ECOREGION Baltic Sea
STOCK Sprat in Subdivisions 22–32 (Baltic Sea)

Advice for 2013

ICES advises on the basis of the MSY approach that catches in 2013 should be no more than 278 000 tonnes and furthermore that a spatial management plan needs to be developed. .

Stock status

F (Fishing Mortality)	2009	2010	2011	
MSY (F_{MSY})	✗	✓	✓	Below target
Precautionary approach (F_{pa})	✗	✓	✓	Harvested sustainably

SSB (Spawning-Stock Biomass)	2010	2011	2012	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{pa},B_{lim})	?	?	?	Undefined
Qualitative evaluation	↘	→	→	Stable at average level

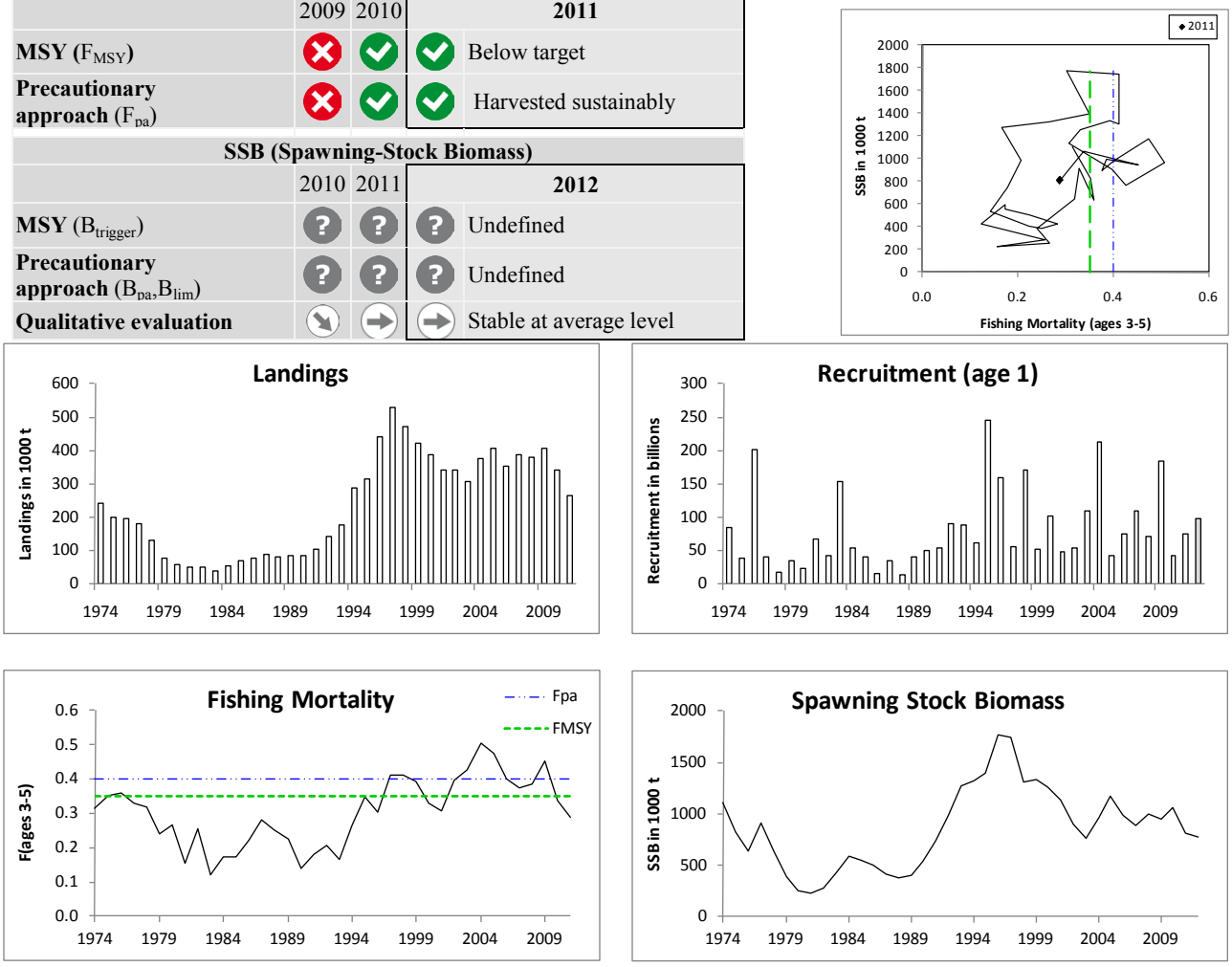

Figure 8.4.8.1 Sprat in Subdivisions 22–32 (Baltic Sea). Summary of stock assessment. Top right: SSB and F for the time-series used in the assessment.

SSB has declined from a historical high in the late 1990s, and the SSB in 2011 was estimated at close to the long-term average. The fishing mortality in 2011 declined to 0.29, which is the lowest estimated for the past ten years. None of the recent three year classes (2009–2011) are strong; the 2009 year class is estimated to be weak, the 2010 close to average, and the 2011 year class is predicted to be close to the average. SSB and recruitment in 2012 are predicted values.

Management plans

The International Baltic Sea Fishery Commission (IBSFC) long-term management plan for the sprat stock was terminated in 2006 and has not been replaced.

Biology

Sprat biomass is strongly dependent on the overlap with the cod stock through predator–prey interactions. Sprat biomass was low in the 1980s when the cod stock was high. A decline in cod biomass and favorable conditions for sprat recruitment led to the development of sprat to a record high in the 1990s. High stock size resulted in a marked decline in sprat mean weights (density-dependent effects). After the 1990s the sprat stock size increased mainly in the northern areas (Subdivisions 27–29 and 32), where cod decreased the most, exacerbating the decrease in mean weights especially in these areas. The decline of the stock in numbers may to some extent be compensated by an expected increase in weights-at-age because of density-dependent effects on growth.

Environmental influence on the stock

Since the 1990s, trends in Baltic sprat have been driven mainly by reduced predation by cod and variable, but high recruitment. Recently, a strong increase of cod has occurred in the southern Baltic (especially in Subdivision 25 and, to a minor extent, in Subdivision 26), whereas no significant increase has been noticed in the northern areas (Subdivisions 27–32). The increase of cod in Subdivision 25 will have a strong effect on sprat in this area, but very limited effect on the whole Baltic sprat population which is currently out of reach for cod, at least in some seasons.

The fisheries

The mesh size (minimum of 16 mm) and TAC are the main regulatory measures adopted for the Baltic sprat fishery. Landings usually do not exceed the TAC, and in 2010 the EU TAC was not taken. Discarding of herring and sprat in the Baltic has been prohibited in the EU fisheries since 2010.

Catch distribution	Total landings (2011) are 268 kt. Most of the catch is taken by pelagic trawlers, discards are negligible.

Effects of the fisheries on the ecosystem

Because sprat and herring are the major prey for cod, the mixed pelagic fishery can indirectly affect the cod stock. On the other hand, a smaller stock size of sprat would release its pressure on the consumption of cod eggs that in some areas and periods may be substantial.

Quality considerations

The assessment shows a historical retrospective pattern, with a tendency to underestimate the SSB and overestimate the F. In some fisheries the species composition of catches in the mixed industrial fishery is imprecise which may add additional uncertainty to the assessment.

Collection of cod stomach contents data would improve the data basis for application in multispecies stock assessment models.

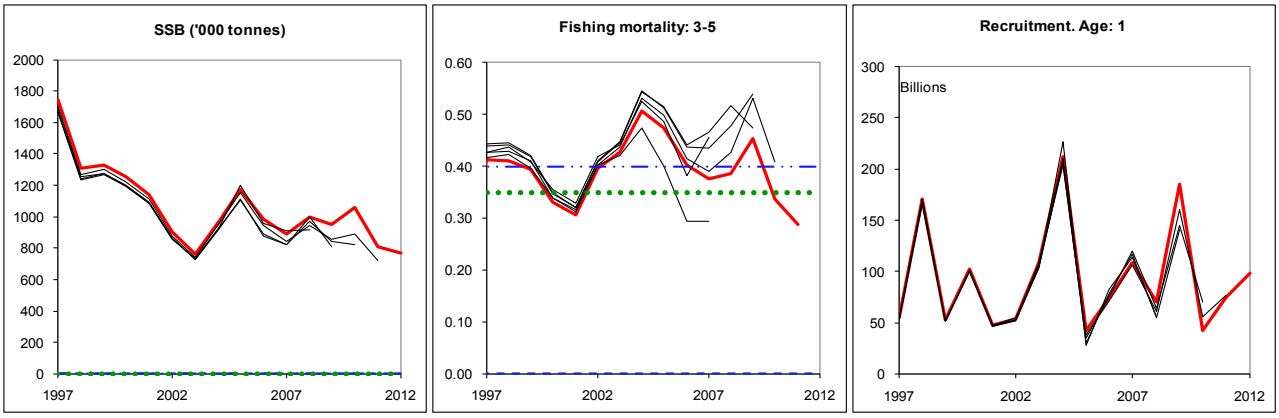

Figure 8.4.8.2 Sprat in Subdivisions 22–32 (Baltic Sea). Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	Age-based analytical assessment (XSA).
Input data	Three survey indices from two acoustic surveys (BASS: May; BIAS: October, BIAS for age 0).
Discards and bycatch	Discards are not included and are considered to be negligible.
Indicators	None.
Other information	The latest benchmark was performed in 2005; the next one is planned for 2013.
Working group report	WGBFAS

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Reference points

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	not defined*	
	F_{MSY}	0.35	Stochastic simulations, including S–R relationship and HCR.
Precautionary Approach	B_{lim}	not defined*	
	B_{pa}	not defined*	
	F_{lim}	not defined	
	F_{pa}	0.40**	F_{med} estimate in 1998, allowing for variable natural mortality.

(unchanged since 2011)

*An integrated ecosystem assessment (ICES, 2008) showed a major shift in foodweb composition and in environmental drivers in the central Baltic basin, and therefore the previously defined precautionary biomass reference points are no longer considered appropriate and were not used in assessing stock status.

**There are doubts about the validity of the F_{pa} reference point in the light of the increased natural mortality which at present cannot be determined accurately.

Outlook for 2013

Basis: F_{2012} = (2009–2011 scaled) = 0.29; SSB (2012) = 770; Recruitment (2012) = 98 billion; Catches (2012) = 230.

Rationale	**Catch 2013**	**Basis**	**F Total (2013)**	**SSB (2013)**	**SSB (2014)**	**%SSB change** [1)]	**%TAC change** [2)]
MSY framework	278	F_{MSY}	0.35	815	789	-3	+9
Precautionary approach	312	F_{pa}	0.4	801	751	-6	+22
Zero catch	0	0	0	919	1128	23	-100
Other options	169	$0.7*F_{sq}$	0.20	857	916	+7	-34
	191	$0.8*F_{sq}$	0.23	849	890	+5	-25
	202	$0.85*F_{sq}$	0.24	845	878	+4	-21
	213	$0.9*F_{sq}$	0.26	840	865	+3	-16
	217	−15%TAC ($0.92*F_{sq}$)	0.27	838	860	+3	-15
	234	F_{sq}	0.29	832	840	+1	-8
	255	0%TAC ($1.1*F_{sq}$)	0.32	824	816	-1	0
	265	$1.15*F_{sq}$	0.33	820	805	-2	+4
	293	+15%TAC ($1.29*F_{sq}$)	0.37	809	772	-5	+15

Weights in thousand tonnes.
[1)] SSB 2014 relative to SSB 2013.
[2)] Catches 2013 relative to TAC 2012 (EU and Russia).

MSY approach

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

Following the ICES MSY framework implies a fishing mortality at 0.35, resulting in catches of no more than 278 000 tonnes in 2013. This is expected to lead to an SSB of more than 790 000 tonnes in 2014.

No transition is needed as the current fishing mortality is below F_{MSY}.

Precautionary approach

The fishing mortality in 2013 should be no more than F_{pa}, corresponding to catches of 312 000 tonnes. This is expected to bring SSB to 750 000 tonnes in 2014.

Additional considerations

Management considerations

Sprat is taken with a bycatch of herring to an extent that depends on season and area. This means that the fishing options for sprat should take account of the state of Baltic herring stocks, especially the central Baltic herring stock, as they overlap in distribution and fishing area. From 2005, EU vessels operating in the sprat and herring fishery are no longer 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 misreported species.

The future catch opportunities will very much depend on the strength of the 2012–2013 year classes. 16% of the predicted yield for 2013 and 45% of the 2014 SSB result from the assumption of average recruitment (1991–2010) in the projections.

The highest yield which this stock can sustain in the long term depends on natural mortality, which is linked to the abundance of cod. Strong recruitment of sprat and low predation contributed to the high SSB in the mid-1990s and 2000s. The exploitation of sprat will have to be reduced as the cod stock recovers, especially in Subdivision 25 where most of the cod biomass is presently distributed.

The sprat stock development is related to cod. However, the present distribution pattern of the two species implies that an increase in F on cod will not necessarily result in increasing Baltic-wide sprat stock size. Conversely, a decrease in F on cod will not necessarily result in a decrease of the Baltic sprat stock size if it is not accompanied by a cod expansion into northern areas.

A higher F on sprat in northern areas (Subdivisions 27–32) would likely reduce density dependence and improve the individual growth and condition of both sprat and herring stocks. An increase in sprat F in these northern areas will not have a negative effect on cod, given that this will not affect the stock that is now mainly distributed in southern areas (Subdivisions 25–26). On the other hand, a reduction of sprat F in Subdivision 25 will likely improve the growth and condition of cod as well as reducing cod cannibalism in this area.

To optimize the growth potential and yield of cod, sprat, and herring, a spatially explicit management plan needs to be developed.

Factors affecting the fisheries and the stock

Sprat in the Baltic Sea is located at the northern limit of the species' geographic distribution. Low temperatures can therefore be expected to be detrimental to production and survival in the Baltic Sea, and higher temperatures might support increased recruitment. Besides an increase in temperature, the unusual climate situation during the 1990s resulted in a change in the circulation pattern and thus a change in the drift pattern of sprat larvae, where retention vs. dispersion in the Baltic deep basins have a strong influence on the recruitment success of sprat. The sprat stock development is related to cod through predation.

The mean weights-at-age for this stock decreased by about 40% in 1992–1998 (Figure 8.4.8.4), after which the weights fluctuated without clear trend. The decrease in weight-at-age has been more pronounced in the northern areas (Subdivisions 27–29) where the majority of the sprat stock has been concentrated since the mid-1990s. This could result from density-dependent effects operating both in time and space.

High stock size resulted in a marked decline in sprat mean weights (density-dependent effects) (Figure 8.4.8.4). After the 1990s the sprat stock size increased mainly in the northern areas (Subdivisions 27–29 and 32), where cod decreased the most (Figures 8.4.8.4 and 8.4.8.5), exacerbating the decrease in mean weights especially in these areas (Figure 8.4.8.6).

Information from the fishery industry

The industry reports a recent shift in distribution of sprat in the autumn: sprat seems to be distributed much closer to the coast in early October than in previous years. As this is the time when the autumn acoustic survey is conducted, this behavioural change might lead to an underestimation of the stock size in the acoustic survey.

Data and methods

The age-structured assessment is based on catch data and three age-structured acoustic survey indices. Natural mortality is derived from a multispecies model that takes cod predation into account.

The recruitment estimate for the 2011 year class used in the predictions is derived from an acoustic survey. Average recruitment is used for younger year classes.

Uncertainties in assessment and forecast

Uncertainties exist with regard to the imprecise historical (pre-2005) catch data, due to inaccurate catch composition data caused by mixed landings of herring and sprat.

The historical performance of the assessment (Figure 8.4.8.2) shows quite a large variation, to some extent caused by changes in natural mortality estimates (depending on cod predation) and revisions in the acoustic data used for tuning. The revised survey data for the years 1991 to 2008 are now consistently based on area-corrected estimates.

Comparison with previous assessment and advice

The assessment shows estimates of SSB and fishing mortality that differ about 20% from the 2011 assessment. The estimate of SSB in 2010 is 19% higher than in the previous assessment and the F in 2010 has been revised downwards by 17%. The changes in natural mortality (up to 10% difference) resulting from a downwards revision of cod SSB, contribute to these deviations. As the F has declined below F_{MSY} , the basis for the advice is now the ICES MSY framework.

Sources

ICES. 2008. Report of the Working Group on Integrated Assessments of the Baltic Sea. Öregrund, Sweden, 25–29 March 2008. ICES CM 2008/BCC:04.

ICES. 2012. Report of the Baltic Fisheries Assessment Working Group. Copenhagen, 12–19 April 2012. ICES CM 2012/ACOM:10.

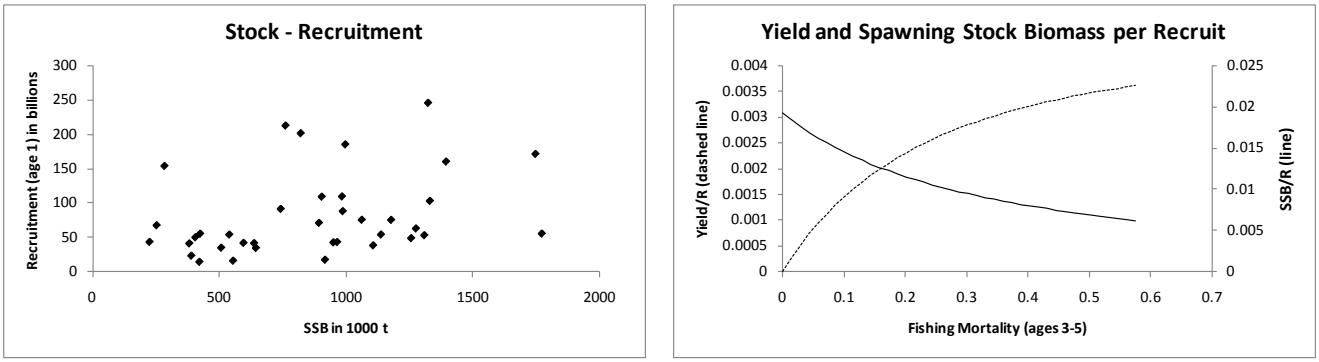

Figure 8.4.8.3 Sprat in Subdivisions 22–32 (Baltic Sea). Stock–recruitment plot and yield-per-recruit analysis.

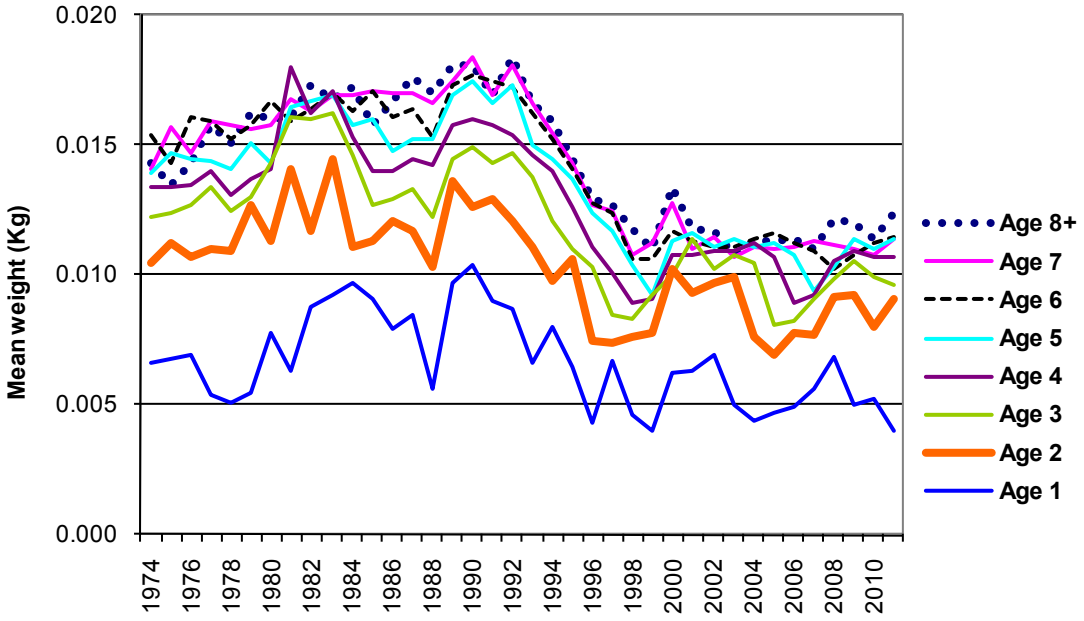

Figure 8.4.8.4 Sprat in Subdivisions 22–32 (Baltic Sea). Mean weight-at-age in the catch (age 1 to age 8+).

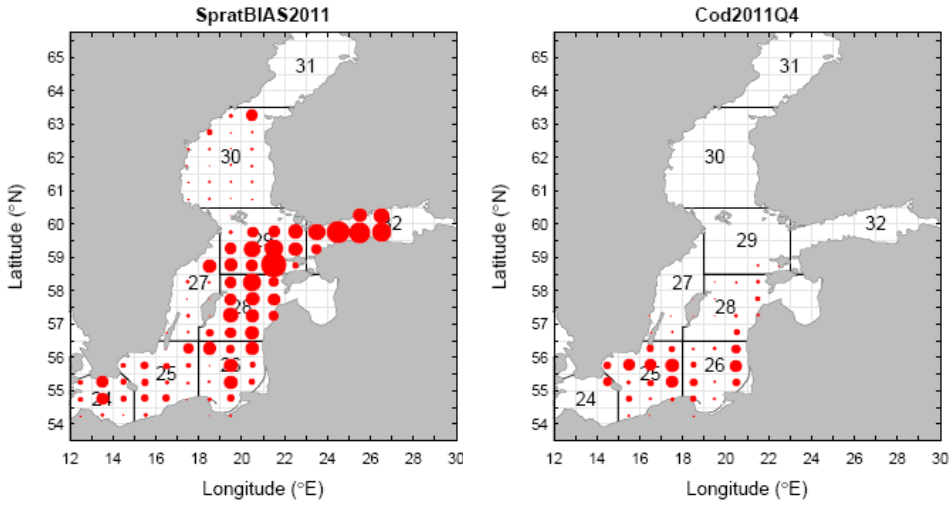

Figure 8.4.8.5 Sprat in Subdivisions 22–32 (Baltic Sea). Distribution of Baltic sprat (left panel) and eastern Baltic cod (Subdivisions 25–32, right panel) from acoustic surveys (BIAS, sprat) and bottom trawl surveys (BITS, cod) in the 4th quarter 2011.

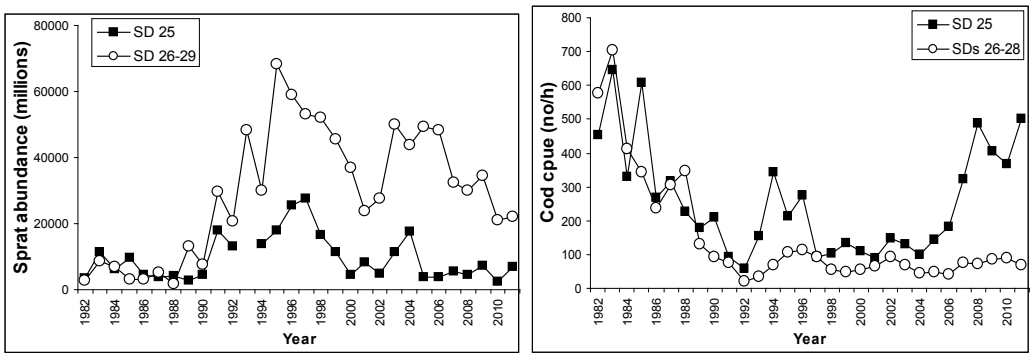

Figure 8.4.8.6 Sprat in Subdivisions 22–32 (Baltic Sea). Trends of average sprat abundance (left panel) and cod cpue (right panel) in the southwest (Subdivision 25) and northeast (Subdivisions 26–28) Baltic Sea, from acoustic and BITS surveys. Subdivision 29 is not well covered by the BITS survey.

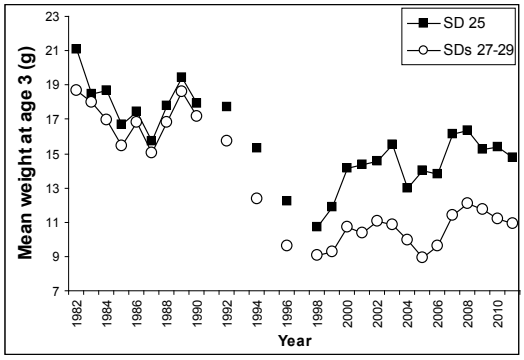

Figure 8.4.8.7 Sprat in Subdivisions 22–32 (Baltic Sea).Trends of sprat mean weight-at-age 3 in the southwest (Subdivision 25) and northeast (Subdivisions 27–29) Baltic, from Swedish acoustic surveys in the 4th quarter.

Table 8.4.8.1 Sprat in Subdivisions 22–32 (Baltic Sea). ICES advice, management, and catch.

Year	ICES advice	Predicted catch corresponding to advice	Agreed TAC	ICES catch
1987			117.2	88
1988	Catch could be increased in Subdivisions 22–25	-	117.2	80
1989		72	142	86
1990		72	150	86
1991	TAC	150	163	103
1992	Status quo F	143	290	142
1993	Increase in yield by increasing F	-	415	178
1994	Increase in yield by increasing F	-	700	289
1995	TAC	205	500	313
1996	Little gain in long-term yield at higher F	279	550	441
1997	No advice	-	550	529
1998	Status quo F	343	550	471
1999	Proposed F_{pa}	304	467.5	421
2000	Proposed F_{pa}	192	400	389
2001	Proposed F_{pa}	314	355	342
2002	Proposed F_{pa}	369	380	343
2003	Below proposed F_{pa} (TAC should be set on Central Baltic Herring considerations)	300	310	308
2004	Below proposed F_{pa} (TAC should be set on Central Baltic Herring considerations)	474	420	374
2005	TAC should be set on Central Baltic Herring considerations	< 614	550	405
2006	Agreed Management Plan	439	468	352
2007	< F_{pa}	<477	454*	388
2008	< F_{pa}	<432	454*	381
2009	< F_{pa}	<291	399*	407
2010	< F_{pa}	<306	380*	342
2011	< F_{pa}	<242	289*	268
2012	MSY transition scheme	<242	225*	
2013	F<F_{msy}	<278		

Weights in thousand tonnes.
*EU autonomous quota, not including Russian catches.

Table 8.4.8.2 Sprat in Subdivisions 22–32 (Baltic Sea). Landings by country (thousand tonnes).

Year	Denmark	Finland	German Dem. Rep.	Germany Fed. Rep.	Poland	Sweden	USSR	Total
1977	7.2	6.7	17.2	0.8	38.8	0.4	109.7	180.8
1978	10.8	6.1	13.7	0.8	24.7	0.8	75.5	132.4
1979	5.5	7.1	4.0	0.7	12.4	2.2	45.1	77.1
1980	4.7	6.2	0.1	0.5	12.7	2.8	31.4	58.1
1981	8.4	6.0	0.1	0.6	8.9	1.6	23.9	49.3
1982	6.7	4.5	1.0	0.6	14.2	2.8	18.9	48.7
1983	6.2	3.4	2.7	0.6	7.1	3.6	13.7	37.3
1984	3.2	2.4	2.8	0.7	9.3	8.4	25.9	52.5
1985	4.1	3.0	2.0	0.9	18.5	7.1	34.0	69.5
1986	6.0	3.2	2.5	0.5	23.7	3.5	36.5	75.8
1987	2.6	2.8	1.3	1.1	32.0	3.5	44.9	88.2
1988	2.0	3.0	1.2	0.3	22.2	7.3	44.2	80.3
1989	5.2	2.8	1.2	0.6	18.6	3.5	54.0	85.8
1990	0.8	2.7	0.5	0.8	13.3	7.5	60.0	85.6
1991	10.0	1.6		0.7	22.5	8.7	59.7*	103.2

Year	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
1992	24.3	4.1	1.8	0.6	17.4	3.3	28.3	8.1	54.2	142.1
1993	18.4	5.8	1.7	0.6	12.6	3.3	31.8	11.2	92.7	178.1
1994	60.6	9.6	1.9	0.3	20.1	2.3	41.2	17.6	135.2	288.8
1995	64.1	13.1	5.2	0.2	24.4	2.9	44.2	14.8	143.7	312.6
1996	109.1	21.1	17.4	0.2	34.2	10.2	72.4	18.2	158.2	441.0
1997	137.4	38.9	24.4	0.4	49.3	4.8	99.9	22.4	151.9	529.4
1998	91.8	32.3	25.7	4.6	44.9	4.5	55.1	20.9	191.1	470.8
1999	90.2	33.2	18.9	0.2	42.8	2.3	66.3	31.5	137.3	422.6
2000	51.5	39.4	20.2	0.0	46.2	1.7	79.2	30.4	120.6	389.1
2001	39.7	37.5	15.4	0.8	42.8	3.0	85.8	32.0	85.4	342.2
2002	42.0	41.3	17.2	1.0	47.5	2.8	81.2	32.9	77.3	343.2
2003	32.0	29.2	9.0	18.0	41.7	2.2	84.1	28.7	63.4	308.3
2004	44.3	30.2	16.6	28.5	52.4	1.6	96.7	25.1	78.3	373.7
2005	46.5	49.8	17.9	29.0	64.7	8.6	71.4	29.7	87.8	405.2
2006	42.1	46.8	19.0	30.8	54.6	7.5	54.3	28.2	68.7	352.1
2007	37.6	51.0	24.6	30.8	60.5	20.3	58.7	24.8	80.7	388.9
2008	45.9	48.6	24.3	30.4	57.2	18.7	53.3	21.0	81.1	380.5
2009	59.7	47.3	23.1	26.3	49.5	18.8	81.9	25.2	75.3	407.1
2010	43.6	47.9	24.4	17.8	45.9	9.2	56.7	25.6	70.4	341.5
2011	31.4	35.0	15.8	11.5**	33.1	9.9	55.3	19.5	56.2	267.6

* Sum of landings by Estonia, Latvia, Lithuania, and Russia.
** The landing value of 7.7 kt, which was used in the final assessment, was corrected after the assessment meeting.

Table 8.4.8.3 Sprat in Subdivisions 22–32 (Baltic Sea). Landings by country and Subdivision (thousand tonnes).

Year: 2005

Country	Total	22	24	25	26	27	28	29	30	31	32
Denmark	**46.5**	17.6	2.1	11.1	5.4	0.3	10.0	-	-	-	-
Estonia	**49.8**	-	-	-	-	-	7.1	16.6	-	-	26.0
Finland	**17.9**	-	0.1	0.6	0.6	0.1	0.3	9.0	3.2	0.005	4.0
Germany	**29.0**	1.2	0.1	0.4	4.3	10.2	6.8	6.1	-	-	-
Latvia	**64.7**	-	-	1.2	7.3	0.4	55.8	-	-	-	-
Lithuania	**8.6**	-	-	-	8.6	-	-	-	-	-	-
Poland	**71.4**	-	2.0	23.5	45.6	0.2	0.1	-	-	-	-
Russia	**29.7**	-	-	-	29.7	-	-	-	-	-	0.1
Sweden	**87.8**	-	0.7	11.1	10.3	25.1	24.5	16.2	-	-	-
Total	**405.2**	**18.8**	**5.0**	**47.9**	**111.7**	**36.2**	**104.5**	**47.9**	**3.2**	**0.005**	**30.2**

Year: 2006

Country	Total	22	24	25	26	27	28	29	30	31	32
Denmark	**42.1**	19.4	1.7	6.9	9.9	0.3	2.6	1.2	-	-	-
Estonia	**46.8**	-	-	0.1	-	0.3	5.5	19.2	-	-	21.6
Finland	**19.0**	-	0.2	0.5	1.1	1.9	2.0	6.8	3.5	0.007	3.0
Germany	**30.8**	1.2	0.01	1.3	8.2	12.0	4.6	3.4	-	-	-
Latvia	**54.6**	-	-	1.1	6.0	-	47.5	-	-	-	-
Lithuania	**7.5**	-	-	-	7.5	-	-	-	-	-	-
Poland	**54.3**	-	0.8	16.7	36.8	-	-	-	-	-	-
Russia	**28.2**	-	-	-	27.9	-	-	-	-	-	0.3
Sweden	**68.7**	0.0	0.7	4.6	25.3	13.7	16.6	7.6	0.0	0.0	0.2
Total	**352.1**	**20.5**	**3.4**	**31.3**	**122.8**	**28.3**	**78.9**	**38.3**	**3.5**	**0.007**	**25.1**

Year: 2007

Country	Total	22	24	25	26	27	28	29	30	31	32
Denmark	**37.6**	9.6	0.7	6.4	17.0	-	3.0	0.8	-	-	-
Estonia	**51.0**	-	-	2.2	0.8	0.1	4.3	15.3	-	-	28.3
Finland	**24.6**	0.0	0.0	1.9	4.2	0.3	2.6	4.5	7.2	0.002	3.8
Germany	**30.8**	0.8	0.46	1.8	12.2	5.8	4.8	4.9	-	-	-
Latvia	**60.5**	-	-	5.1	7.4	1.4	46.5	-	-	-	-
Lithuania	**20.3**	-	-	1.7	11.8	-	3.6	3.2	-	-	-
Poland	**58.7**	-	0.8	21.4	36.4	0.04	0.06	-	-	-	-
Russia	**24.8**	-	-	-	24.8	-	-	-	-	-	-
Sweden	**80.7**	-	1.8	10.0	30.8	11.0	14.9	11.9	0.1	-	0.2
Total	**388.9**	**10.4**	**3.8**	**50.5**	**145.4**	**18.7**	**79.8**	**40.6**	**7.3**	**0.002**	**32.4**

Year: 2008

Country	Total	22	24	25	26	27	28	29	30	31	32
Denmark	**45.9**	5.6	1.0	5.6	4.0	7.1	13.2	0.3	-	-	9.2
Estonia	**48.6**	-	-	0.3	0.0	-	5.3	15.6	-	-	27.3
Finland	**24.3**	-	-	2.1	2.1	0.2	2.3	8.6	5.2	0.0002	3.8
Germany	**30.4**	1.3	0.07	1.8	6.0	4.0	13.7	3.6	-	-	-
Latvia	**57.2**	-	-	2.1	6.3	0.2	48.6	0.005	-	-	-
Lithuania	**18.7**	-	0.01	5.5	6.0	0.7	4.6	1.8	-	-	-
Poland	**53.3**	-	3.9	25.4	23.8	0.02	0.15	-	-	-	-
Russia	**21.0**	-	-	-	21.0	-	-	-	-	-	-
Sweden	**81.1**	-	2.0	13.3	13.2	9.1	27.4	15.4	0.00005	-	0.7
Total	**380.5**	**6.9**	**7.1**	**56.0**	**82.4**	**21.4**	**115.2**	**45.3**	**5.2**	**0.0002**	**41.0**

Table 8.4.8.3 continued

Year: 2009

Country	Total	22	23	24	25	26	27	28	29	30	31	32
Denmark	**59.7**	3.8	0.5	0.7	9.7	14.3	0.3	22.1	8.3	-	-	-
Estonia	**47.3**	-	-	-	0.6	-	-	2.5	13.7	-	-	30.5
Finland	**23.1**	-	-	-	0.0	2.7	0.3	2.9	7.7	4.4	0.0001	5.2
Germany	**26.3**	1.4	-	0.24	1.9	3.7	6.2	9.0	4.0	-	-	-
Latvia	**49.5**	-	-	0.0	6.0	5.0	0.5	38.0	0.008	-	-	-
Lithuania	**18.8**	-	-	0.45	3.3	6.4	0.5	7.2	0.9	-	-	-
Poland	**81.9**	-	0.3	2.1	25.4	33.9	6.60	8.40	5.2	-	-	-
Russia	**25.2**	-	-	-	-	25.2	-	-	-	-	-	-
Sweden	**75.3**	-	-	2.4	7.9	13.5	10.5	28.2	12.6	0.0014	-	0.2
Total	**407.1**	**5.2**	**0.9**	**5.9**	**54.8**	**104.6**	**24.9**	**118.3**	**52.3**	**4.4**	**0.0001**	**35.9**

Year: 2010

Country	Total	22	23	24	25	26	27	28	29	30	31	32
Denmark	**43.6**	8.0	-	0.7	5.2	12.3	2.4	9.6	5.3	-	-	-
Estonia	**47.9**	-	-	-	-	-	-	2.6	16.9	-	-	28.3
Finland	**24.4**	-	-	-	-	1.9	0.3	5.3	6.8	3.3	0.002	6.9
Germany	**17.8**	1.8	-	0.05	1.3	4.7	2.8	4.5	2.7	-	-	-
Latvia	**45.9**	-	-	-	5.2	5.0	-	35.7	-	-	-	-
Lithuania	**9.2**	-	-	-	0.03	4.6	-	4.6	-	-	-	-
Poland	**56.7**	-	0.02	0.1	14.3	32.8	6.1	2.9	0.6	-	-	-
Russia	**25.6**	-	-	-	-	25.6	-	-	-	-	-	-
Sweden	**70.4**	-	-	1.6	5.3	8.8	22.5	19.9	12.2	0.003	-	-
Total	**341.5**	**9.8**	**0.02**	**2.5**	**31.2**	**95.7**	**34.1**	**85.0**	**44.5**	**3.3**	**0.002**	**35.2**

Year: 2011

Country	Total	22	23	24	25	26	27	28	29	30	31	32
Denmark	**31.4**	7.1	-	0.4	2.4	4.0	0.1	8.9	8.1	-	-	0.3
Estonia	**35.0**	-	-	-	0.2	0.2	0.042	2.5	11.9	-	-	20.2
Finland	**15.8**	-	-	-	-	0.6	0.3	1.2	4.5	3.5	-	5.7
Germany	**11.5***	1.2	-	0.061	0.4	2.8	0.011	3.8	3.3	-	-	-
Latvia	**33.1**	-	-	0.003	2.1	4.2	0.1	26.6	-	-	-	-
Lithuania	**9.9**	-	-	0.021	1.8	5.8	0.053	1.7	0.6	-	-	-
Poland	**55.3**	-	-	0.7	9.5	38.0	0.2	6.0	1.0	-	-	-
Russia	**19.5**	-	-	-	-	19.5	-	-	-	-	-	-
Sweden	**56.2**	-	-	1.2	5.9	8.9	11.0	15.4	11.9	0.077	-	1.8
Total	**267.6**	**8.3**	**0.00**	**2.4**	**22.3**	**83.8**	**11.8**	**66.1**	**41.2**	**3.6**	**0.000**	**28.0**

*The landing value of 7.7 kt, which was used in the final assessment, was corrected after the assessment meeting.

Table 8.4.8.4 Sprat in Subdivisions 22–32 (Baltic Sea). Summary of the assessment.

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3–5
1974	83816000	1106000	242000	0.3140
1975	37663000	820000	201000	0.3523
1976	201070000	636000	195000	0.3588
1977	40979000	916000	181000	0.3278
1978	16778000	643000	132000	0.3188
1979	33913000	388000	77000	0.2407
1980	22657000	251000	58000	0.2668
1981	66951000	223000	49000	0.1551
1982	42748000	282000	49000	0.2554
1983	153429000	423000	37000	0.1224
1984	54684000	594000	53000	0.1727
1985	41317000	553000	70000	0.1738
1986	15351000	506000	76000	0.2225
1987	34276000	420000	88000	0.2826
1988	13738000	380000	80000	0.2499
1989	40580000	404000	86000	0.2233
1990	49467000	538000	86000	0.1410
1991	53405000	741000	103000	0.1787
1992	90834000	986000	142000	0.2063
1993	87483000	1275000	178000	0.1653
1994	62302000	1323000	289000	0.2671
1995	245321000	1394000	313000	0.3485
1996	159806000	1772000	441000	0.3017
1997	54861000	1747000	529000	0.4119
1998	170889000	1308000	471000	0.4108
1999	52482000	1330000	421000	0.3935
2000	102519000	1256000	389000	0.3311
2001	48171000	1137000	342000	0.3070
2002	53488000	903000	343000	0.3972
2003	108657000	760000	308000	0.4269
2004	212273000	964000	374000	0.5057
2005	42534000	1177000	405000	0.4733
2006	74805000	983000	352000	0.4019
2007	108969000	892000	388000	0.3755
2008	70507000	996000	381000	0.3856
2009	184832000	949000	407000	0.4528
2010	42094000	1061000	342000	0.3368
2011	74977000	809000	264000*	0.2876
2012	97951000**	770000***		
Average	80732744	861949	235316	0.3038

* Total landings in 2011 were 267 600 tonnes.
** Output from recruitment prediction model (RCT3) using acoustic survey.
*** Predicted estimate.