501	267	8 768
1989	4 005	423	4 428
1990	7 603	295	7 898
1991	6 800	400	7 200
1992	6 900	400	7 300
1993	8 752	383	9 135
1994	5 195	411	5 606
1995	3 898	563	4 461
1996	5 080	114	5 194
1997	4 195	86	4 281
1998	5 358	224	5 582
1999	3 909	248	4 157
2000	2 479	113	2 592
2001	2 755	67	2 822
2002	3 532	219	3 750
2003	3 855	150	4 004
2004	5 831	142	5 973
2005	4 800	169	4 970
2006	2 684	269	2 954
2007	2 992	253	3 245
2008	2 309	175	2 484
2009	2 166	209	2 375
2010	1 898	177	2 075
2011	3 218	132	3 350
2012	5 206	161	5 367
2013	4 486	126	4 612
2014*	4 637	195	4 832

\*Preliminary.

## Summary of the assessment

**Table 8.3.11.8** Herring in Subdivision 31. Assessment summary with weights (in tonnes).

Year	Relative recruitment (age 1)	Relative SSB	Total catch	Relative mean F (ages 3–7)
1980	2.355	1.667	9 659	0.714
1981	0.745	1.365	7 826	0.89
1982	0.596	1.549	8 652	1.001
1983	2.391	1.432	7 707	1.392
1984	1.767	1.43	8 916	0.736
1985	0.901	1.635	9 312	0.711
1986	0.683	1.875	9 090	0.851
1987	0.914	1.761	8 108	0.744
1988	0.28	1.637	8 768	0.888
1989	2.551	1.346	4 428	0.539
1990	1.101	1.385	7 898	0.709
1991	0.475	1.551	7 200	0.634
1992	0.691	1.231	7 300	0.927
1993	0.669	1.017	9 135	1.479
1994	0.439	0.753	5 606	1.177
1995	1.507	0.543	4 461	1.281
1996	1.016	0.618	5 194	1.555
1997	0.618	0.565	4 281	1.609
1998	0.39	0.599	5 582	2.186
1999	0.364	0.478	4 157	1.96
2000	1.652	0.408	2 592	0.941
2001	0.677	0.526	2 822	0.859
2002	1.146	0.627	3 750	0.843
2003	1.319	0.67	4 004	0.939
2004	0.41	0.674	5 973	1.399
2005	0.487	0.638	4 970	1.354
2006	0.79	0.508	2 954	0.865
2007	1.498	0.539	3 245	0.97
2008	0.328	0.458	2 484	0.757
2009	0.225	0.67	2 375	0.697
2010	1.353	0.611	2 075	0.432
2011	1.336	0.733	3 350	0.488
2012	1.66	1.045	5 367	0.86
2013	0.941	1.221	4 612	0.775
2014	0.724	1.235	4 832	0.839

## Sources and references

ICES. 2012. ICES Implementation of Advice for Data-limited Stocks in 2012 in its 2012 Advice. ICES CM 2012/ACOM 68. 42 pp.

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