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

Advice for 2015

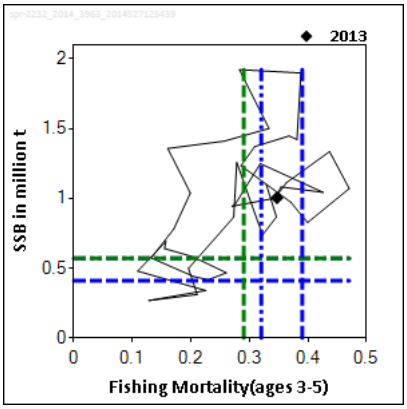
ICES advises on the basis of the MSY approach that catches in 2015 should be no more than 222 kt.

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})	✓	✓	✗	Above target
Precautionary approach (F_{pa},F_{lim})	✓	✓	o	Increased risk

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



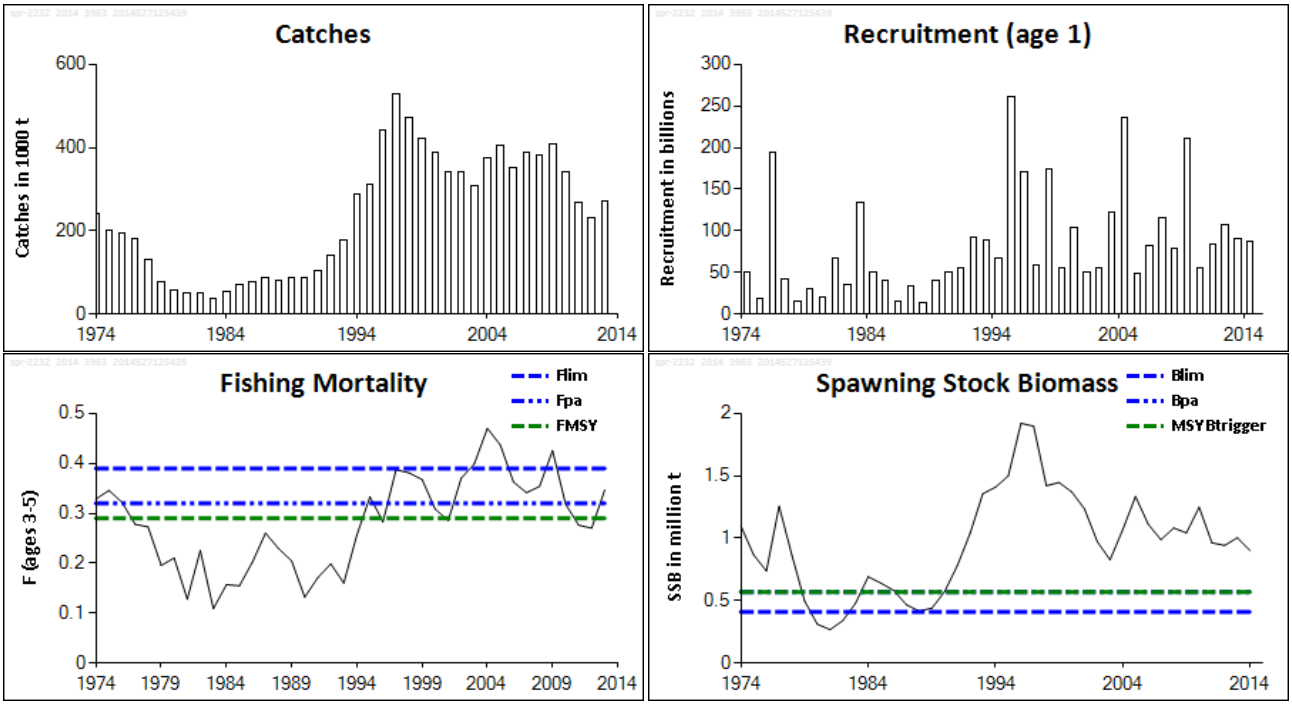


Figure 8.3.18.1 Sprat in Subdivisions 22–32 (Baltic Sea). Summary of stock assessment. Top right: SSB and F over the years. SSB at spawning time in 2014 is predicted.

SSB has declined from a historical high in the late 1990s, and since 2002 has fluctuated around 1 million tonnes and remained above the MSY $B_{trigger}$. The fishing mortality in 2013 is above both F_{MSY} and F_{pa}. None of the recent four year classes (2009–2012) are strong and the 2013 year class is estimated to be average.

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 favourable 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

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 fisheries

Catches are usually lower than the TAC, except in 2013 when the EU TAC was taken. Discarding of herring and sprat in the Baltic has been prohibited in the EU fisheries since 2010.

Catch distribution	Total catch (2013): 272 kt, where all are landed (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 fishing mortality. An ongoing collection of cod stomach contents data will improve the data basis for estimating natural mortality. Data is expected to be ready for the assessment in 2015.

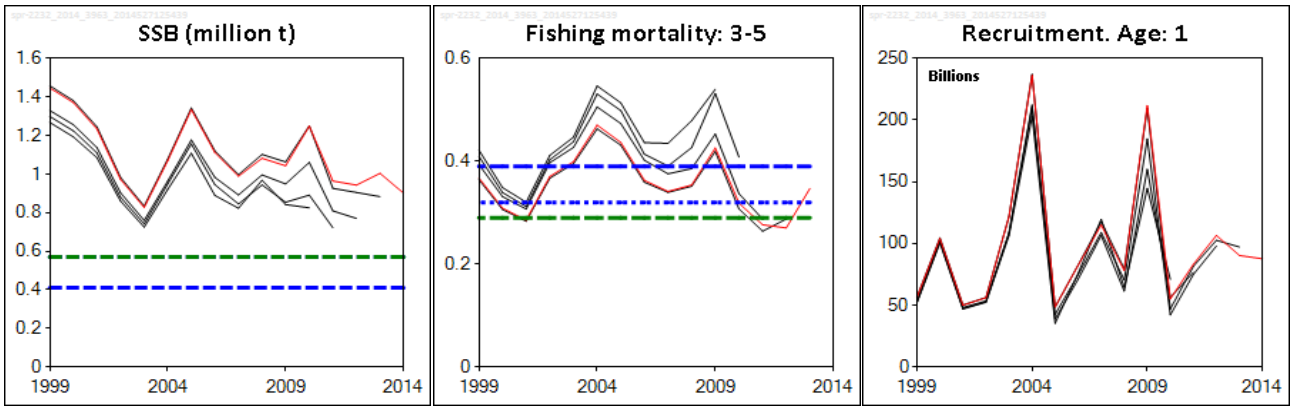


Figure 8.3.18.2 Sprat in Subdivisions 22–32 (Baltic Sea). Historical assessment results (final-year recruitment estimates included). The stock was benchmarked in 2013.

Scientific basis

Stock data category	1. (ICES, 2014a)
Assessment type	Age-based analytical assessment (XSA).
Input data	Commercial catches (international landings, ages and length frequencies from catch sampling); two acoustic surveys (BASS; BIAS); natural mortalities from multispecies model (SMS).
Discards and bycatch	Not included, considered negligible.
Indicators	None.
Other information	The latest benchmark was performed in 2013 (WKBALT; ICES, 2013a).
Working group	Baltic Fisheries Assessment Working Group (WGBFAS)

ECOREGION Baltic Sea
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Reference points

	Type	*Value*	*Technical basis*
MSY approach	MSY $B_{trigger}$	570 000 t	Assumed at B_{pa}.
	F_{MSY}	0.29	Stochastic single-species simulations, including S–R relationship.
	Multispecies F_{MSY}	0.25–0.32*	0.25–0.35 constrained to F_{pa}. Multispecies model SMS. One of several options giving a high sustainable yield of sprat, as well as of herring and cod due to low to moderate predation from cod.
Precautionary approach	B_{lim}	410 000 t	S–R relationship (biomass which produces half of maximal recruitment in a Beverton–Holt model).
	B_{pa}	570 000 t	$B_{lim} \times 1.4$.
	F_{lim}	0.39	Consistent with B_{lim}.
	F_{pa}	0.32	Consistent with B_{pa}.

(Last changed in: 2013)
*ICES does not advise fishing mortalities higher than F_{pa} due to precautionary considerations.

Outlook for 2015

Basis: F (2014) = F (2011–2013 scaled) = 0.35; SSB (2014) = 901; Recruitment age 1 (2014) = 87.6 billion, RCT3; Recruitment age 1 (2015–2016) = 93.6 (GM 1991–2013); Catches (2014) = Landings (2014) = 270; Discards (2014) = negligible.

Rationale	**Catch 2015**	**Basis**	**F (Catch) 2015**	**SSB 2015**	**SSB 2016**	**%SSB change[1)]**	**%TAC change[2)]**
MSY approach	222	F_{MSY}	0.29	859	877	+2%	−17%
Precautionary approach	242	F_{pa}	0.32	851	854	0%	−10%
Zero catch	0	0	0.00	943	1133	+20%	−100%
Other options	189	$0.7 \times F_{2014}$	0.24	872	913	+5%	−29%
	213	$0.8 \times F_{2014}$	0.28	863	886	+3%	−20%
	237	$0.9 \times F_{2014}$	0.31	853	860	+1%	−12%
	227	−15% TAC ($0.86 \times F_{2014}$)	0.30	857	871	+2%	−15%
	260	F_{2014}	0.35	844	835	−1%	−3%
	194	Lower limit multispecies F_{MSY}	0.25	870	907	+4%	−27%
	242	Upper limit multispecies F_{MSY}	0.32	851	854	0%	−10%
	268	0% TAC ($1.15 \times F_{2014}$)	0.36	841	826	−2%	0%
	308	+15% TAC ($1.22 \times F_{2014}$)	0.42	825	783	−5%	+15%

Weights in thousand tonnes.
[1)] SSB 2016 relative to SSB 2015.
[2)] Catches 2015 relative to TAC 2014 (EU and Russia, 240 + 27.9 = 267.9 kt).

MSY approach

Following the ICES MSY approach implies fishing mortality to be reduced to 0.29, which implies catches of no more than 222 kt in 2015. This is expected to lead to an SSB of 877 kt in 2016.

Precautionary approach

The fishing mortality in 2015 should be no more than F_{pa} = 0.32, which implies catches of no more than 242 kt. This is expected to keep SSB above B_{pa} in 2016.

Multispecies considerations

Sprat multispecies F_{MSY} as a single point target does not exist in a multispecies context, as the natural mortality of sprat depends on the population size of the other species in the Baltic. Long-term yield of sprat (estimated from the SMS model) is more linked to the population size of its predator cod than F on sprat itself. The multispecies F_{MSY} values for sprat (0.25–0.32) used in the outlook table give the highest long-term yield, given a long term average biomass of cod associated with fishing mortality on cod that is 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} is within the range of 0.25–0.32, which would give catches in 2015 within the range of 194–242 kt and SSB in 2016 within the range of 854–907 kt.

Additional considerations

Advice considerations

ICES recommends that a spatial management plan is developed for the clupeid stocks. The abundance of cod in Subdivisions 25–26 is high compared to other areas in the Baltic and cod growth is considered to be limited due to food availability. Sprat and herring are important food items for cod, but the present high biomass of the two prey stocks is mainly distributed outside the distribution area for cod. Any fishery on the two prey species in the main cod distribution area will potentially decrease the local prey density, which may lead to increased food deprivation for cod. The relative catch proportion of sprat in the main cod distribution area has since 2010 increased from 37% of the total catch to 47% in 2013. This increase in fishing pressure may exacerbate the food condition for cod as the availability decreases. Restrictions on sprat catches taken in the main cod area (Subdivisions 25–26) should be established.

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. 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 (Figure 8.3.18.4).

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.

The future catch opportunities will very much depend on the strength of the 2013–2014 year classes. 16% of the predicted yield for 2015 and 51% of the 2016 SSB result from the assumption of average recruitment (1991–2012) 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.

Factors affecting the fisheries and the stock

The mean weights-at-age for this stock decreased by about 40% in 1992–1998 (Figure 8.3.18.5), after which the weights fluctuated without clear trend. High stock size resulted in a marked decline in sprat mean weights (density-dependent effects). The decrease in weights-at-age has been more pronounced in the northern areas (Subdivisions 27–29 and 32; Figure 8.3.18.6) where the majority of the sprat stock has been concentrated since the mid-1990s and where cod decreased the most (Figure 8.3.18.7; Casini *et al.*, 2011).

Regulations and their effects

The mesh size (minimum of 16 mm) and TAC are the main regulatory measures adopted for the Baltic sprat fishery.

The regulation allows 45% herring in the sprat catch for Subdivisions 22–27.

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.

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 2013 year class used in the predictions is derived from an acoustic survey. Average recruitment is used to estimate subsequent years' recruitment.

Uncertainties in the assessment and forecast

The historical performance of the assessment (Figure 8.3.18.2) 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 are now consistently based on area-corrected estimates.

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.

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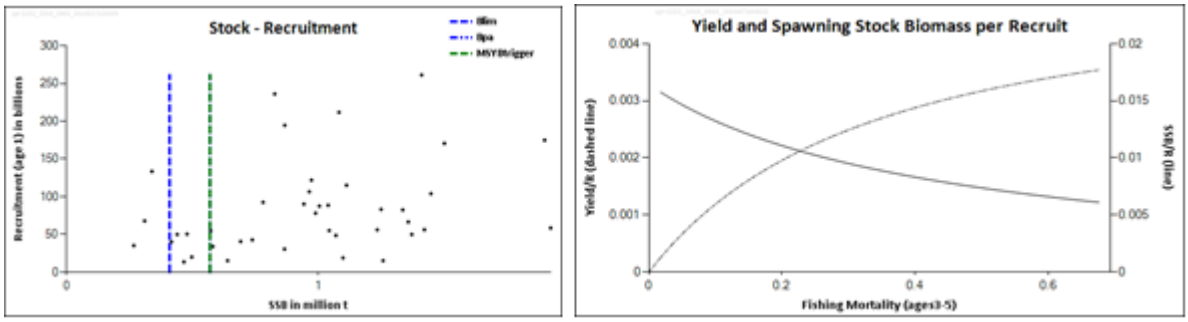

Figure 8.3.18.3 Sprat in Subdivisions 22–32 (Baltic Sea). Stock–recruitment plot (left panel) and yield-per-recruit analysis (right panel).

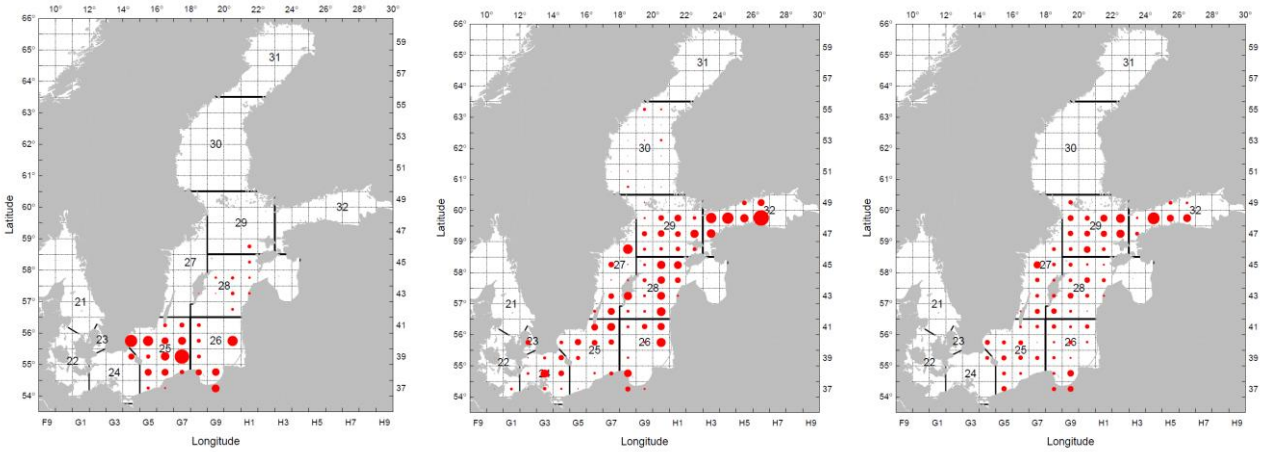

Figure 8.3.18.4 Sprat in Subdivisions 22–32 (Baltic Sea). Distribution of eastern Baltic Sea cod from the bottom trawl survey (BITS) in the 4th quarter 2013 (left panel); Baltic sprat from the acoustic survey (BIAS) in the 4th quarter 2013 (middle panel); herring in Subdivisions 25 to 29 and 32, excluding the Gulf of Riga, from the BIAS survey (BIAS) in the 4th quarter 2013 (right panel).

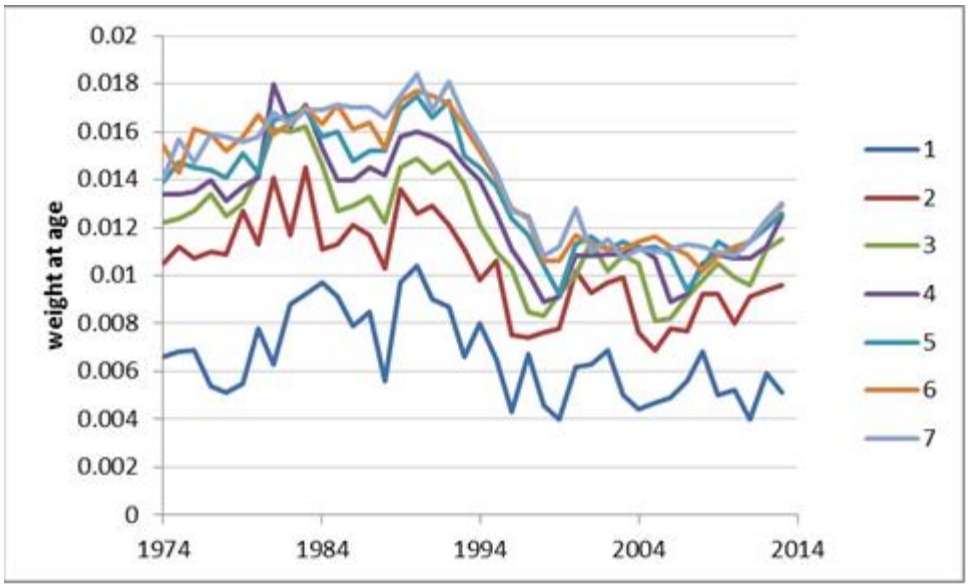

Figure 8.3.18.5 Sprat in Subdivisions 22–32 (Baltic Sea). Mean weight-at-age in the catch (age 1 to age 7).

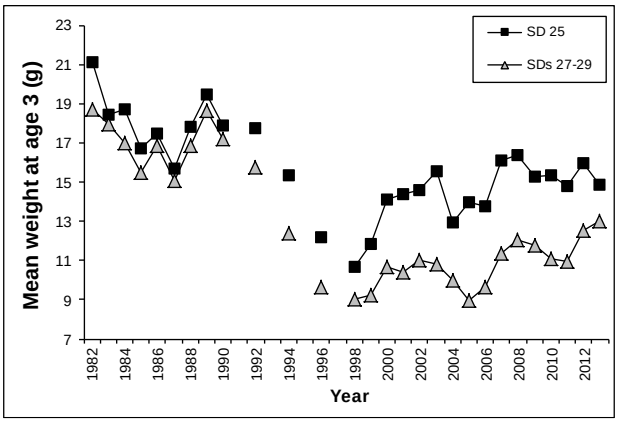

Figure 8.3.18.6 Sprat in Subdivisions 22–32 (Baltic Sea). Trends of sprat mean weight-at-age 3 in the southern (Subdivision 25) and northern (Subdivisions 27–29) Baltic Sea, from Swedish acoustic surveys in the 4th quarter.

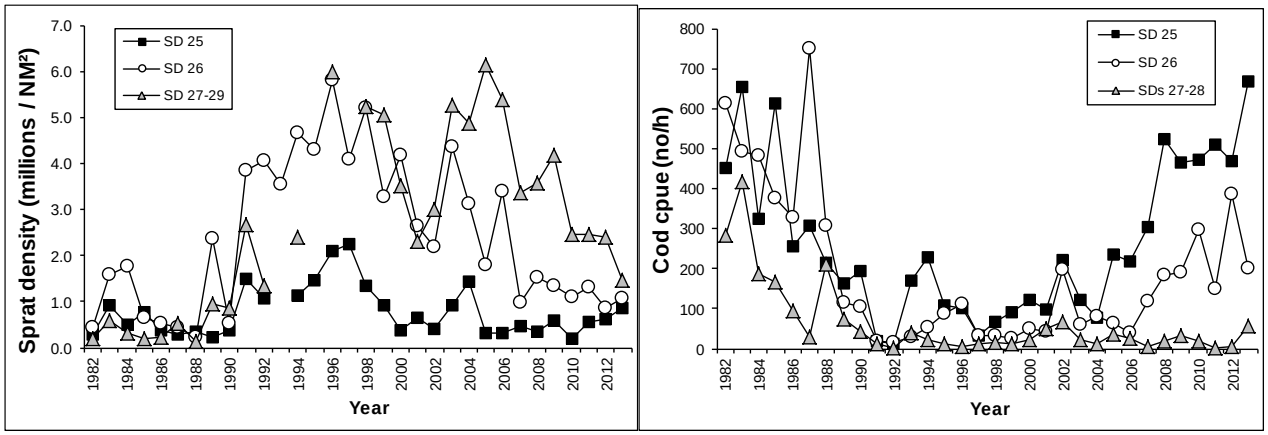

Figure 8.3.18.7 Sprat in Subdivisions 22–32 (Baltic Sea). Trends of average sprat density (left panel) and cod cpue (right panel) in the southern (Subdivision 25 and 26) and northern (Subdivisions 27–28) Baltic Sea, from the acoustic (BIAS) and bottom trawl (BITS) surveys. Subdivision 29 is not well covered by the BITS survey and therefore was excluded from the estimate of cod cpue.

Table 8.3.18.1 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*	231
2013	F< F_{msy}	< 278	250*	272
2014	MSY approach	< 247	240*	
2015	MSY approach	< 222		

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

Table 8.3.18.2 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	11.4	33.4	9.9	55.3	19.5	56.2	267.9
2012***	11.4	27.7	9.0	11.3	30.7	11.3	62.1	25.0	46.5	235.0
2013	25.6	29.8	11.1	10.3	33.3	10.4	79.7	22.6	49.7	272.4

* Sum of landings by Estonia, Latvia, Lithuania, and Russia.

** German and Latvian total landings 2011 were corrected before the EG meeting.

***German total landings 2012 were corrected before the EG meeting.

Table 8.3.18.3 Sprat in Subdivisions 22–32 (Baltic Sea). Landings by country and subdivision (thousand tonnes).

Year 2001

Country	Total	22	24	25	26	27	28	29	30	31	32
Denmark	**39.7**	-	-	39.7	-	-	-	-	-	-	-
Estonia	**37.5**	-	-	-	-	-	6.3	16.1	-	-	15.1
Finland	**15.4**	-	-	-	-	-	-	4.5	3.2	0.001	7.6
Germany	**0.8**	0.02	0.8	-	-	-	-	-	-	-	-
Latvia	**42.8**	-	-	1.1	7	-	34.7	-	-	-	-
Lithuania	**3**	-	-	-	3	-	-	-	-	-	-
Poland	**85.8**	-	0.4	46.3	39.1	-	-	-	-	-	-
Russia	**32**	-	-	-	29.6	-	2.3	-	-	-	-
Sweden	**85.4**	-	1	2.9	4.8	27.8	30.2	18.1	-	-	0.5
Total	**342.2**	**0.02**	**2.1**	**90**	**83.5**	**27.8**	**73.5**	**38.7**	**3.2**	**0.001**	**23.2**

Year 2002

Country	Total	22	24	25	26	27	28	29	30	31	32
Denmark	**42.0**	4.7	1.0	22.5	7.7	0.7	4.6	0.9	-	-	-
Estonia	**41.3**	-	-	-	-	-	7.7	17.0	-	-	16.6
Finland	**17.2**	-	0.8	2.3	0.004	0.1	0.001	3.7	4.8	-	5.5
Germany	**1.0**	0.03	-	0.1	0.4	0.1	0.1	0.2	-	-	-
Latvia	**47.5**	-	-	1.4	4.5	-	41.7	0.0	-	-	-
Lithuania	**2.8**	-	-	0.0	2.8	-	-	-	-	-	-
Poland	**81.2**	-	0.04	39.7	41.5	-	-	-	-	-	-
Russia	**32.9**	-	-	-	29.9	-	2.9	-	-	-	-
Sweden	**77.3**	-	3.0	13.3	5.6	27.2	19.9	8.3	-	-	-
Total	**343.2**	**4.8**	**4.8**	**79.3**	**92.4**	**28.1**	**76.8**	**30.1**	**4.8**	**0.0**	**22.1**

Year 2003

Country	Total	22	24	25	26	27	28	29	30	31	32
Denmark	**32.0**	8.2	0.7	10.4	8.9	1.8	1.7	0.3	-	-	-
Estonia	**29.2**	-	-	-	-	-	11.1	11.6	-	-	6.5
Finland	**9.0**	-	0.03	0.4	0.04	0.2	0.1	4.6	1.5	0.001	2.0
Germany	**18.0**	0.2	0.5	0.8	3.0	9.5	2.8	1.1	-	-	-
Latvia	**41.7**	-	-	0.8	7.8	-	33.2	-	-	-	-
Lithuania	**2.2**	-	-	-	2.2	-	-	-	-	-	-
Poland	**84.1**	-	0.03	26.7	57.4	-	-	-	-	-	-
Russia	**28.7**	-	-	0.0	27.2	-	1.4	-	-	-	-
Sweden	**63.4**	-	2.1	5.5	8.6	24.1	19.3	3.8	-	-	-
Total	**308.3**	**8.3**	**3.5**	**44.6**	**115.1**	**35.6**	**69.6**	**21.5**	**1.5**	**0.001**	**8.5**

Year 2004

Country	Total	22	24	25	26	27	28	29	30	31	32
Denmark	**44.3**	16.0	5.5	16.8	0.5	0.5	3.9	1.1	-	-	-
Estonia	**30.2**	-	-	-	-	-	8.9	10.1	-	-	11.1
Finland	**16.6**	-	0.5	2.5	0.003	0.1	0.03	9.3	3.0	0.003	1.1
Germany	**28.5**	0.8	0.9	1.4	6.0	8.2	6.8	4.4	-	-	-
Latvia	**52.4**	-	-	2.3	7.5	0.2	42.4	0.0	-	-	-
Lithuania	**1.6**	-	-	-	1.6	-	-	-	-	-	-
Poland	**96.7**	-	1.4	33.6	61.6	0.04	0.02	-	-	-	-
Russia	**25.1**	-	-	-	23.9	-	1.2	-	-	-	-
Sweden	**78.3**	-	1.4	9.2	7.6	25.8	22.3	12.0	-	-	-
Total	**373.7**	**16.8**	**9.7**	**65.8**	**108.8**	**34.8**	**85.6**	**36.9**	**3.0**	**0.003**	**12.2**

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**

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		0.426	2.4	4.0	0.13	8.9	8.1			0.3
Estonia	**35.0**				0.2	0.2	0.04	2.5	11.9			20.2
Finland	**15.8**					0.6	0.27	1.2	4.5	3.49		5.7
Germany*	**11.4**	1.2		0.061	0.4	2.8	0.01	3.8	3.3			
Latvia*	**33.4**			0.003	2.5	4.2	0.12	26.6				
Lithuania	**9.9**			0.021	1.8	5.8	0.05	1.7	0.6			
Poland	**55.3**			0.689	9.5	38.0	0.16	6.0	1.0			
Russia	**19.5**					19.5						
Sweden	**56.2**			1.190	5.9	8.9	11.02	15.4	11.9	0.08		1.8
Total	**267.9**	**8.3**	**0.00**	**2.4**	**22.7**	**83.8**	**11.8**	**66.1**	**41.2**	**3.6**	**0.000**	**28.0**

*German and Latvian total landings 2011 were corrected before the EG meeting.

Year 2012

Country	Total	22	23	24	25	26	27	28	29	30	31	32
Denmark	**11.4**	4.73	0.00	0.23	2.5	1.4	0.13	-	2.45	-	-	-
Estonia	**27.7**	-	-	-	-	-	-	2.19	10.16	-	-	15.3
Finland	**9.0**	-	-	-	-	-	-	-	2.34	2.45	0.02	4.1
Germany*	**11.3**	0.92		0.06	2.0	2.2	0.09	4.10	1.93	-	-	-
Latvia	**30.7**	-	-	-	0.1	4.7	-	25.85	0.01	-	-	-
Lithuania	**11.3**	-	-	-	2.8	6.6	-	2.00	-	-	-	-
Poland	**62.1**	-	-	3.56	24.3	30.5	0.08	2.55	1.16	-	-	-
Russia	**25.0**	-	-	-	-	25.0	-	-	-	-	-	-
Sweden	**46.5**	-	-	0.59	7.7	2.7	5.30	19.31	10.62	0.04	-	0.3
Total	**235.0**	**5.7**	**0.00**	**4.4**	**39.3**	**73.0**	**5.6**	**56.0**	**28.7**	**2.5**	**0.022**	**19.8**

*German total landings 2012 were corrected before the EG meeting.

Year 2013

Country	Total	22	23	24	25	26	27	28	29	30	31	32
Denmark	**25.6**	7.10		0.36	3.31	2.2	0.7	3.4	8.4			
Estonia	**29.8**							1.8	11.7			16.2
Finland	**11.1**				0.08		0.1	0.2	4.1	2.86		3.7
Germany	**10.3**	0.59		0.17	1.30	2.6	0.9	1.4	3.4			
Latvia	**33.3**				0.12	4.2		28.6	0.4			
Lithuania	**10.4**				1.35	4.6		3.1	1.3			
Poland	**79.7**			0.96	19.13	53.4	1.6	2.6	2.1			
Russia	**22.6**					22.6						
Sweden	**49.7**			0.12	8.25	4.4	10.9	8.8	16.5	0.12		0.5
Total	**272.4**	**7.7**	**0.00**	**1.6**	**33.5**	**94.0**	**14.2**	**50.0**	**47.9**	**3.0**	**0.000**	**20.5**

Table 8.3.18.4 Sprat in Subdivisions 22–32 (Baltic Sea). Summary of the assessment.

Year	Recruitment Age 1 thousands	SSB* tonnes	Catches tonnes	Landings tonnes	Mean F Ages 3–5
1974	50444000	1098000	242000	242000	0.329
1975	18936000	867000	201000	201000	0.346
1976	194551000	738000	195000	195000	0.322
1977	42738000	1257000	181000	181000	0.278
1978	15227000	866000	132000	132000	0.273
1979	30548000	498000	77000	77000	0.196
1980	20044000	311000	58000	58000	0.211
1981	67814000	268000	49000	49000	0.128
1982	35196000	340000	49000	49000	0.225
1983	133461000	479000	37000	37000	0.109
1984	50450000	692000	53000	53000	0.157
1985	40633000	640000	70000	70000	0.155
1986	15218000	582000	76000	76000	0.203
1987	34041000	467000	88000	88000	0.261
1988	13532000	417000	80000	80000	0.229
1989	40105000	440000	86000	86000	0.205
1990	49978000	573000	86000	86000	0.132
1991	54882000	781000	103000	103000	0.171
1992	92547000	1039000	142000	142000	0.199
1993	88571000	1357000	178000	178000	0.16
1994	66517000	1410000	289000	289000	0.257
1995	261192000	1500000	313000	313000	0.333
1996	170570000	1922000	441000	441000	0.283
1997	58490000	1898000	529000	529000	0.388
1998	174919000	1421000	471000	471000	0.381
1999	56195000	1447000	421000	421000	0.368
2000	104004000	1371000	389000	389000	0.309
2001	49986000	1234000	342000	342000	0.285
2002	56046000	973000	343000	343000	0.37
2003	121885000	827000	308000	308000	0.399
2004	236133000	1070000	374000	374000	0.47
2005	48541000	1335000	405000	405000	0.437

Table 8.3.18.4 (cont.) Sprat in Subdivisions 22–32 (Baltic Sea). Summary of the assessment.

Year	Recruitment Age 1 thousands	SSB* tonnes	Catches tonnes	Landings tonnes	Mean F Ages 3–5
2006	82458000	1112000	352000	352000	0.363
2007	115067000	989000	388000	388000	0.341
2008	78099000	1082000	381000	381000	0.354
2009	211748000	1043000	407000	407000	0.426
2010	55135000	1249000	342000	342000	0.318
2011	83142000	964000	268000	268000	0.276
2012	106574000	943000	231000	231000	0.27
2013	90234000	1004000	272000	272000	0.347
2014	87600000**	901000***			
Average	83011000	961098	236225	236225	0.282

* At spawning time.
** Output from recruitment prediction model (RCT3) using acoustic survey.
*** Predicted value.