

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 2022 should be no more than 28 187 tonnes.

Stock development over time

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

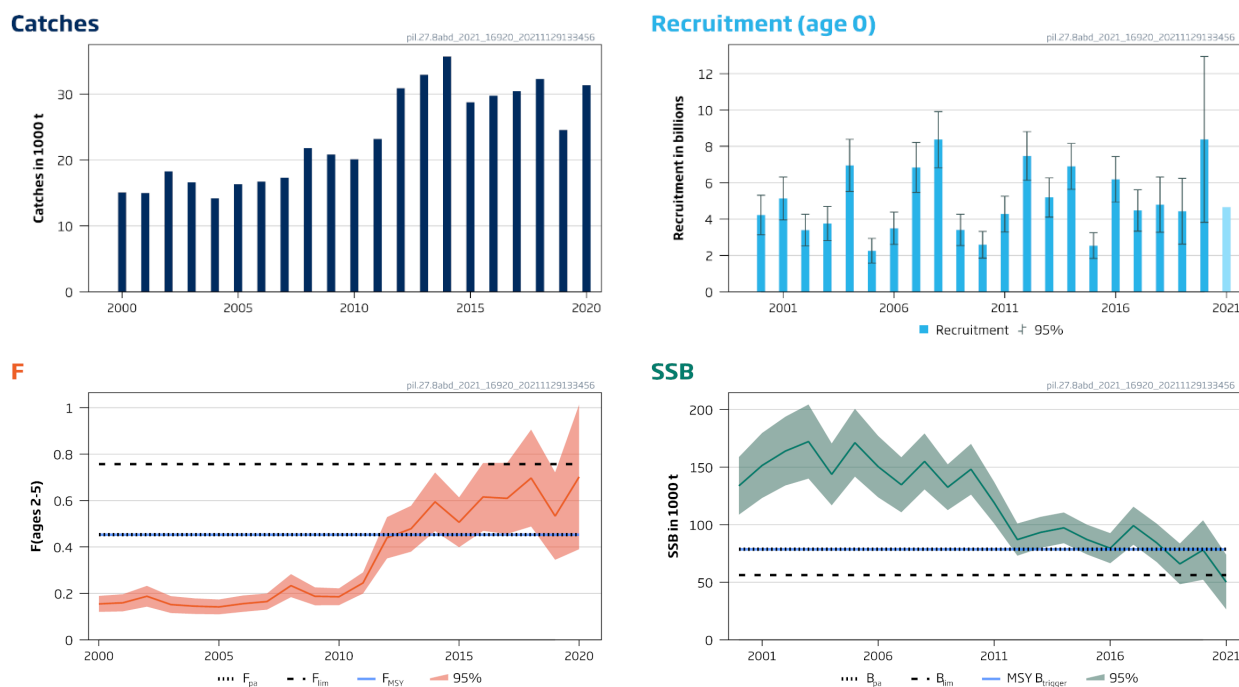


Figure 1 Sardine in divisions 8.a–b and 8.d. Summary of the stock assessment. Recruitment and SSB are estimated at the beginning of the year. The lighter blue 2021 bar in the recruitment graph represents the geometric mean (2002–2020).

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
$F_{ages\ 2-5}$ (2021)	0.61	Based on assumed catches for 2021
SSB (2022)	94 560	Short term forecast; tonnes
$R_{age\ 0}$ (2021–2022)	4 665	Geometric mean (2002–2020); millions
Total catch (2021)	30 497	Preliminary value based on reported catches in Quarters 1 to 3 and predicted catches for Quarter 4; tonnes
Discards (2021)	0	Negligible; tonnes

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

Basis	Catch (2022)	F (2022)	SSB (2023)	% SSB change *	% catch change **	% advice change ***
ICES advice basis						
MSY approach: F_{MSY}	28187	0.45	86646	-8	-10	1
Other scenarios						
F = 0	0	0	108797	15	-100	-100
F = F_{pa}	28187	0.45	86646	-8	-10	1

Basis	Catch (2022)	F (2022)	SSB (2023)	% SSB change *	% catch change **	% advice change ***
$F = F_{lim}$	42858	0.76	75493	-20	37	54
$SSB(2023) = B_{lim}$	69405	1.52	56300	-40	121	149
$SSB(2023) = B_{pa}$ = MSY $B_{trigger}$	38597	0.66	78700	-17	23	39
$F = F(2021)$	35932	0.61	80719	-15	15	29

* SSB 2023 relative to SSB 2022.

** Catch in 2022 relative to catch in 2020 (31 368 tonnes).

*** Advised catch for 2022 relative to advised catch for 2021 (27 858 tonnes).

The advice for 2022 is slightly higher than the advice for 2021, due to the anticipated increase in biomass caused by the increased recruitment in 2020.

Basis of the advice

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

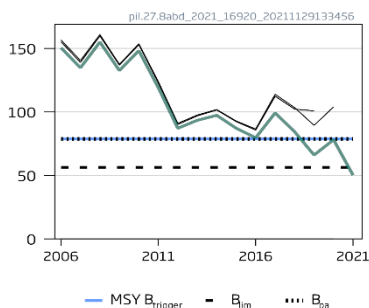
Advice basis	MSY approach
Management plan	ICES is not aware of an agreed precautionary management plan for sardine in this area

Quality of the assessment

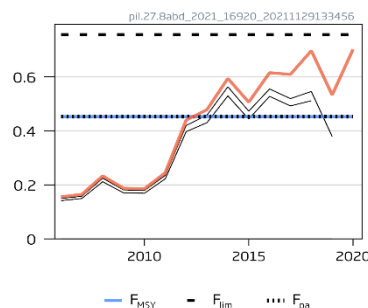
Due to the Covid-19 disruption, the PELGAS acoustic survey was not carried out in 2020. In 2021, all expected input data were available and used for updating the assessment. There is no evidence that Covid-19 has had an effect on the new data available in 2021.

The current assessment substantially differs from previous ones (Figure 2). Previous estimates of SSB have been revised downwards and fishing mortality has been revised upwards. The large change in this year’s assessment may be due to a combination of the missing PELGAS acoustic survey in 2020, and the sensitivity of the assessment to the inclusion of the 2021 data. In addition, a higher than usual proportion of the age-1 individuals in 2021 were immature (66%), and the weight at age 1 was the lowest in the time series; this has caused the spawning biomass to fall below B_{lim} and to the lowest level of the time series.

SSB (1000 t)



F



Rec (age 0; Billions)

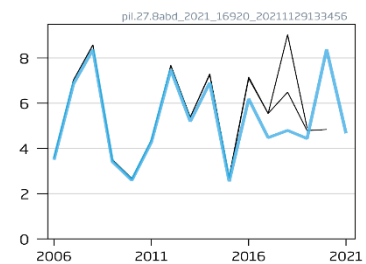


Figure 2 Sardine in divisions 8.a–b and 8.d. Historical assessment results. For each trend line in the recruitment plot, the last value is an assumption. The stock was benchmarked in 2019.

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 in managing the fishery.

Reference points

Reference points have been updated in 2019 (ICES, 2019) and 2021 (ICES, 2021a).

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 $B_{trigger}$	78700 t	B_{pa}	ICES (2019)
	F_{MSY}	0.45	F that maximizes long-term yield under the constraint that the long-term $P(SSB < B_{lim}) \leq 5\%$ when applying the ICES MSY advice rule ($F_{p,0.05}$); calculated by stochastic simulation (EQsim)	ICES (2019)
Precautionary approach	B_{lim}	56300 t	35%SPR, i.e. equilibrium biomass at the F that leads to 35% of spawners per recruit without fishing	ICES (2019)
	B_{pa}	78700 t	$B_{pa} = B_{lim} \times \exp(1.645 \times \sigma)$, 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	$F_{p0.5}$. The F that leads to $SSB \geq B_{lim}$ with 95% probability; calculated by stochastic simulation (EQsim)	ICES (2019; 2021a)
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, 2021b).
Assessment type	Analytical assessment (Stock Synthesis Model 3; SS3) that uses catches in the model and in the forecast (ICES, 2021a).
Input data	Commercial catches (international landings; ages and length frequencies from catch sampling). Three survey indices: PELGAS (acoustic biomass, [A4150], 2000–2019, 2021), BIOMAN (egg counts, [I9143], 2000–2021), 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 official 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 official 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		
2022	MSY approach	≤ 28187		

History of the catch and landings

Table 7 Sardine in divisions 8.a–b and 8.d. Catch distribution by fleet in 2020 as estimated by ICES.

Catch	Landings		Discards
31368 tonnes	Purse-seiners 86%	Pelagic trawl 14%	Negligible
	31368 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	Belgium	
1999	n/a	n/a	2384	0	0	0	124	11	0	0	n/a
2000	1324	10615	3158	34	0	0	0	38	0	0	15097
2001	1281	10004	3720	333	0	0	0	135	0	0	15005
2002	1872	11977	4428	23	19	276	0	4	0	0	18277
2003	5685	9809	1113	68	1750	68	0	0	0	0	16607
2004	2700	11155	342	6	1401	0	0	0	0	0	14197
2005	4487	10975	898	1	974	0	0	54	0	0	16360
2006	5032	10884	825	2	49	0	12	78	5	0	16741
2007	2829	13231	1263	0	0	0	48	0	0	0	17323
2008	3033	18071	717	0	0	1	39	0	0	0	21821
2009	4780	15847	228	0	0	0	0	0	0	0	20855
2010	6608	12877	642	0	0	0	0	0	0	0	20127
2011	5456	12469	5283	5	0	0	0	0	0	0	23208
2012	5098	10854	14948	0	0	0	0	0	0	0	30900
2013	6901	13614	12423	445	0	252	0	0	0	0	32938
2014	4737	14730	16237	0	0	0	0	0	0	0	35704
2015	2569	13132	13055	0	0	7	0	0	0	0	28756
2016	8610	14320	6824	65	0	0	0	1	0	0	29754
2017	6790	17265	6380	0	0	0	0	0	0	0	30435
2018	7034	18161	7104	0	0	0	0	0	0	0	32299
2019	6255	14844	3250	0	0	0	0	0	0	0	24579
2020	12034	12562	6746	0	0	0	0	0	0	0	31368

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	4226920	5312950	3140890	133755	158830	108680	15097	0.155	0.189	0.120
2001	5134660	6311780	3957540	151471	179745	123197	15005	0.160	0.197	0.123
2002	3400570	4274360	2526780	163945	193820	134070	18277	0.188	0.23	0.143
2003	3760940	4703950	2817930	172269	204484	140054	16607	0.152	0.188	0.115
2004	6951690	8388760	5514620	143769	170695	116843	14197	0.145	0.179	0.111
2005	2261310	2940560	1582060	171256	200746	141766	16360	0.142	0.174	0.110
2006	3495820	4384940	2606700	150491	177188	123794	16741	0.156	0.191	0.121
2007	6844220	8220340	5468100	134712	158665	110759	17323	0.165	0.20	0.130
2008	8371660	9914710	6828610	154996	179363	130629	21821	0.23	0.28	0.184
2009	3409220	4271290	2547150	132572	152503	112641	20855	0.188	0.23	0.149
2010	2591540	3325560	1857520	148213	170292	126134	20127	0.186	0.22	0.149
2011	4274160	5258130	3290190	119094	137243	100945	23208	0.25	0.29	0.199
2012	7473560	8813610	6133510	87101	101116	73085	30900	0.44	0.53	0.35
2013	5188680	6268350	4109010	93379	106888	79869	32938	0.48	0.58	0.38
2014	6902560	8163870	5641250	97290	110662	83918	35704	0.59	0.72	0.47
2015	2542420	3251600	1833240	87121	100058	74183	28756	0.51	0.61	0.40
2016	6187660	7441660	4933660	79622	92735	66510	29754	0.62	0.76	0.47
2017	4475950	5616170	3335730	99175	115694	82656	30435	0.61	0.76	0.46
2018	4794720	6310840	3278600	84330	101068	67591	32299	0.70	0.91	0.49
2019	4435970	6245940	2626000	66008	83729	48288	24579	0.53	0.72	0.34
2020	8381930	12945600	3818250	78068	103911	52225	31368	0.70	1.01	0.39
2021	4665110 **			50142	73913	26371				

* Catch as estimated by ICES.

** Geometric mean (2002–2020).

Sources and references

ICES. 2019b. 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>

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

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