

## 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 2022 that correspond to the F ranges in the plan are between 214 000 tonnes and 373 210 tonnes. According to the MAP, catches higher than those corresponding to  $F_{MSY}$  (291 745 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

ICES assesses that fishing pressure on the stock is above  $F_{MSY}$  but below  $F_{pa}$ , and  $F_{lim}$  and that spawning-stock size is above  $MSY B_{trigger}$ ,  $B_{pa}$ , and  $B_{lim}$ .

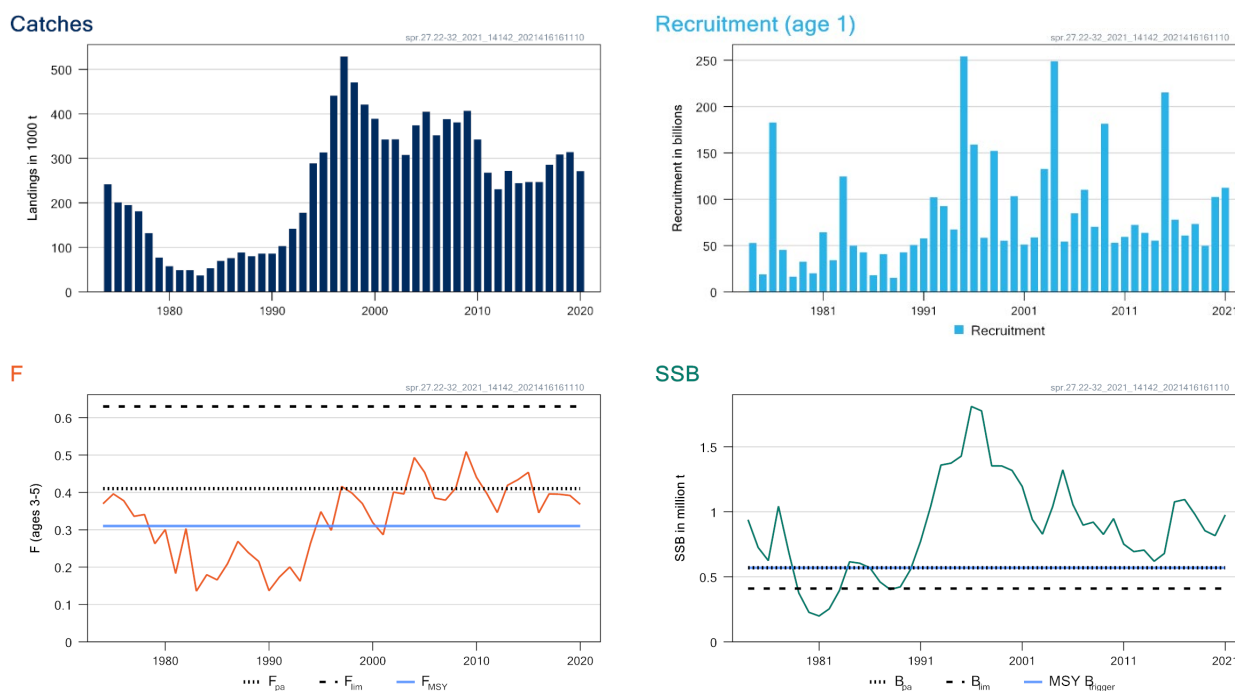


Figure 1 Sprat in subdivisions 22–32. Summary of the stock assessment. SSB at spawning time is predicted for 2021.

### Catch scenarios

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

Variable	Value	Notes
$F_{ages\ 3-5}$ (2021)	0.32	F based on catch constraint
SSB (2021)	977000	Predicted SSB at spawning time; tonnes
$R_{age\ 1}$ (2021)	112431000	RCT3 estimate; thousands
$R_{age\ 1}$ (2022–2023)	86919000	Geometric mean 1991–2020; thousands
Total catch (2021)	268458	Catch constraint (268 458 t = EU quota of 222 958 t + Russian quota of 45 500 t); tonnes

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

Basis	Total catch (2022)	F <sub>total</sub> (2022)	SSB (2022)	SSB (2023)	% SSB change *	% TAC change **	% Advice change ***
ICES advice basis							
EU MAP ^^: F <sub>MSY</sub>	291745	0.31	1160291	1185818	2.2	8.7	18
EU MAP ^^: F <sub>MSY lower</sub>	214000	0.22	1192000	1283571	7.7	-20	18^
EU MAP ^^: F <sub>MSY upper</sub>	373210	0.41	1126525	1086878	-3.5	39	18^
Other scenarios							
F <sub>MSY</sub>	291745	0.31	1160291	1185818	2.2	8.7	18
F = 0	0	0.00	1274000	1565000	23	-100	-100
F = F <sub>pa</sub>	373210	0.41	1126525	1086878	-3.5	39	51
F = F <sub>lim</sub>	533522	0.63	1055605	902379	-15	99	115
SSB (2023) = B <sub>lim</sub>	1038250	1.66	779438	410000	-47	287	319
SSB (2023) = B <sub>pa</sub>	857440	1.21	889600	570000	-36	219	246
SSB (2023) = MSY B <sub>trigger</sub>	857440	1.21	889600	570000	-36	219	246
SSB (2023) = SSB (2022)	322000	0.35	1148000	1148000	0	20	30
F = F <sub>2021</sub>	300888	0.32	1156577	1174390	1.54	12	21

\* SSB<sub>2023</sub> relative to SSB<sub>2022</sub>.

\*\* Catches in 2022 relative to the sum of autonomous quotas in 2021 (268 458 tonnes = EU quota of 222 958 tonnes + Russian quota of 45 500 tonnes).

\*\*\* Advice value this year relative to the advice value last year (247 952 tonnes).

^ Advice value this year relative to the advice value last year for the MAP F<sub>MSY lower</sub> (181 567 tonnes) and MAP F<sub>MSY upper</sub> (316 833 tonnes)

^^ MAP multiannual plan (EU, 2016).

The advised catches for 2022 have increased compared to those for 2021 mainly because of the two above-average year-classes of 2019 and 2020.

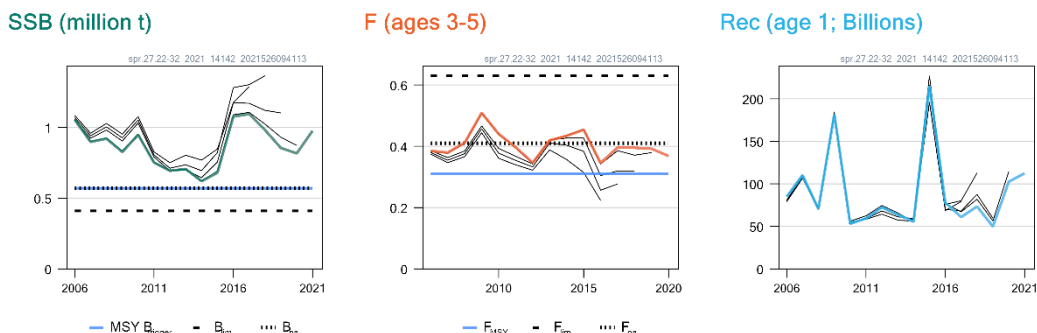
### Basis of the advice

**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 <sub>MSY</sub> 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 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 two years should be compared to the reference points indicated.

### Issues relevant for the advice

Sprat are an important forage species for Baltic cod, and multispecies interactions should be considered when managing the sprat fishery (ICES, 2020a, 2020b).

### 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	Assumed at $B_{pa}$	ICES (2020c)
	$F_{MSY}$	0.31	Stochastic simulations with Beverton–Holt stock–recruitment model	ICES (2020c)
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 (2020c)
	$B_{pa}$	570 000	$B_{lim} \times \exp(1.645 \times \sigma)$ , where $\sigma = 0.2$	ICES (2020c)
	$F_{lim}$	0.63	Consistent with $B_{lim}$	ICES (2020c)
	$F_{pa}$	0.41	$F_{P05}$ . The $F$ that leads to $SSB \geq B_{lim}$ with 95% probability	ICES (2021b)
Management plan	MAP MSY $B_{trigger}$	570 000	MSY $B_{trigger}$	ICES (2020c)
	MAP $B_{lim}$	410 000	$B_{lim}$	ICES (2020c)
	MAP $F_{MSY}$	0.31	$F_{MSY}$	ICES (2020c)
	MAP target range $F_{lower}-F_{MSY}$	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 (2020c)
	MAP target range $F_{MSY}-F_{upper}$	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 (2020c)

## Basis of the assessment

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

ICES stock data category	1 (ICES, 2021a)
Assessment type	Age-based analytical assessment, XSA (ICES, 2021b) 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 (ICES, 2019), 2020 from regression with eastern Baltic cod biomass of individuals $\geq 20$ cm, fixed maturity ogive
Discards and bycatch	Not included, considered negligible
Indicators	None
Other information	Interbenchmark in March 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. <i>Status quo</i> F for subdivisions 27 and 29–32		117200	88200
1988	Catch could be increased in subdivisions 22–25	-	117200	80300
1989	Catch could be increased for subdivisions 26 and 28. <i>Status quo</i> F for subdivisions 27 and 29–32	72000	142000	85800
1990		72000	150000	85600
1991	TAC	150000	163000	103200
1992	<i>Status quo</i> F	143000	290000	142100
1993	Increase in yield by increasing F	-	415000	178100
1994	Increase in yield by increasing F	-	700000	288800
1995	TAC	205000	500000	312600
1996	Little gain in long-term yield at higher F	279000	550000	441000
1997	No advice	-	550000	529400
1998	<i>Status quo</i> F	343000	550000	470800
1999	Proposed $F_{pa}$	304000	467005	422600
2000	Proposed $F_{pa}$	192000	400000	389100
2001	Proposed $F_{pa}$	314000	355000	342200
2002	Proposed $F_{pa}$	369000	380000	343200
2003	Below proposed $F_{pa}$ (TAC should be set on central Baltic herring considerations)	300000	310000	308300
2004	Below proposed $F_{pa}$ (TAC should be set on central Baltic herring considerations)	474000	420000	373700
2005	TAC should be set on central Baltic herring considerations	< 614000	550000	405200
2006	Agreed management plan	439000	468000	352100

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES catch
2007	$< F_{pa}$	$< 477000$	454000*	388900
2008	$< F_{pa}$	$< 432000$	454000*	380500
2009	$< F_{pa}$	$< 291000$	399000*	407100
2010	$< F_{pa}$	$< 306000$	380000*	341500
2011	$< F_{pa}$	$< 242000$	322700**	267900
2012	MSY transition scheme	$< 242000$	255100**	235000
2013	$F < F_{MSY}$	$< 278000$	278000**	272400
2014	MSY approach	$< 247000$	267900**	243800
2015	MSY approach	$< 222000$	240200**	247200
2016	MSY approach ( $F = 0.26$ )	$\leq 205000$	243000**	246500
2017	MSY approach ( $F = 0.26$ )	$\leq 314000$	303593**	285701
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	219152–301722, but catch higher than 291715 only under conditions specified in MAP	304900**	308827
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	225752–311523, but catch higher than 301125 only under conditions specified in MAP	313100**	314147
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	169965–233704, but catch higher than 225786 only under conditions specified in MAP	256700**	271531
2021	Management Plan	247952 (range 181567–316833)	268458**	
2022	Management Plan	291745 (range 214000–373210)		

\* EU autonomous quota, not including Russian catches.

\*\* TAC is calculated as EU + Russian autonomous quotas.

### History of the catch and landings

**Table 7** Sprat in subdivisions 22–32. Catch distribution by fleet in 2020 as estimated by ICES.

Catch (2020)	Landings	Discards
271531 tonnes	Most of the catch is taken by pelagic trawlers 271531 tonnes	Discarding is considered to be negligible.

**Table 8** Sprat in subdivisions 22–32. History of ICES catches presented by area 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	7200		6700	17200	800			38800		400	109700	180800
1978	10800		6100	13700	800			24700		800	75500	132400
1979	5500		7100	4000	700			12400		2200	45100	77100
1980	4700		6200	100	500			12700		2800	31400	58100
1981	8400		6000	100	600			8900		1600	23900	49300
1982	6700		4500	1000	600			14200		2800	18900	48700
1983	6200		3400	2700	600			7100		3600	13700	37300
1984	3200		2400	2800	700			9300		8400	25900	52500
1985	4100		3000	2000	900			18500		7100	34000	69500

Year	Denmark	Estonia	Finland	German Dem. Rep.	German Fed. Rep.	Latvia	Lithuania	Poland	Russia	Sweden	USSR	Total
1986	6000		3200	2500	500			23700		3500	36500	75800
1987	2600		2800	1300	1100			32000		3500	44900	88200
1988	2000		3000	1200	300			22200		7300	44200	80300
1989	5200		2800	1200	600			18600		3500	54000	85800
1990	800		2700	500	800			13300		7500	60000	85600
1991	10000		1600		700			22500		8700	59700*	103200
1992	24300	4100	1800		600	17400	3300	28300	8100	54200		142100
1993	18400	5800	1700		600	12600	3300	31800	11200	92700		178100
1994	60600	9600	1900		300	20100	2300	41200	17600	135200		288800
1995	64100	13100	5200		200	24400	2900	44200	14800	143700		312600
1996	109100	21100	17400		200	34200	10200	72400	18200	158200		441000
1997	137400	38900	24400		400	49300	4800	99900	22400	151900		529400
1998	91800	32300	25700		4600	44900	4500	55100	20900	191100		470800
1999	90200	33200	18900		200	42800	2300	66300	31500	137300		422600
2000	51500	39400	20200		0	46200	1700	79200	30400	120600		389100
2001	39700	37500	15400		800	42800	3000	85800	32000	85400		342200
2002	42000	41300	17200		1000	47500	2800	81200	32900	77300		343200
2003	32000	29200	9000		18000	41700	2200	84100	28700	63400		308300
2004	44300	30200	16600		28500	52400	1600	96700	25100	78300		373700
2005	46500	49800	17900		29000	64700	8600	71400	29700	87800		405200
2006	42100	46800	19000		30800	54600	7500	54300	28200	68700		352100
2007	37600	51000	24600		30800	60500	20300	58700	24800	80700		388900
2008	45900	48600	24300		30400	57200	18700	53300	21000	81100		380500
2009	59700	47300	23100		26300	49500	18800	81900	25200	75300		407100
2010	43600	47900	24400		17800	45900	9200	56700	25600	70400		341500
2011	31400	35000	15800		11400	33400	9900	55300	19500	56200		267900
2012	11400	27700	9000		11300	30700	11300	62100	25000	46500		235000
2013	25600	29800	11100		10300	33300	10400	79700	22600	49700		272400
2014	26600	28500	11700		10200	30800	9600	56900	23400	46000		243800
2015	22500	24000	12000		10300	30500	11000	62200	30700	44100		247200
2016	19100	23700	16900		10900	28100	11600	59300	34600	42400		246500
2017	27100	25300	16100		13600	35700	12500	68400	38700	48300		285701
2018	24590	29341	16430		15213	37099	16250	79395	41374	49135		308827
2019	30888	29178	16136		14644	38914	16228	82398	40694	45062		314147
2020**	26447	24270	12498		8929	28893	11164	72539	45716	41071		271531

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

\*\* Preliminary.

## 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			
1974	52788000	940000	242000	0.37
1975	18704000	726000	201000	0.40
1976	182883000	625000	195000	0.38
1977	45092000	1044000	181000	0.34
1978	16404000	695000	132000	0.34
1979	32558000	377000	77000	0.26
1980	20055000	227000	58000	0.30
1981	64217000	199000	49000	0.183
1982	34161000	254000	49000	0.30
1983	124735000	394000	37000	0.136
1984	49917000	616000	53000	0.180
1985	42732000	605000	70000	0.166
1986	18171000	570000	76000	0.21
1987	40822000	461000	88000	0.27
1988	15300000	403000	80000	0.24
1989	42790000	423000	86000	0.22
1990	50566000	556000	86000	0.137
1991	57667000	775000	103000	0.173
1992	101926000	1045000	142000	0.20
1993	92592000	1360000	178000	0.163
1994	67380000	1375000	289000	0.26
1995	254132000	1429000	313000	0.35
1996	158819000	1811000	441000	0.30
1997	58455000	1777000	529000	0.42
1998	152073000	1354000	471000	0.40
1999	55170000	1353000	421000	0.37
2000	103360000	1319000	389000	0.32
2001	51093000	1196000	342000	0.29
2002	58743000	942000	343000	0.40
2003	132654000	829000	308000	0.40
2004	248860000	1040000	374000	0.49
2005	54357000	1324000	405000	0.45
2006	84925000	1055000	352000	0.38
2007	110176000	898000	388000	0.38
2008	70326000	921000	381000	0.41
2009	181708000	827000	407000	0.51
2010	53004000	948000	342000	0.44
2011	59520000	752000	268000	0.40
2012	72387000	694000	231000	0.35
2013	63778000	706000	272000	0.42
2014	55386000	620000	244000	0.43
2015	215431000	680000	247000	0.45
2016	77947000	1077000	247000	0.35
2017	60854000	1095000	286000	0.40
2018	73394000	982000	309000	0.40
2019	49775000	855000	314000	0.39
2020	102470000	817000	271531	0.37
2021	112431000**	977000***		

\* At spawning time.

\*\* Output from survey data (RCT3 analysis).

\*\*\* Predicted.

## Sources and references

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[Download the stock assessment data and figures.](#)

*Recommended citation:* ICES. 2021. Sprat (*Sprattus sprattus*) in Subdivisions 22-32 (Baltic Sea). In Report of the ICES Advisory Committee, 2021. ICES Advice 2021, spr.27.22-32. <https://doi.org/10.17895/ices.advice.7867>.