

Sardine (*Sardina pilchardus*) in divisions 8.a–b and 8.d (Bay of Biscay)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 21 497 tonnes.

Stock development over time

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

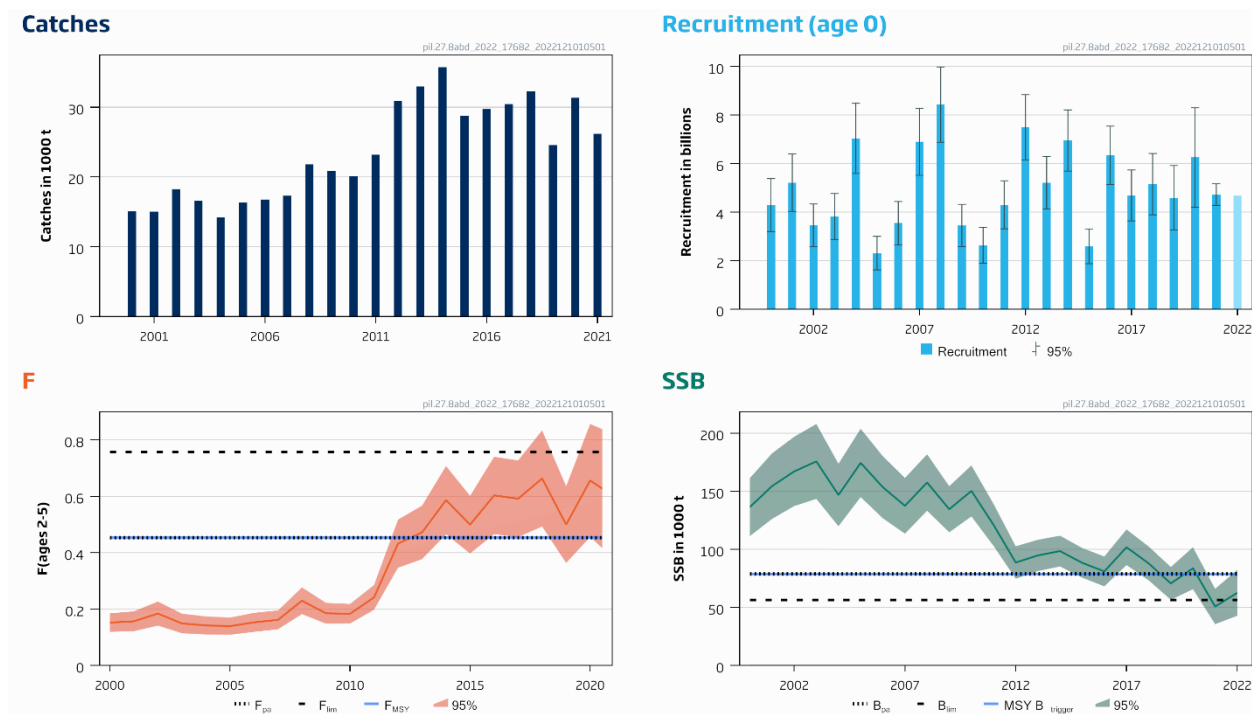


Figure 1 Sardine in divisions 8.a–b and 8.d. Summary of the stock assessment. Recruitment and SSB are estimated at the beginning of the year. The lighter blue 2022 bar in the recruitment graph represents the geometric mean (2002–2021).

Catch scenarios

Table 1 Sardine in divisions 8.a–b and 8.d. Basis for the catch scenarios. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 2-5}$ (2022)	0.55	Based on assumed catches for 2022
SSB (2023)	69 828	Short term forecast; tonnes
$R_{age\ 0}$ (2022–2023)	4 681	Geometric mean (2002–2021); millions
Total catch (2022)	22 608	Preliminary value based on reported catches in quarters 1 to 3 and assumed catches for quarter 4; tonnes
Discards (2022)	0	Negligible; tonnes

Table 2 Sardine in divisions 8.a–b and 8.d. Annual catch scenarios. All weights are in tonnes.

Basis	Catch (2023)	F (2023)	SSB (2024)	% SSB change *	% catch change **	% advice change ***
ICES advice basis						
MSY approach: $F = F_{MSY} \cdot SSB(2023) / MSY B_{trigger}$	21497	0.40	70347	+0.74	-17.9	-24
Other scenarios						
$F = 0$	0	0	87731	+26	-100	-100
$F = F_{pa} = F_{MSY}$	23820	0.45	68507	-1.89	-9.1	-15.5
$F = F_{lim}$	36127	0.76	58912	-15.6	+38	+28
$SSB(2024) = B_{lim}$	39545	0.85	56300	-19.4	+51	+40
$SSB(2024) = B_{pa}$ $= MSY B_{trigger}$	11077	0.193	78700	+12.7	-58	-61
$F = F(2022)$	28021	0.55	65201	-6.6	+7.0	-0.59

* SSB 2024 relative to SSB 2023.

** Advised catch for 2023 relative to catch in 2021 (26 198 tonnes).

*** Advised catch for 2023 relative to advised catch for 2022 (28 187 tonnes).

The advice for 2023 is substantially lower than the advice for 2022 due to a revision downwards of the 2020 recruitment which has resulted in an SSB that is below $MSY B_{trigger}$ at the start of the advice year, resulting in a lower target F.

Basis of the advice

Table 3 Sardine in divisions 8.a–b and 8.d. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of an agreed precautionary management plan for sardine in this area

Quality of the assessment

The downwards revision of the recruitment (Figure 2) is due to large age 1 estimates in the PELGAS survey in 2018, 2019, and 2021 that could not be tracked consistently in the age 2 estimates of the following year.

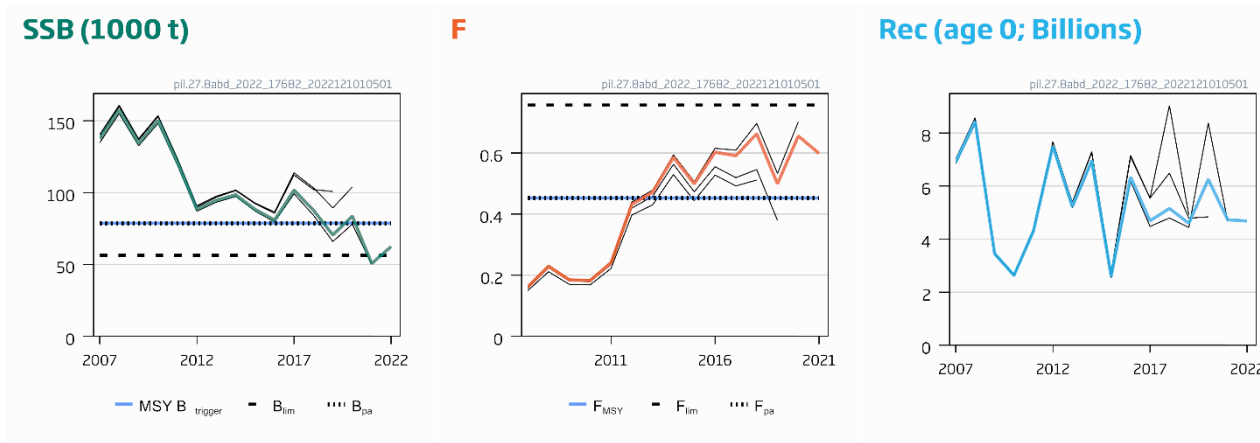


Figure 2 Sardine in divisions 8.a–b and 8.d. Historical assessment results. For each trend line in the recruitment plot, the last value is an assumption. The stock was benchmarked in 2019.

Issues relevant for the advice

The French catches originating from rectangles 25E5 and 25E4 (in Subarea 7) have been allocated by ICES to Division 8.a, as they occur at the boundary and are considered to be more closely associated with the sardine stock in divisions 8.a–b and 8.d. These catches have, therefore, been included in this assessment and typically represent 25% of the total stock

catches so should be taken into consideration when managing the fishery. In 2021 these catches were 47% of the total stock catches. This is the highest proportion of catches that have occurred in these two rectangles.

There continues to be a long-term decline in the mean weight and proportion mature of age 1 and 2 individuals which contributes to the low stock status.

Reference points

Table 4 Sardine in divisions 8.a–b and 8.d. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B_{trigger}	78 700 t	B_{pa}	ICES (2019)
	F_{MSY}	0.45	F that maximizes long-term yield under the constraint that the long-term $P(\text{SSB} < B_{\text{lim}}) \leq 5\%$ when applying ICES MSY advice rule (F_{P05}); calculated by stochastic simulation (EQsim)	ICES (2019)
Precautionary approach	B_{lim}	56 300 t	35%SPR, i.e. equilibrium biomass at the F that leads to 35% of spawners per recruit without fishing	ICES (2019)
	B_{pa}	78 700 t	$B_{\text{pa}} = B_{\text{lim}} \times \exp(1.645 \times \sigma)$, where $\sigma = 0.2$	ICES (2019)
	F_{lim}	0.76	F that results in 50% probability that SSB is above B_{lim} in the long term	ICES (2019)
	F_{pa}	0.45	F_{P05} . The F that leads to $\text{SSB} \geq B_{\text{lim}}$ with 95% probability, calculated by stochastic simulation (EQsim).	ICES (2019; 2021)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 5 Sardine in divisions 8.a–b and 8.d. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a).
Assessment type	Analytical assessment (Stock Synthesis Model 3; SS3) that uses catches in the model and in the forecast (ICES, 2022b)
Input data	Commercial catches (international landings; ages and length frequencies from catch sampling). Three survey indices: PELGAS (acoustic biomass, [A4150], 2000–2019, 2021–2022), BIOMAN (egg counts, [I9143], 2000–2022), and DEPM Triennial surveys (PT-DEPM [I7533] and SP-DEPM [I9787]; 2011, 2014, 2017, 2020). Age composition in the PELGAS survey.
Discards and bycatch	Not included; discarding and bycatch are considered negligible
Indicators	None
Other information	This stock was benchmarked in 2019 (IBPSardine; ICES, 2019)
Working group	Working Group on Southern Horse Mackerel, Anchovy, and Sardine (WGHANSA)

History of the advice, catch, and management

Table 6a Sardine in divisions 8.a–b and 8.d, and in Subarea 7*. ICES advice, official landings, and ICES catches. No TAC is set for this stock. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Official landings	ICES landings
2010	None		32592	30287
2011	None		28847	28840
2012	None		37214	37214
2013	None		40971	40130
2014	20% reduction of catches (average of last three years)	< 27554	45312	42015
2015	No new advice, same as for 2014	< 27554	36928	38070
2016	Precautionary approach (increase catches by no more than 20%)	≤ 33065	47324	49161
2017	Precautionary approach (same advised catch value as given for 2016)	≤ 33065	57889	43101

* Prior to 2017, sardine in this area was assessed as a single stock combining Subarea 7 (English Channel and Celtic Sea) and divisions 8.a–b and 8.d (Bay of Biscay).

Table 6b Sardine in divisions 8.a–b and 8.d. ICES advice, official landings, and ICES catches. No TAC is set for this stock. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Official landings	ICES catches
2018	MSY approach	≤ 30579	32289	32299
2019	MSY approach	≤ 22410	24349	24579
2020	MSY approach	≤ 34647	31343	31368
2021	MSY approach	≤ 27858	26161	26198
2022	MSY approach	≤ 28187		22608*
2023	MSY approach	≤ 21497		

* Provisional estimate

History of the catch and landings

Table 7 Sardine in divisions 8.a–b and 8.d. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings		Discards
26198 tonnes	Purse-seiners 87 %	Pelagic trawl 13 %	Negligible
	26198 tonnes		

Table 8 Sardine in divisions 8.a–b and 8.d. History of commercial landings; the official estimated values are presented by country. All weights are in tonnes.

Year	Rectangles 25E5, 25E4 (Subarea 7)	Divisions 8.a–b and 8.d								ICES catches
	France	France	Spain	Netherlands	Ireland	United Kingdom	Denmark	Germany	Lithuania	
1999	n/a	n/a	2384	0	0	0	124	11	0	n/a
2000	1324	10615	3158	34	0	0	0	38	0	15097
2001	1281	10004	3720	333	0	0	0	135	0	15005
2002	1872	11977	4428	23	19	276	0	4	0	18277
2003	5685	9809	1113	68	1750	68	0	0	0	16607
2004	2700	11155	342	6	1401	0	0	0	0	14197
2005	4487	10975	898	1	974	0	0	54	0	16360
2006	5032	10884	825	2	49	0	12	78	5	16741
2007	2829	13231	1263	0	0	0	48	0	0	17323
2008	3033	18071	717	0	0	1	39	0	0	21821
2009	4780	15847	228	0	0	0	0	0	0	20855
2010	6608	12877	642	0	0	0	0	0	0	20127
2011	5456	12469	5283	5	0	0	0	0	0	23208
2012	5098	10854	14948	0	0	0	0	0	0	30900

Year	Rectangles 25E5, 25E4 (Subarea 7)	Divisions 8.a–b and 8.d								ICES catches
	France	France	Spain	Netherlands	Ireland	United Kingdom	Denmark	Germany	Lithuania	
2013	6901	13614	12423	445	0	252	0	0	0	32938
2014	4737	14730	16237	0	0	0	0	0	0	35704
2015	2569	13132	13055	0	0	7	0	0	0	28756
2016	8610	14320	6824	65	0	0	0	1	0	29754
2017	6790	17265	6380	0	0	0	0	0	0	30435
2018	7034	18161	7104	0	0	0	0	0	0	32299
2019	6255	14844	3250	0	0	0	0	0	0	24579
2020	12034	12562	6746	0	0	0	0	0	0	31368
2021	12409	7830	5922	0	0	0	0	0	0	26198

n/a = not available.

Summary of the assessment

Table 9 Sardine in divisions 8.a–b and 8.d. Assessment summary. ‘High’ and ‘Low’ refer to 95% confidence intervals.

Year	Recruitment (age 0)	High	Low	SSB	High	Low	Total catch*	F (ages 2–5)	High	Low
	thousands				tonnes		tonnes			
2000	4289250	5383480	3195020	136348	161405	111291	15097	0.152	0.185	0.119
2001	5212970	6399450	4026490	154389	182676	126102	15005	0.156	0.192	0.121
2002	3459770	4342910	2576630	167059	196941	137177	18277	0.184	0.23	0.141
2003	3822350	4774410	2870290	175678	207989	143367	16607	0.149	0.184	0.114
2004	7041850	8487870	5595830	146755	173747	119763	14197	0.142	0.174	0.110
2005	2311460	3001260	1621660	174396	203900	144892	16360	0.139	0.170	0.109
2006	3545680	4442300	2649060	153484	180269	126699	16741	0.153	0.186	0.119
2007	6900310	8282470	5518150	137456	161506	113406	17323	0.161	0.195	0.128
2008	8431470	9980370	6882570	157525	181899	133151	21821	0.23	0.28	0.182
2009	3451450	4319040	2583860	134492	154378	114606	20855	0.185	0.22	0.148
2010	2632200	3373290	1891110	150272	172298	128246	20127	0.183	0.22	0.148
2011	4302900	5290320	3315480	120974	139122	102826	23208	0.24	0.29	0.197
2012	7501940	8846540	6157340	88608.7	102637	74580.5	30900	0.43	0.52	0.35
2013	5216840	6298750	4134930	94728	108209	81247.3	32938	0.47	0.57	0.38
2014	6956530	8217810	5695250	98464.7	111773	85156.7	35704	0.59	0.71	0.46
2015	2590210	3305030	1875390	88334.8	101126	75543.7	28756	0.50	0.60	0.40
2016	6345320	7547850	5142790	80949.4	93839.7	68059.1	29754	0.60	0.74	0.47
2017	4689770	5741560	3637980	101761	117171	86351.3	30435	0.59	0.73	0.46
2018	5153780	6417220	3890340	87847.1	102464	73230.5	32299	0.66	0.83	0.49
2019	4595980	5923820	3268140	70586.9	84739.5	56434.3	24579	0.50	0.64	0.36
2020	6253460	8306440	4200480	83678.2	101810	65546	31368	0.66	0.86	0.46
2021	4728130	5172970	4283290	50716.1	65976.2	35456	26198	0.60	0.82	0.38
2022	4680980**			62534.2	82354.7	42713.7				

* Catch as estimated by ICES.

** Geometric mean (2002–2021).

Sources and references

ICES. 2019. Inter-benchmark process on sardine (*Sardina pilchardus*) in the Bay of Biscay (IBPSardine). ICES Scientific Reports, 1:80. 34 pp. <https://doi.org/10.17895/ices.pub.5552>

ICES. 2021. Working Group on Southern Horse Mackerel Anchovy and Sardine (WGHANSA). ICES Scientific Reports. 3:55. 679 pp. <https://doi.org/10.17895/ices.pub.8138>

ICES. 2022a. Advice on fishing opportunities. In Report of the ICES Advisory Committee, 2022. ICES Advice 2022, section 1.1.1. <https://doi.org/10.17895/ices.advice.19928060>

ICES. 2022b. Working Group on Southern Horse Mackerel, Anchovy and Sardine (WGHANSA). ICES Scientific Reports. 4:51. 518 pp. <http://doi.org/10.17895/ices.pub.19982720>

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

Recommended citation: ICES. 2022. Sardine (*Sardina pilchardus*) in divisions 8.a-b and 8.d (Bay of Biscay). In Report of the ICES Advisory Committee, 2022. ICES Advice 2022, pil.27.8abd, <https://doi.org/10.17895/ices.advice.19772452>