Sprat (*Sprattus sprattus*) in subdivisions 22–32 (Baltic Sea)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for the Baltic Sea is applied, catches in 2023 that correspond to the F ranges in the plan are between 183 749 tonnes and 317 905 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (249 237 tonnes) can only be taken under conditions specified in the plan, whilst the entire range is considered precautionary when applying ICES advice rule.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and between F_{pa} and F_{lim} and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

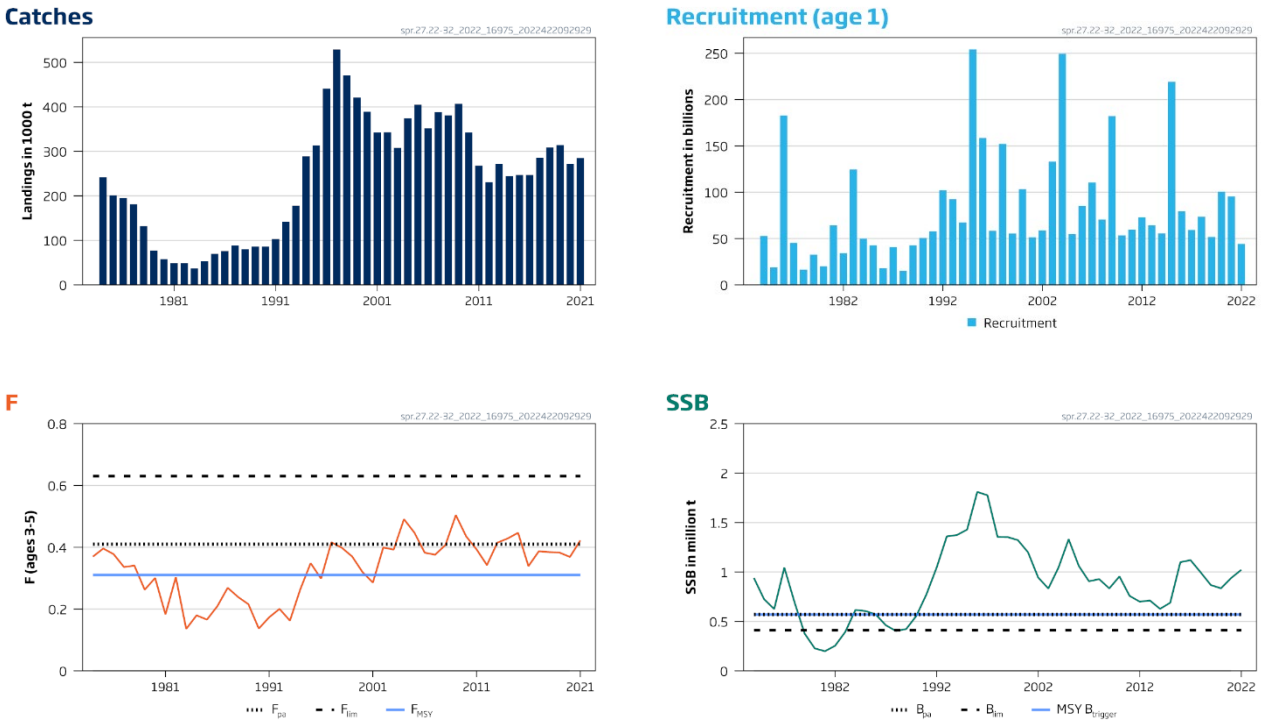

Figure 1 Sprat in subdivisions 22–32. Summary of the stock assessment. SSB at spawning time is predicted for 2022.

Catch scenarios

Table 1 Sprat in subdivisions 22–32. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 3–5}$ (2022)	0.38	F based on catch constraint
SSB (2022)	1 022 000	Predicted SSB at spawning time; tonnes
$R_{age\ 1}$ (2022)	4 421 3000	RCT3 estimate; thousands
$R_{age\ 1}$ (2023–2024)	8 747 2000	Geometric mean 1991–2021; thousands
Total catch (2022)	295 300	Catch constraint (295 300 t = EU quota of 251 900 t + Russian quota of 43 400 t); tonnes

Table 2 Sprat in subdivisions 22–32. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	F_{total} (2023)	SSB (2023)	SSB (2024)	% SSB change *	% TAC change **	% advice change ***
ICES advice basis							
EU MAP^^: F_{MSY}	249 237	0.31	907 905	986 716	8.7	-16	-15
EU MAP^^range F_{lower}	183 749	0.22	935 258	1 067 775	14	-38	-14^
EU MAP^^range F_{upper}	317 905	0.41	878 469	904 540	3.0	7.7	-15^
Other scenarios							
F_{MSY}	249 237	0.31	907 905	986 716	8.7	-16	-15
F = 0	0	0	1 006 000	1 306 000	30	-100	-100
$F = F_{pa}$	317 905	0.41	878 469	904 540	3.0	7.7	9.0
$F = F_{lim}$	452 071	0.63	816 965	753 170	-7.8	53	55
SSB (2024) = B_{lim}	801 586	1.47	623 172	410 000	-34	171	175
SSB (2024) = B_{pa}	630 357	1.01	723 893	570 000	-21	113	116
SSB (2024) = MSY $B_{trigger}$	630 357	1.01	723 893	570 000	-21	113	116
SSB (2024) = SSB (2023)	354 500	0.47	862 333	862 333	0	20	22
$F = F_{2022}$	284 943	0.36	892 853	943 758	5.7	-3.5	-2.3

* SSB_{2024} relative to SSB_{2023}.
** Catch in 2023 relative to the sum of autonomous quotas in 2022 (295 300 tonnes = EU quota of 251 900 tonnes + Russian quota of 43 400 tonnes).
*** Advice value this year relative to the advice value last year (291 745 tonnes).
^ Advice value this year relative to the advice value last year for the MAP range F_{lower} (214 000 tonnes) and MAP range F_{upper} (373 210 tonnes)
^^ MAP multiannual plan (EU, 2016, 2019).

The advised catches for 2023 have declined by 15% compared to those for 2022 mainly because of the low 2021 year class.

Basis of the advice

Table 3 Sprat in subdivisions 22–32. The basis of the advice.

Advice basis	EU Baltic multiannual plan
Management plan	This stock is shared between the EU and Russia. An EU multiannual plan (MAP) in place for stocks in the Baltic Sea includes sprat (EU, 2016, 2019). The advice, based on the F_{MSY} ranges used in the management plan, is considered precautionary. Russia does not have a management plan for this stock.

Quality of the assessment

This year's assessment is consistent with last year's. Species misreporting of sprat has occurred in the past, and there is evidence of sprat being misreported as herring and flounder in recent years. These effects have not been quantified or included in the assessment.

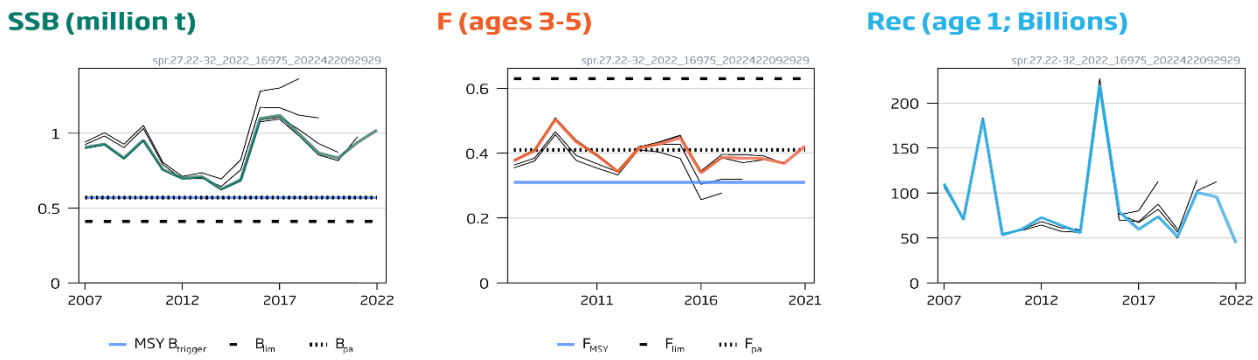

Figure 2 Sprat in subdivisions 22–32. Historical assessment results (final-year recruitment estimates predicted from the survey). The stock was interbenchmarked in 2020 with updated natural mortality data. The fishing mortality reference points were updated at the interbenchmark, and only assessment results from the last three years should be compared to the reference points indicated.

Issues relevant for the advice

Sprat is an important forage species for Baltic cod, and multispecies interactions should be considered when managing the sprat fishery (ICES, 2021a).

Reference points

Table 4 Sprat in subdivisions 22–32. Reference points, values, and their technical basis. Weights in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	570 000	B_{pa}	ICES (2020)
	F_{MSY}	0.31	Stochastic simulations with Beverton–Holt stock–recruitment model	ICES (2020)
Precautionary approach	B_{lim}	410 000	Stock–recruitment relationship (average of biomasses which produce half of the maximal recruitment in the Beverton–Holt and Ricker models)	ICES (2020)
	B_{pa}	570 000	$B_{lim} \times \exp(1.645 \times \sigma)$, where $\sigma = 0.2$	ICES (2020)
	F_{lim}	0.63	Consistent with B_{lim}	ICES (2020)
	F_{pa}	0.41	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2021b)
Management plan	MAP MSY $B_{trigger}$	570 000	MSY $B_{trigger}$	ICES (2020)
	MAP B_{lim}	410 000	B_{lim}	ICES (2020)
	MAP F_{MSY}	0.31	F_{MSY}	ICES (2020)
	MAP target range F_{lower}	0.22–0.31	Consistent with the ranges that result in a no more than 5% reduction in long-term yield compared with MSY	ICES (2020)
	MAP target range F_{upper}	0.31–0.41	Consistent with the ranges that result in a no more than 5% reduction in long-term yield compared with MSY	ICES (2020)

Basis of the assessment

Table 5 Sprat in subdivisions 22–32. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment, XSA (ICES, 2022b) that uses catches in the model and in the forecast
Input data	Commercial catches; two acoustic surveys (BASS [A7041], BIAS [A1588]); natural mortalities from multispecies model (SMS) until 2018, 2019 =2018 , 2020–2021 from regression with eastern Baltic cod biomass of individuals ≥ 20 cm, fixed maturity ogive
Discards and bycatch	Not included, considered negligible
Indicators	None
Other information	Interbenchmark in 2020 (ICES, 2020)
Working group	Baltic Fisheries Assessment Working Group (WGBFAS)

History of the advice, catch, and management

Table 6 Sprat in subdivisions 22–32. ICES advice, the agreed TAC, and ICES estimates of catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES catch
1987	Catch could be increased in subdivisions 22, 24, and 25. *Status quo* F for subdivisions 27 and 29–32		117 200	88 200
1988	Catch could be increased in subdivisions 22–25	-	117 200	80 300
1989	Catch could be increased for subdivisions 26 and 28. *Status quo* F for subdivisions 27 and 29–32	72 000	142 000	85 800
1990		72 000	150 000	85 600
1991	TAC	150 000	163 000	103 200
1992	*Status quo* F	143 000	290 000	142 100
1993	Increase in yield by increasing F	-	415 000	178 100
1994	Increase in yield by increasing F	-	700 000	288 800
1995	TAC	205 000	500 000	312 600
1996	Little gain in long-term yield at higher F	279 000	550 000	441 000
1997	No advice	-	550 000	529 400
1998	*Status quo* F	343 000	550 000	470 800
1999	Proposed F_{pa}	304 000	467 005	422 600
2000	Proposed F_{pa}	192 000	400 000	389 100
2001	Proposed F_{pa}	314 000	355 000	342 200
2002	Proposed F_{pa}	369 000	380 000	343 200
2003	Below proposed F_{pa} (TAC should be set on central Baltic herring considerations)	300 000	310 000	308 300
2004	Below proposed F_{pa} (TAC should be set on central Baltic herring considerations)	474 000	420 000	373 700
2005	TAC should be set on central Baltic herring considerations	< 614 000	550 000	405 200
2006	Agreed management plan	439 000	468 000	352 100

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES catch
2007	< F_{pa}	< 477 000	454 000*	388 900
2008	< F_{pa}	< 432 000	454 000*	380 500
2009	< F_{pa}	< 291 000	399 000*	407 100
2010	< F_{pa}	< 306 000	380 000*	341 500
2011	< F_{pa}	< 242 000	322 700**	267 900
2012	MSY transition scheme	< 242 000	255 100**	235 000
2013	F < F_{MSY}	< 278 000	278 000**	272 400
2014	MSY approach	< 247 000	267 900**	243 800
2015	MSY approach	< 222 000	240 200**	247 200
2016	MSY approach (F = 0.26)	≤ 205 000	243 000**	246 500
2017	MSY approach (F = 0.26)	≤ 314 000	303 593**	285 701
2018	MAP target F ranges: F_{lower} to F_{upper} (0.19–0.27), but F higher than F_{MSY} = 0.26 only under conditions specified in MAP	219 152–301 722, but catch higher than 291 715 only under conditions specified in MAP	304 900**	308 827
2019	MAP target F ranges: F_{lower} to F_{upper} (0.19–0.27), but F higher than F_{MSY} = 0.26 only under conditions specified in MAP	225 752–311 523, but catch higher than 301 125 only under conditions specified in MAP	313 100**	314 147
2020	MAP target F ranges: F_{lower} to F_{upper} (0.19–0.27), but F higher than F_{MSY} = 0.26 only under conditions specified in MAP	169 965–233 704, but catch higher than 225 786 only under conditions specified in MAP	256 700**	271 531
2021	Management plan	247 952 (range 181 567–316 833)	268 458**	284 890
2022	Management plan	291 745 (range 214 000– 373 210)	295 300***	
2023	Management plan	249 237 (range 183 749–317 905)		

* EU autonomous quota and doesn't include Russian catches.
** TAC is calculated as EU + Russian autonomous quotas.
*** TAC is calculated as EU quota + Russian autonomous quota of 43 400 tonnes.

History of the catch and landings

Table 7 Sprat in subdivisions 22–32. Catch distribution by fleet in 2021 as estimated by ICES.

Catch (2021)	Landings	Discards
284 890 tonnes	Most of the catch is taken by pelagic trawlers	Discarding is considered to be negligible
	284 890 tonnes	

Table 8 Sprat in subdivisions 22–32. History of ICES catches presented for each country participating in the fishery. All weights are in tonnes.

Year	Denmark	Estonia	Finland	German Dem. Rep.	German Fed. Rep.	Latvia	Lithuania	Poland	Russia	Sweden	USSR	Total
1977	7 200		6 700	17 200	800			38 800		400	109 700	180 800
1978	10 800		6 100	13 700	800			24 700		800	75 500	132 400
1979	5 500		7 100	4 000	700			12 400		2 200	45 100	77 100
1980	4 700		6 200	100	500			12 700		2 800	31 400	58 100
1981	8 400		6 000	100	600			8 900		1 600	23 900	49 300
1982	6 700		4 500	1 000	600			14 200		2 800	18 900	48 700
1983	6 200		3 400	2 700	600			7 100		3 600	13 700	37 300
1984	3 200		2 400	2 800	700			9 300		8 400	25 900	52 500
1985	4 100		3 000	2 000	900			18 500		7 100	34 000	69 500
1986	6 000		3 200	2 500	500			23 700		3 500	36 500	75 800
1987	2 600		2 800	1 300	1 100			32 000		3 500	44 900	88 200
1988	2 000		3 000	1 200	300			22 200		7 300	44 200	80 300
1989	5 200		2 800	1 200	600			18 600		3 500	54 000	85 800
1990	800		2 700	500	800			13 300		7 500	60 000	85 600
1991	10 000		1 600		700			22 500		8 700	597 00*	103 200
1992	24 300	4 100	1 800		600	17 400	3 300	28 300	8 100	54 200		142 100
1993	18 400	5 800	1 700		600	12 600	3 300	31 800	11 200	92 700		178 100
1994	60 600	9 600	1 900		300	20 100	2 300	41 200	17 600	135 200		288 800
1995	64 100	13 100	5 200		200	24 400	2 900	44 200	14 800	143 700		312 600
1996	109 100	21 100	17 400		200	34 200	10 200	72 400	18 200	158 200		441 000
1997	137 400	38 900	24 400		400	49 300	4 800	99 900	22 400	151 900		529 400
1998	91 800	32 300	25 700		4 600	44 900	4 500	55 100	20 900	191 100		470 800
1999	90 200	33 200	18 900		200	42 800	2 300	66 300	31 500	137 300		422 600
2000	51 500	39 400	20 200		0	46 200	1 700	79 200	30 400	120 600		389 100
2001	39 700	37 500	15 400		800	42 800	3 000	85 800	32 000	85 400		342 200
2002	42 000	41 300	17 200		1 000	47 500	2 800	81 200	32 900	77 300		343 200
2003	32 000	29 200	9 000		18 000	41 700	2 200	84 100	28 700	63 400		308 300
2004	44 300	30 200	16 600		28 500	52 400	1 600	96 700	25 100	78 300		373 700
2005	46 500	49 800	17 900		29 000	64 700	8 600	71 400	29 700	87 800		405 200
2006	42 100	46 800	19 000		30 800	54 600	7 500	54 300	28 200	68 700		352 100
2007	37 600	51 000	24 600		30 800	60 500	20 300	58 700	24 800	80 700		388 900
2008	45 900	48 600	24 300		30 400	57 200	18 700	53 300	21 000	81 100		380 500
2009	59 700	47 300	23 100		26 300	49 500	18 800	81 900	25 200	75 300		407 100
2010	43 600	47 900	24 400		17 800	45 900	9 200	56 700	25 600	70 400		341 500
2011	31 400	35 000	15 800		11 400	33 400	9 900	55 300	19 500	56 200		267 900
2012	11 400	27 700	9 000		11 300	30 700	11 300	62 100	25 000	46 500		235 000
2013	25 600	29 800	11 100		10 300	33 300	10 400	79 700	22 600	49 700		272 400
2014	26 600	28 500	11 700		10 200	30 800	9 600	56 900	23 400	46 000		243 800
2015	22 500	24 000	12 000		10 300	30 500	11 000	62 200	30 700	44 100		247 200
2016	19 100	23 700	16 900		10 900	28 100	11 600	59 300	34 600	42 400		246 500
2017	27 100	25 300	16 100		13 600	35 700	12 500	68 400	38 700	48 300		285 701
2018	24 590	29 341	16 430		15 213	37 099	16 250	79 395	41 374	49 135		308 827
2019	30 888	29 178	16 136		14 644	38 914	16 228	82 398	40 694	45 062		314 147
2020	26 447	24 270	12 498		8 929	28 893	11 164	72 539	45 716	41 071		271 531***
2021**	24 753	25 582	14 773		11 959	29 091	11 369	79 198	43 360	44 805		284 890***

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

** Preliminary

*** Possible misreporting of sprat as flounder from subdivisions 24 and 25 of about 2–3 kt not included.

Summary of the assessment

Table 9 Sprat in subdivisions 22–32. Assessment summary. Weights are in tonnes. Numbers in thousands.

Year	Recruitment age 1	SSB*	Catches	F ages 3–5
	thousands	Tonnes		
1974	52 788 000	940 000	242 000	0.37
1975	18 704 000	726 000	201 000	0.40
1976	182 883 000	625 000	195 000	0.38
1977	45 092 000	1 044 000	181 000	0.34
1978	16 404 000	695 000	132 000	0.34
1979	32 558 000	377 000	77 000	0.26
1980	20 055 000	227 000	58 000	0.30
1981	64 216 000	199 000	49 000	0.183
1982	34 160 000	254 000	49 000	0.30
1983	124 733 000	394 000	37 000	0.136
1984	49 916 000	616 000	53 000	0.180
1985	42 731 000	605 000	70 000	0.166
1986	18 170 000	570 000	76 000	0.21
1987	40 820 000	461 000	88 000	0.27
1988	15 299 000	403 000	80 000	0.24
1989	42 788 000	423 000	86 000	0.22
1990	50 562 000	556 000	86 000	0.137
1991	57 662 000	775 000	103 000	0.173
1992	101 915 000	1 045 000	142 000	0.20
1993	92 574 000	1 360 000	178 000	0.163
1994	67 362 000	1 374 000	289 000	0.26
1995	254 162 000	1 429 000	313 000	0.35
1996	158 602 000	1 810 000	441 000	0.30
1997	58 536 000	1 776 000	529 000	0.42
1998	152 162 000	1 354 000	471 000	0.40
1999	55 576 000	1 353 000	421 000	0.37
2000	103 359 000	1 322 000	389 000	0.32
2001	51 398 000	1 199 000	342 000	0.29
2002	58 822 000	944 000	343 000	0.40
2003	133 174 000	833 000	308 000	0.39
2004	249 547 000	1 045 000	374 000	0.49
2005	54 617 000	1 331 000	405 000	0.45
2006	85 250 000	1 061 000	352 000	0.38
2007	110 412 000	906 000	388 000	0.38
2008	70 590 000	928 000	381 000	0.41
2009	182 171 000	834 000	407 000	0.50
2010	53 347 000	955 000	342 000	0.44
2011	59 726 000	758 000	268 000	0.39
2012	72 774 000	700 000	231 000	0.34
2013	64 260 000	712 000	272 000	0.41
2014	55 679 000	627 000	244 000	0.43
2015	219 398 000	689 000	247 000	0.45
2016	79 387 000	1 099 000	247 000	0.34
2017	59 226 000	1 120 000	286 000	0.39
2018	73 710 000	996 000	309 000	0.38
2019	51 786 000	868 000	314 000	0.38
2020	100 551 000	835 000	272 000	0.37
2021	95 644 000	939 000	285 000	0.42
2022	44 213 000**	1 022 000***		

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

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Download the stock assessment data and figures.

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