ECOREGION Baltic Sea
STOCK Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring)

Advice for 2015

ICES advises on the basis of the MSY approach that catches in 2015 should be no more than 193 kt. This applies to all catches from the stock in the Central Baltic Sea and Gulf of Riga.

ICES advises the implementation of a spatial management plan for the clupeid stocks in Subdivisions 25–26.

Stock status

Fishing pressure	2011	2012	2013	
MSY (F_{MSY})	✓	✓	✓	Below target
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓	Harvested sustainably

Stock size	2012	2013	2014	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity

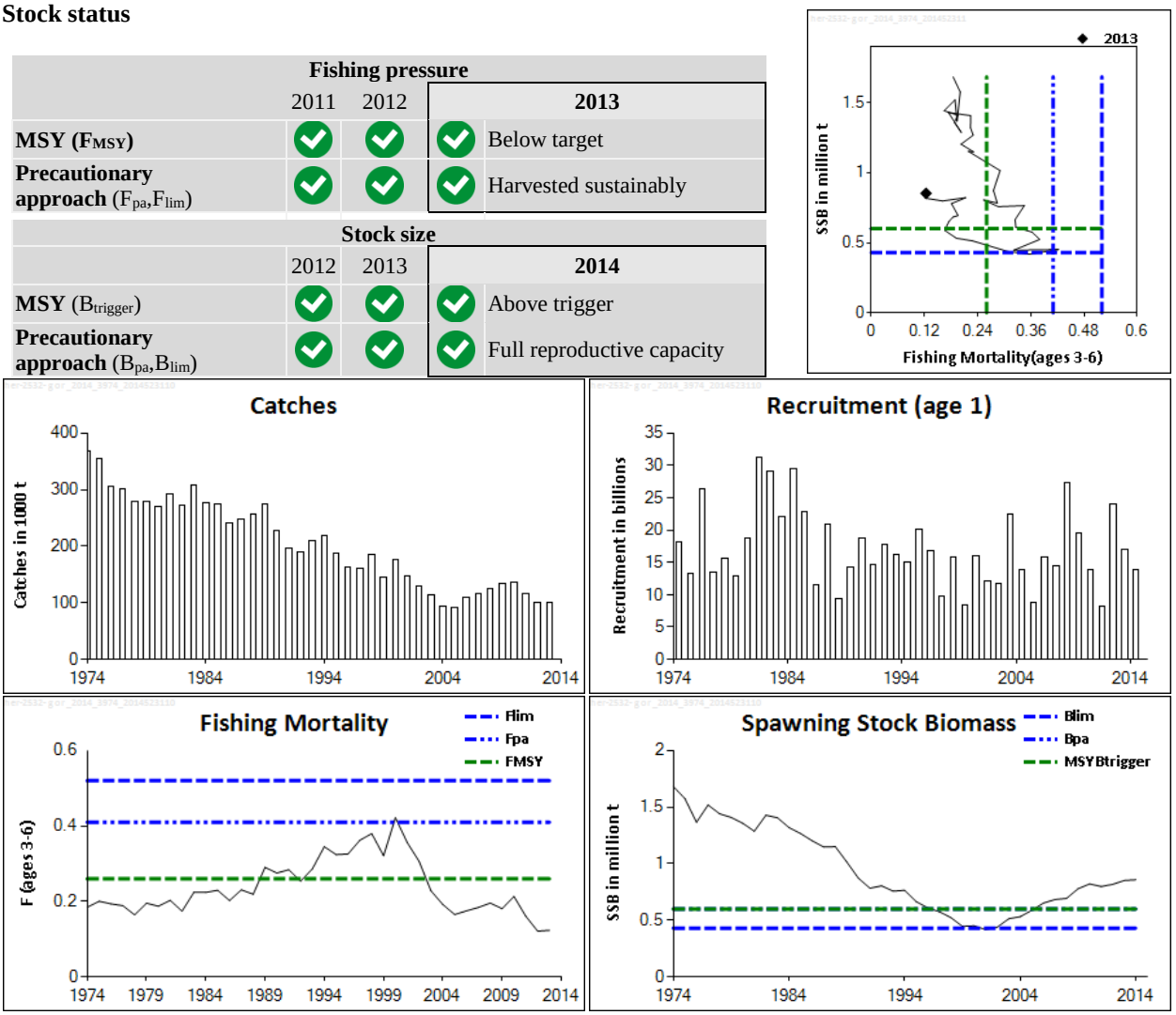

Figure 8.3.10.1 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). Summary of stock assessment (SSB in 2014 is predicted). Top right: SSB and F over the years.

SSB declined until 2001 and then increased, and has been above MSY $B_{trigger}$ since 2006. Fishing mortality increased until 2000 and then decreased, remaining below F_{MSY} since 2003.

Management plans

No specific management objectives are known to ICES.

Biology

Herring biomass is dependent on the cod stock through predator–prey interactions, and on sprat through competition. Regional differences in growth rate result in a high proportion of small individuals in the north (Subdivisions 28.2, 29, and 32) and large individuals in the south (Subdivisions 25 and 26). The strong increase in sprat stock size since the

early 1990s in the northern areas (Subdivisions 27–29 and 32) exacerbated the interspecific competition and the decrease in herring weight-at-age, especially in these northern areas. Despite a slight increase in mean weights-at-age in recent years weights are low.

Environmental influence on the stock

The decline in SSB of central Baltic herring in the 1970s to the 1990s was partly caused by a reduction in mean weights-at-age. Growth rate tends to change due to salinity variations, changes in zooplankton (prey) community, and competition with the Baltic sprat, i.e. a density-dependent effect.

Recently, an increase in cod density has occurred in the southern Baltic (mainly in Subdivision 25 and, to a lesser degree, in Subdivision 26), whereas no significant increase has been noticed in the northern areas (Subdivisions 27–32). The increase of cod in Subdivision 25 may have a significant effect on herring in this area, but very limited effect on the whole central Baltic herring stock.

The fisheries

All passive gears and purse-seiners, which are directed for human consumption, can be regarded as a fishery that almost exclusively takes herring. The pelagic trawl fishery takes a mixture of herring and sprat, and landings by species are quantified.

Catch distribution	Total catches of the central Baltic stock (2013) were 101 kt (mainly pelagic trawl). Herring catches from the central Baltic area were 96.9 kt. Discards are considered to be negligible.

Effects of the fisheries on the ecosystem

As both herring and sprat are the major prey of cod, the pelagic fishery can indirectly affect the cod stock.

Quality considerations

Misreporting of herring has occurred and is now assumed to be minor.

The overall biological sampling (length and age data) seems to be sufficient. The recent assessments show an overall upwards revision in SSB and a downwards revision in fishing mortality.

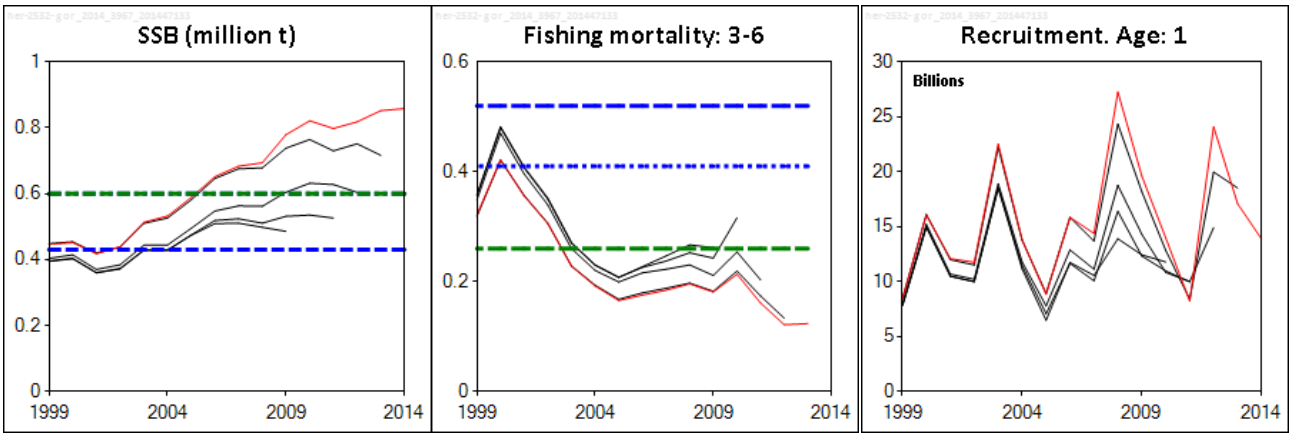

Figure 8.3.10.2 Herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga. Historical assessments results (final-year recruitment and predicted SSB estimates included). The assessment was benchmarked in 2013.

Scientific basis

Stock data category	1 (ICES, 2014a)
Assessment type	Age-based analytical assessment (XSA).
Input data	Commercial catches (international landings, age and length frequencies from catch sampling); one survey acoustic index (BIAS); natural mortalities from multispecies model (SMS); fixed maturity ogive.
Discards and bycatch	Not included and considered negligible.
Indicators	None.
Other information	Last benchmark in 2013 (ICES, 2013a).
Working group	Baltic Fisheries Assessment Working Group (WGBFAS)

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Reference points

	Type	*Value*	*Technical basis*
MSY approach	MSY $B_{trigger}$	600 000 t	B_{pa}.
	F_{MSY}	0.26	Stochastic single-species simulations, including S–R relationship.
	Multispecies F_{MSY}	0.25–0.35	Multispecies model (SMS). One of several options giving a high sustainable yield of herring as well as of cod and sprat due to low to moderate predation from cod.
Precautionary approach	B_{lim}	430 000 t	B_{loss}.
	B_{pa}	600 000 t	$1.4 \times B_{lim}$.
	F_{lim}	0.52	Consistent with B_{lim}.
	F_{pa}	0.41	Consistent with B_{pa}.

(Last changed in: 2013)

Outlook for 2015

Basis: F (2014) = TAC constraint* = 0.17; SSB (2014) = 859; Recruitment (age 1 in 2014) = 14 billion (RCT3 estimate); Recruitment (age 1 in 2015 and 2016) = 15 billion (GM 1988–2012); Catches (2014) = Landings (2014) = 137; Discards (2014) = negligible.

Rationale	**Catches (2015)**	**Basis**	**F (2015)**	**SSB (2015)**	**SSB (2016)**	**%SSB change[1)]**	**%Advice change[2)]**
MSY approach	193	F_{MSY}	0.26	776	685	−12%	+18%
Precautionary approach	266	B_{pa} ($F_{2014} \times 2.15$)	0.36	750	600	−20%	+62%
Zero catch	0	F = 0	0	847	912	+8%	−100%
Other options	93	$F_{2014} \times 0.7$	0.12	814	800	−2%	−43%
	106	$F_{2014} \times 0.8$	0.13	810	785	−3%	−36%
	118	$F_{2014} \times 0.9$	0.15	805	771	−4%	−28%
	130	$F_{2014} \times 1$	0.17	801	757	−5%	−21%
	142	$F_{2014} \times 1.1$	0.18	796	743	−7%	−14%
	154	$F_{2014} \times 1.2$	0.20	792	730	−8%	−6%
	164	$F_{2014} \times 1.29$	0.22	788	718	−9%	0%
	187	Lower limit multispecies F_{MSY}	0.25	779	693	−11%	+14%
	259	Upper limit multispecies F_{MSY}	0.35	752	609	−15%	+58%
	303	F_{pa}	0.41	736	556	−24%	+85%

Weights in thousand tonnes.
[1)] SSB 2016 relative to SSB 2015.
[2)] Catches in 2015 relative to 2013 ICES advice for 2014.
* TAC constraint in 2014: EU share 112 725 t + Russian quota 19 500 t + central Baltic herring stock caught in Gulf of Riga 5 100 t (mean 2008–2012) – Gulf of Riga herring stock caught in central Baltic Sea 180 t (mean 2008–2012) = 137 145 t.

MSY approach

Following the ICES MSY approach implies fishing mortality at F_{MSY} = 0.26, which implies catches of no more than 193 kt. This is expected to lead to an SSB of 685 kt in 2016.

Precautionary approach

F must be at least 12% lower than F_{pa} to increase SSB to B_{pa} in 2016, which implies catches of no more than 266 kt.

Multispecies considerations

Herring multispecies F_{MSY} as a single point target does not exist in a multispecies context, as the natural mortality of herring depends on the population size of the other species in the Baltic. Long-term yield of herring (estimated from the SMS model) is linked more to the population size of its predator cod than by the F on herring itself. The multispecies F_{MSY} (i.e. 0.25–0.35) values for herring used in the outlook table give the highest long-term yields, based on a biomass of cod that is associated with a fishing mortality on cod in the range of 0.4–0.6 (see ICES (2013b) for details on how the multispecies F_{MSY} used in the outlook table was derived). Fishing at multispecies F_{MSY} would give catches in 2015 within the range of 187–259 kt and SSB in 2016 within the range of 609–693 kt.

Additional considerations

Advice considerations

The recent decreased in cod growth in SD 24 and 25 and, as a result, the dramatic decrease in number and biomass of larger cod has indicated that there may be reasons for additional measures to protect the older cod in that stock (see section 8.3.3). The decrease in growth for larger cod is likely caused by many factors such as a general decrease in food availability (benthos, pelagic fish and other food items) influenced by density dependence of cod, increased parasites induced by seals and increased anoxic areas. However, the only additional fishery component possible to manage is the amount of pelagic species (herring and sprat) caught in the main area of cod. ICES advises the implementation of a spatial management plan to reduce the fishing pressure for the pelagic stocks in Subdivisions 25-26, where the cod is concentrated (see sections 8.3.3 and 8.3.18).

The relative catch proportion of central Baltic herring in the main cod distribution area has since 2008 increased from 30% of the total catches to 39% in 2013. This increase in fishing pressure may exacerbate the food condition for cod as the availability of sprat and herring decreases. Restrictions on herring catches taken in the main cod area (Subdivisions 25–26) should be established, especially as the 2014 TAC for central Baltic herring has increased. Redistribution of the fishery to the northern areas (Subdivisions 27–32) may also reduce the density-dependent effect, i.e. increase growth for the clupeids in the area.

Management considerations

A mixture of central Baltic herring (Subdivisions 25–27, 28.2, 29, and 32) and the Gulf of Riga (Subdivision 28.1) herring is caught in the central Baltic Sea.

The assessment and the advice consider that the central Baltic herring stock is caught both in and outside the central Baltic Sea. The TAC (sum of the EU and Russia autonomous quotas) is set for herring caught in the central Baltic management area, which includes also a small amount of Gulf of Riga herring caught in the central Baltic Sea but excludes central Baltic herring caught outside the central Baltic Sea.

The TAC value proposed for the central Baltic area is based on the advised catch for the central Baltic herring stock, plus the assumed catch of the Gulf of Riga herring taken in the central Baltic, minus the assumed catch of herring from the central Baltic stock taken in the Gulf of Riga. The values of the two latter are given by the average over the last five years.

- Central Baltic herring assumed to be taken in the Gulf of Riga in 2015 (Subdivision 28.1) is 4700 t (average 2009–2013);
- Gulf of Riga herring assumed to be taken in Subdivision 28.2 in 2015 is 220 t (average 2009–2013).

Following the ICES MSY approach of catches no more than 193 kt, the corresponding TAC in the central Baltic management area for 2015 would be 188.52 kt, calculated as 193 kt +0.22 kt −4.7 kt.

Preliminary investigations indicate that western Baltic spring-spawning herring (Division IIIa and Subdivisions 22–24) and central Baltic herring (Subdivisions 25–29 and 32, excluding Gulf of Riga herring) are mixing in Subdivisions 24–26 (Gröhsler *et al*., 2013; ICES, 2014c). However, this is not taken into account in the current assessment.

ICES recommends that activities that have a negative impact on the spawning habitat of herring, such as extraction of marine aggregates and construction on the spawning grounds, should not occur.

Regulations and their effects

Since 2005, EU vessels operating in the sprat and herring fishery have not been allowed to land unsorted catches, unless there is a proper sampling scheme to monitor species composition. This is thought to have led to a reduction in the amount of species misreporting.

Multispecies considerations

The mean weights-at-age for this stock have decreased during 1980–1998 (Figure 8.3.10.5) after which the weights fluctuated without clear trend. The decrease in weight-at-age has been relatively more pronounced in the northern areas (Subdivisions 27–29) where the sprat stock has been concentrated since the beginning of the 1990s. This could result from interspecific density-dependent effects (Casini *et al*., 2011).

The herring stock is affected by cod predation. However, the present species distribution pattern implies that an increase in F on cod will not necessarily result in Baltic-wide herring stock size increase. Conversely, a decrease in F on cod will not necessarily result in a decrease of herring stock size if it is not accompanied by a cod expansion into northern areas. All of these considerations depend on the spatial overlap of the species.

An increase in sprat F in the northern areas (Subdivisions 27–32), where the sprat stock is currently mainly concentrated during autumn and early winter, would be potentially beneficial for herring growth by potentially reducing density dependence.

Data and methods

The stock was benchmarked in 2013 (ICES, 2013a). The assessment is based on catch data and on an international acoustic survey. Natural mortality is now derived from a multispecies model, taking cod predation into account. Catches of the central Baltic herring stock taken from the Gulf of Riga are included in the assessment and the catches of the Gulf of Riga herring stock taken from the central Baltic Sea are excluded.

Uncertainties in the assessment and forecast

Herring in the central Baltic is composed of a number of local populations differing in biological parameters and population dynamics. Among the factors influencing the future mean weight-at-age of the stock is recruitment success for the separate populations. Separate trial assessments for different populations conducted in 2013 (ICES, 2013a), however, showed only a limited impact of this complex stock structure on the perception of the overall stock dynamics.

The SSB in 2012 has been revised upwards by 9% compared to the estimated SSB in last year's assessment.

Comparison of the basis of previous assessment and advice

The basis for the assessment has not changed from last year.

The basis for the advice this year is the same as last year: the MSY approach.

Sources

Casini, M., Kornilovs, G., Cardinale, M., Möllmann, M., Grygiel, W., Jonsson, P., Raid, T., Flinkman, J., and Feldman, V. 2011. Spatial and temporal density-dependence regulates the condition of central Baltic Sea clupeids: compelling evidence using an extensive international acoustic survey. Population Ecology, 53: 511–523.

Gröhsler, T., Oeberst, R., Schaber, M., Larson, N., and Kornilovs, G. 2013. Discrimination of western Baltic spring-spawning and central Baltic herring (*Clupea harengus* L.) based on growth vs. natural tag information. ICES Journal of Marine Science, 70(6): 1108–1117.

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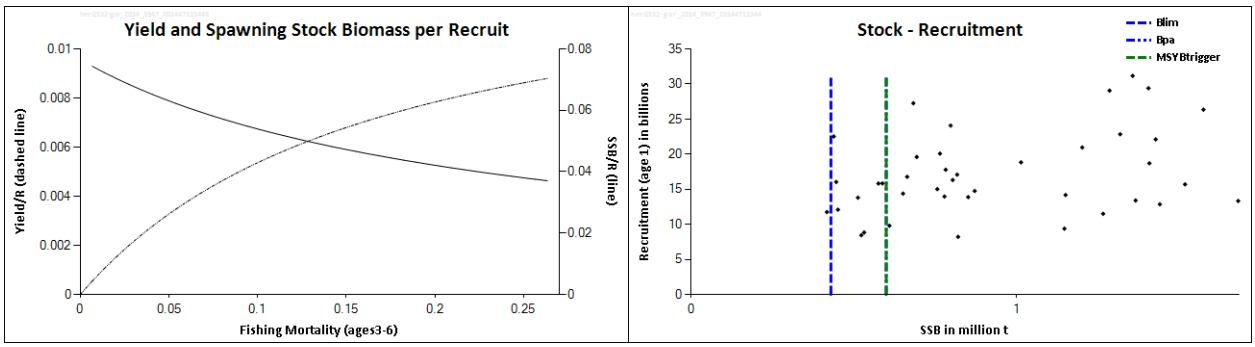

Figure 8.3.10.3 Herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga. Yield-per-recruit analysis (left panel) and stock–recruitment plot (right panel).

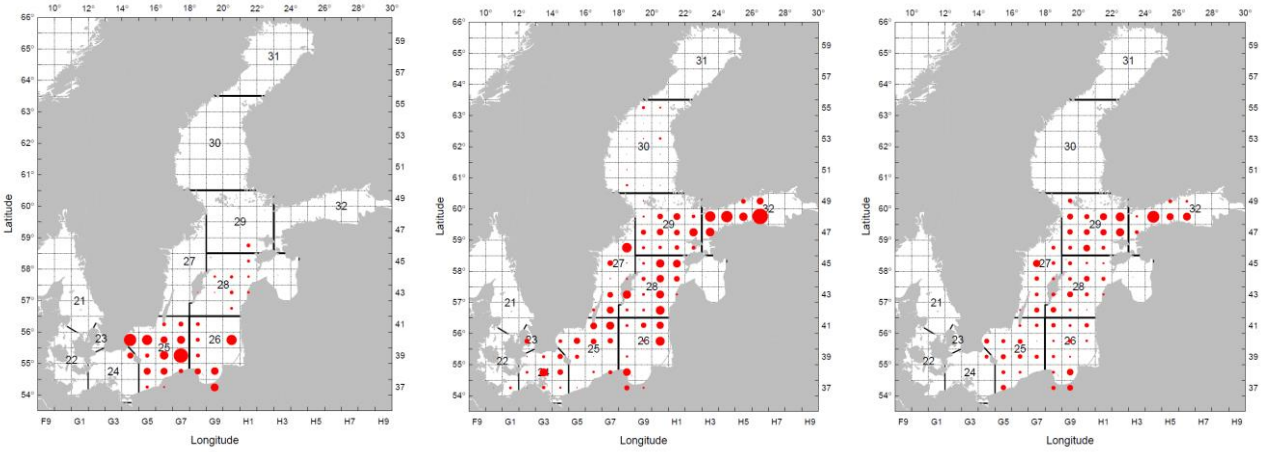

Figure 8.3.10.4 Herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga. Distribution of eastern Baltic Sea cod from bottom trawl survey (BITS) in the 4th quarter 2013 (left panel); Baltic sprat from the acoustic survey (BIAS) in the 4th quarter 2013 (middle panel); herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga, from the BIAS survey (BIAS) in the 4th quarter 2013 (right panel).

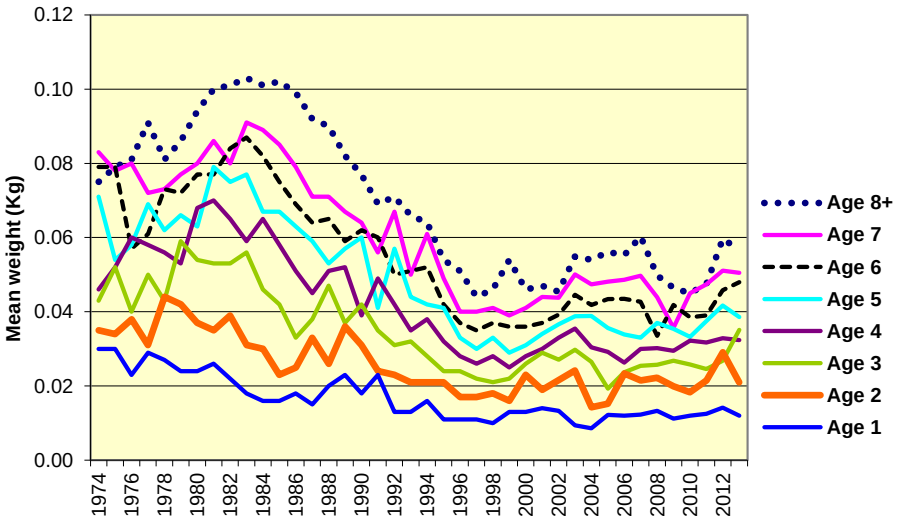

Figure 8.3.10.5 Herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga. Trends in the mean weights-at-age (kg) in the catch.

Table 8.3.10.1 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). ICES advice, management, and ICES catch.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC[a]	ICES catch SDs 25–29+32
1988[b]		204	399	286
1989[b]		176	399	290
1990[b]		112	399	244
1991[b]	TAC for entire area	293	402	213
1992[b]	F near present level	343	402	210
1993[b]	Increase in yield at higher F	371	560	231
1994[b]	Increase in yield at higher F	317–463	560	242
1995[b]	TAC	394	560	221
1996[b]	TAC	394	560	195
1997[b]	No advice	-	560	208
1998[b]	No advice	-	560	212
1999[b]	Proposed $F_{pa =}$ (0.17)	117	476	178
2000[b]	Proposed $F_{pa =}$ (0.17)	95	405	208
2001[b]	Proposed $F_{pa =}$ (0.17)	60	300	188
2002[b]	$F < F_{pa}$	< 73	Not agreed	168
2003	$F < F_{pa}$	< 72	143	154
2004	$F < F_{pa}$	< 80	171	93[e]
2005	$F < F_{pa}$ (single-stock exploitation boundaries)	< 130	130[c]	92[e]
2006	$F < F_{pa}$ (single-stock exploitation boundaries)	< 120	128[c]	110[e]
2007	$F < F_{pa}$ (single-stock exploitation boundaries)	< 164	133[d]	116[e]
2008	$F < F_{pa}$ (single-stock exploitation boundaries)	< 194	153[d]	126[e]
2009	$F < F_{pa}$ (single-stock exploitation boundaries)	< 147	144[d]	132[e]
2010	$F < F_{pa}$ (single-stock exploitation boundaries)	< 103	126[d]	137[e]
2011	MSY Framework (F = 0.19)	< 95	107[d]	117[e]
2012	MSY transition ($F = F_{pa} = 0.19$)	< 92	78[d]	101[e]
2013	MSY transition ($F = F_{pa} = 0.19$)	< 117	90[d]	101[e]
2014	MSY approach	< 164	113[d]	
2015	MSY approach	< 193		

Weights in thousand tonnes.
[a] TAC for Subdivisions 22–29S and 32.
[b] 1987–2002 incl. Gulf of Riga herring.
[c] TAC for Subdivisions 25–28(2), 29, and 32.
[d] EU TAC for Subdivisions 25–28(2), 29, and 32.
[e] Excl. GoR (Subdivision 28.1).

Table 8.3.10.2 Herring in Subdivisions 25–29 and 32 (excluding Gulf of Riga herring). Catches (in thousand tonnes) from the central Baltic management area and of the central Baltic stock.

Year	Catches of herring from the central Baltic			CB herring stock catches	Total catch of central Baltic herring stock
	Central Baltic herring stock	Gulf of Riga herring stock	Total	From the Gulf of Riga	
1977	261.9	-	261.9	2.4	264.3
1978	276.6	-	276.6	6.3	282.9
1979	297.8	-	297.8	4.7	302.5
1980	282.7	-	282.7	5.7	288.4
1981	269.2	-	269.2	5.9	275.1
1982	292.6	-	292.6	4.7	297.3
1983	280.6	-	280.6	4.8	285.4
1984	269.3	-	269.3	3.8	273.1
1985	267.7	-	267.7	4.6	272.3
1986	248.3	-	248.3	1.3	249.6
1987	231.6	-	231.6	4.8	236.4
1988	262.5	-	262.5	3.0	265.5
1989	263.6	-	263.6	5.9	269.5
1990	223.3	-	223.3	6.0	229.3
1991	188.5	-	188.5	6.1	194.6
1992	185.7	1.3	187.0	3.5	189.2
1993	204.0	1.2	205.2	4.3	208.3
1994	213.6	2.1	215.7	5.0	218.6
1995	183.2	2.4	185.6	6.1	189.3
1996	162.3	4.3	166.6	4.4	166.7
1997	167.7	2.9	170.6	4.3	172.0
1998	181.8	2.8	184.6	4.1	185.9
1999	144.4	1.9	146.3	4.3	148.7
2000	170.5	1.9	172.4	4.6	175.1
2001	147.3	1.2	148.5	2.9	150.2
2002	125.6	0.4	126.0	3.5	129.1
2003	109.5	0.4	109.9	4.3	113.8
2004	89.7	0.2	89.9	3.3	93.0
2005	89.3	0.5	89.8	2.3	91.6
2006	107.2	0.4	107.6	3.2	110.4
2007	114.5	0.1	114.6	1.5	116.0
2008	120.1	0.1	120.2	6.1	126.2
2009	129.2	0.1	129.3	4.9	134.1
2010	131.5	0.4	131.9	5.2	136.7
2011	111.3	0.1	111.4	5.5	116.8
2012	97.2	0.2	97.4	3.8	101.0
2013	96.9	0.3	97.2	4.1	101.0

Table 8.3.10.3 Herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga. Catches (thousand tonnes) of the central Baltic stock.

Year	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia[b]	Sweden	Total
1977	11.9		33.7	0.0			57.2	112.8	48.7	264.3
1978	13.9		38.3	0.1			61.3	113.9	55.4	282.9
1979	19.4		40.4	0.0			70.4	101.0	71.3	302.5
1980	10.6		44.0	0.0			58.3	103.0	72.5	288.4
1981	14.1		42.5	1.0			51.2	93.4	72.9	275.1
1982	15.3		47.5	1.3			63.0	86.4	83.8	297.3
1983	10.5		59.1	1.0			67.1	69.1	78.6	285.4
1984	6.5		54.1	0.0			65.8	89.8	56.9	273.1
1985	7.6		54.2	0.0			72.8	95.2	42.5	272.3
1986	3.9		49.4	0.0			67.8	98.8	29.7	249.6
1987	4.2		50.4	0.0			55.5	100.9	25.4	236.4
1988	10.8		58.1	0.0			57.2	106.0	33.4	265.5
1989	7.3		50.0	0.0			51.8	105.0	55.4	269.5
1990	4.6		26.9	0.0			52.3	101.3	44.2	229.3
1991	6.8	27.0	18.1	0.0	20.7	6.5	47.1	31.9	36.5	194.6
1992	8.1	22.3	30.0	0.0	12.5	4.6	39.2	29.5	43.0	189.2
1993	8.9	25.4	32.3	0.0	9.6	3.0	41.1	21.6	66.4	208.3
1994	11.3	26.3	38.2	3.7	9.8	4.9	46.1	16.7	61.6	218.6
1995	11.4	30.7	31.4	0.0	9.3	3.6	38.7	17.0	47.2	189.3
1996	12.1	35.9	31.5	0.0	11.6	4.2	30.7	14.6	25.9	166.7
1997	9.4	42.6	23.7	0.0	10.1	3.3	26.2	12.5	44.1	172.0
1998	13.9	34.0	24.8	0.0	10.0	2.4	19.3	10.5	71.0	185.9
1999	6.2	35.4	17.9	0.0	8.3	1.3	18.1	12.7	48.9	148.7
2000	15.8	30.1	23.3	0.0	6.7	1.1	23.1	14.8	60.2	175.1
2001	15.8	27.4	26.1	0.0	5.2	1.6	28.4	15.8	29.8	150.2
2002	4.6	21.0	25.7	0.3	3.9	1.5	28.5	14.2	29.4	129.1
2003	5.3	13.3	14.7	3.9	3.1	2.1	26.3	13.4	31.8	113.8
2004	0.2	10.9	14.5	4.3	2.7	1.8	22.8	6.5	29.3	93.0
2005	3.1	10.8	6.4	3.7	2.0	0.7	18.5	7.0	39.4	91.6
2006	0.1	13.4	9.6	3.2	3.0	1.2	16.8	7.6	55.3	110.4
2007	1.4	14.0	13.9	1.7	3.2	3.5	19.8	8.8	49.9	116.0
2008	1.2	21.6	19.1	3.4	3.5	1.7	13.3	8.6	53.7	126.2
2009	1.5	19.9	23.3	1.3	4.1	3.6	18.4	11.8[c]	50.2	134.1
2010	5.4	17.9	21.6	2.2	3.9	1.5	25.0	9.1	50.0	136.7
2011	1.8	14.9	19.2	2.7	3.4	2.0	28.0	8.5	36.2	116.8
2012	1.4	11.4[d]	18.0	0.9	2.6	1.8	25.5	13.0	26.2	101.0
2013[a]	3.4	12.6	18.2	1.4	3.5	1.7	20.6	10.0	29.5	101.0

[a] Preliminary.
[b] In 1977–1990 sum of catches for Estonia, Latvia, Lithuania, and Russia.
[c] Updated in 2011.
[d] Updated in 2013 from 8.3 kt to 11.4 kt and included in 2014 assessment (ICES, 2014b).

Table 8.3.10.4 Herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga. Summary of stock assessment (weights in tonnes).

Year	Recruitment Age 1	*SSB	Catches	Landings	Mean F Ages 3–6
	thousands	Tonnes	Tonnes	Tonnes	
1974	18112476	1682600	368652	368652	0.185
1975	13327766	1575467	354851	354851	0.2
1976	26355030	1366981	305420	305420	0.194
1977	13397272	1519066	301952	301952	0.189
1978	15697707	1441414	278966	278966	0.164
1979	12850915	1409235	278182	278182	0.195
1980	18706942	1357914	270282	270282	0.187
1981	31176784	1286965	293615	293615	0.203
1982	29077064	1428742	273134	273134	0.174
1983	22109784	1406572	307601	307601	0.224
1984	29419952	1319516	277926	277926	0.224
1985	22851142	1267182	275760	275760	0.23
1986	11505712	1202883	240516	240516	0.202
1987	20960954	1148015	248653	248653	0.231
1988	9379067	1151552	255734	255734	0.219
1989	14180087	1014397	275501	275501	0.29
1990	18842458	872019	228572	228572	0.275
1991	14753255	782822	197676	197676	0.284
1992	17785920	804755	189781	189781	0.254
1993	16318005	757137	209094	209094	0.287
1994	15019941	765274	218260	218260	0.345
1995	20086082	664445	188181	188181	0.324
1996	16770188	609784	162578	162578	0.326
1997	9804183	576187	160002	160002	0.362
1998	15817595	523456	185780	185780	0.38
1999	8445351	446414	145922	145922	0.321
2000	16044541	451567	175646	175646	0.422
2001	12083564	417882	148404	148404	0.356
2002	11754923	438849	129222	129222	0.306
2003	22533140	513363	113584	113584	0.228
2004	13803199	532217	93006	93006	0.192
2005	8833440	588444	91592	91592	0.165
2006	15841553	651721	110372	110372	0.175
2007	14380184	683480	116030	116030	0.184
2008	27266742	693929	126155	126155	0.196
2009	19604896	779055	134127	134127	0.181
2010	13967936	821311	136706	136706	0.213
2011	8216954	798253	116785	116785	0.161
2012	24086166	818184	100893	100893	0.121
2013	17088726	852165	100954	100954	0.123
2014	**13877000	***858701			
Average	17125234	933656	204652	204652	0.237

* At spawning time.
** Output from survey data (RCT3 analysis).
*** Predicted.