ICES Advice on fishing opportunities, catch, and effort
Bay of Biscay and the Iberian Coast ecoregion
Published 28 June 2019

ICES
CIEM

International Council for
the Exploration of the Sea

Conseil International pour
l'Exploration de la Mer

Sole (*Solea solea*) in divisions 8.a–b (northern and central Bay of Biscay)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for Western waters and adjacent waters is applied, catches in 2020 that correspond to the F ranges in the MAP are between 2209 tonnes and 5196 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (3768 tonnes) can only be taken under conditions specified in the MAP, whilst the entire range is considered precautionary when applying the ICES advice rule.

Stock development over time

The spawning-stock biomass (SSB) has been above MSY $B_{trigger}$ since 2004, with the exception of years 2014–2015. The fishing mortality (F) has been relatively stable around F_{pa} since 2003, declined below F_{MSY} in 2017, but is estimated between F_{MSY} and F_{pa} in 2018. Recruitment (R) has been fluctuating at low values since 2012.
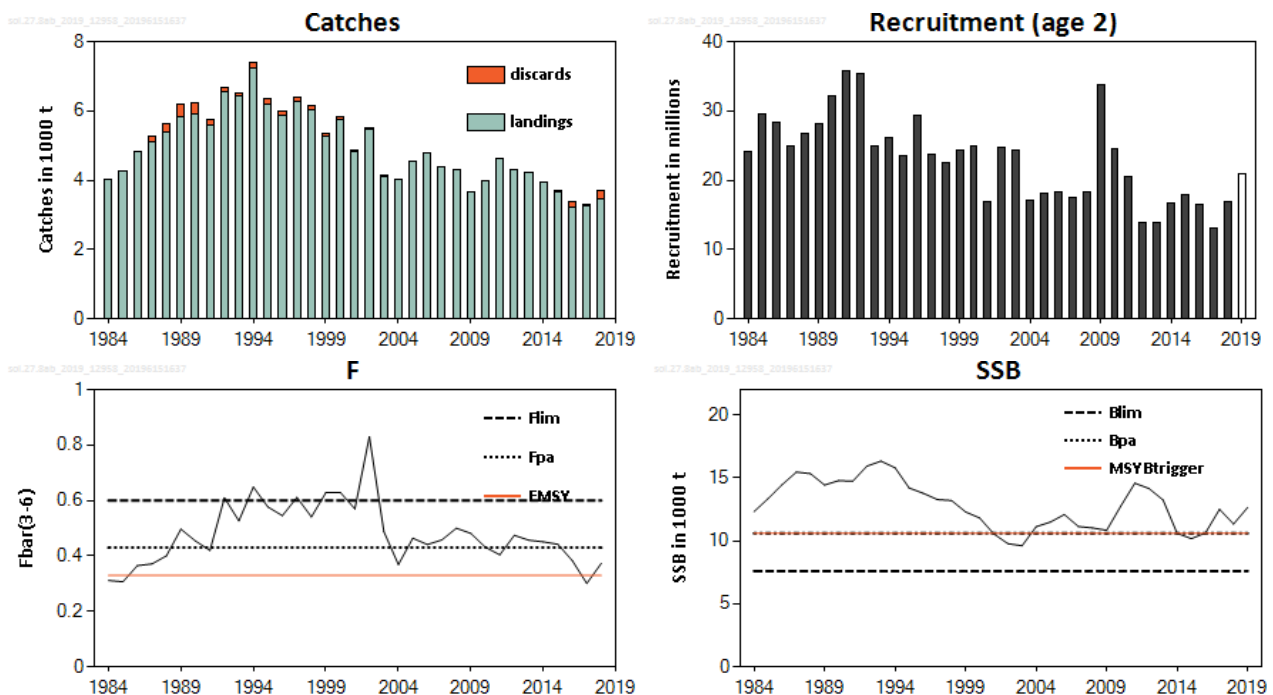

Figure 1   Sole in divisions 8.a–b. Summary of the stock assessment. Assumed recruitment value is unshaded. The catches plot includes discard estimates (no estimates between 2004 and 2015).

Stock and exploitation status

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

Table 1   Sole in divisions 8.a–b. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size			
		2016	2017	2018			2017	2018	2019
Maximum sustainable yield	F_{MSY}	❌	✅	❌ Above		MSY $B_{trigger}$	✅	✅	✅ Above trigger
Precautionary approach	F_{pa}, F_{lim}	✅	✅	✅ Harvested sustainably		B_{pa}, B_{lim}	✅	✅	✅ Full reproductive capacity
Management plan	F_{MGT}	✅	✅	✅ Within the range		B_{MGT}	✅	✅	✅ Above trigger

Catch scenarios

Table 2   Sole in divisions 8.a–b. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{age\ 3–6}$ (2019)	0.39	Corresponding to assumption about catch in 2019 (TAC constraint).
SSB (2020)	13141	Assessment forecast; in tonnes.
$R_{age\ 2}$ (2019–2020)	20829	Geometric mean (1993–2016); in thousands.
Total catch (2019)	3967	TAC for 2019; in tonnes.
Landings (2019)	3872	TAC for 2019; in tonnes.
Discards (2019)	95	Computed using the average discard ratio (2.4%) over 2015–2017 but not used in the assessment; in tonnes.

Table 3   Sole in divisions 8.a–b. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch* (2020)	Wanted catch** (2020)	Unwanted catch** (2020)	F_{wanted} (2020)	SSB (2021)	% SSB change ^	% TAC change ^^	% Advice change^^^
ICES advice basis								
EU MAP#: F_{MSY}	3768	3645	123	0.33	14288	8.7%	−2.7%	−5.0%
F = MAP $F_{MSY\ lower}$	2209	2137	72	0.180	16038	22%	−43%	−43%
F = MAP $F_{MSY\ upper}$	5196	5026	170	0.49	12693	-3.4%	34%	34%
Other scenarios								
MSY approach = F_{MSY}	3768	3645	123	0.33	14288	8.7%	−2.7%	−5.0%
F = 0	0	0	0	0.00	18528	41%	−100%	−100%
F_{pa}	4687	4533	153	0.43	13261	0.91%	21%	18%
F_{lim}	6056	5858	198	0.60	11736	−10.7%	56%	53%
SSB (2021) = B_{lim}	9835	9513	322	1.29	7560	−42%	154%	148%
SSB (2021) = B_{pa} = MSY $B_{trigger}$	7093	6861	232	0.75	10600	−19.4%	83%	79%
F = F_{2019}	4303	4162	141	0.39	14025	4.2%	11.1%	8.5%
Wanted catch equal to 2019 TAC	4003	3872	131	0.35	14025	6.7%	3.4%	0.9%
Total catch equal to 2019 TAC	3872	3745	127	0.34	14172	7.8%	0%	−2.4%

* Total catch is calculated based on wanted catch (fish that would be landed in the absence of the EU landing obligation) and the assumed unwanted catch ratio (3.38%).
** "Wanted" and "unwanted" catch are used to describe fish that would be landed and discarded in the absence of the EU landing obligation, based on the average discard rate estimate of 2015–2017 (2.4%).
\# MAP multiannual plan (EU, 2019).
^ SSB 2021 relative to SSB 2020.
^^ Total catch in 2020 relative to TAC in 2019 (3872 tonnes).
^^^ Advice value for 2020 relative to the advice value for 2019 (3967 tonnes). The 2020 advice is based on catch.

The downwards revision in stock size from last year's assessment has resulted in a decrease of 5% in the advice.

Basis of the advice

Table 4   Sole in divisions 8.a–b. The basis of the advice.

Advice basis	Management plan approach
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the F_{MSY} range for the stock. In accordance with the MAP, catches higher than those corresponding to F_{MSY} can only be taken providing SSB is greater than MSY $B_{trigger}$, and one of the following conditions is met: a) if it is necessary for the achievement of objectives of mixed fisheries; b) if it is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics; c) in order to limit variations in fishing opportunities between consecutive years to not more than 20%. ICES considers that the F_{MSY} range for this stock used in the MAP is precautionary. Full details of the plan are described in EU (2019).

Quality of the assessment

Recruitment estimates for recent years were revised downwards in this year's assessment compared to previous assessments. Recruits (at age 2) contribute to the SSB and constitute approximately 37% of the landings in the short-term forecast. The assumed recruitment (intermediate year) was set to the geometric mean of 1993–2016.

Figure 2   Sole in divisions 8.a–b. Historical assessment results. Final year assumed recruitment included.

Issues relevant for the advice

There is no information to present for this stock.

Reference points

Table 5   Sole in divisions 8.a–b. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	10600	B_{pa}	ICES (2016a)
	F_{MSY}	0.33	Stochastic simulations using a segmented regression stock–recruitment model	ICES (2016a)
Precautionary approach	B_{lim}	7600	$B_{lim} = B_{pa} / \exp(\sigma \times 1.645)$; $\sigma = 0.20$	ICES (2016b)
	B_{pa}	10600	Lowest SSB with good recruitment and increase of SSB	ICES (2016b)
	F_{lim}	0.60	In equilibrium; gives a 50% probability of SSB >B_{lim}	ICES (2016b)
	F_{pa}	0.43	$F_{pa} = F_{lim} \times \exp(-\sigma \times 1.645)$; $\sigma = 0.20$	ICES (2016b)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		
	MAP MSY $B_{trigger}$	10600	MSY $B_{trigger}$	ICES (2016a) and EU (2019)
	MAP B_{lim}	7600	B_{lim}	ICES (2016a) and EU (2019)
	MAP F_{MSY}	0.33	F_{MSY}	ICES (2016a) and EU (2019)
	MAP range F_{lower}	0.180	Consistent with ranges, resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2016a).	ICES (2016a) and EU (2019)
	MAP range F_{upper}	0.49	Consistent with ranges, resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2016a).	ICES (2016a) and EU (2019)

Basis of the assessment

Table 6   Sole in divisions 8.a–b. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Age-based analytical assessment (FLXSA; ICES, 2019) that uses landings in the model; discards are then included to calculate a catch forecast.
Input data	Commercial catch (French and Belgian), ages and length frequencies from catch sampling; one survey index (FR-ORHAGO in 2007–2018); four commercial indices (FR-SABLES and FR-ROCHELLE in 1991–2009, FR-BB-IN-Q4 in 2000–2018, and FR-BB-OFF-Q2 in 2000–2012). Maturity ogive fixed, estimated in 2000. Assumed natural mortality fixed at 0.1.
Discards and bycatch	Not included in the assessment, but used to provide catch advice.
Indicators	None.
Other information	Last benchmark in 2013 (ICES, 2013).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

Information from stakeholders

"Since 2015, the French sole fishery in the Bay of Biscay (ICES divisions 8ab) has been subjected to additional management measures aimed at reducing fishing mortality and improving the recruitment level of the stock. Since 2016, these measures have concerned a fishing stop of at least 15 days during the first quarter for netters and a reinforcement of the selectivity for at least 8 months of the year (including the first quarter) for trawlers." (CNPMEM, 2019.)

History of the advice, catch, and management

Table 7   Sole in divisions 8.a–b. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings	Discards	ICES catch
1987	Not assessed	-	4400	4379	5086	198	5284
1988	Precautionary TAC	3700	4000	4443	5382	254	5636
1989	No increase in effort; TAC	4500	4800	5782*	5845	356	6201
1990	No increase in F; TAC	5100	5200	5532*	5916	303	6219
1991	Precautionary TAC	4700	5300	4707*	5569	198	5767
1992	F = F(90)	5000	5300	6359*	6550	123	6673
1993	No long-term gain in increasing F	-	5700	6496	6420	104	6524
1994	No long-term gain in increasing F	-	6600	7095	7229	184	7413
1995	No long-term gain in increasing F	5400	6600	5872	6205	130	6335
1996	No increase in F	5000	6600	4302	5854	142	5996
1997	40% reduction in F	3100	5400	4961	6259	118	6377
1998	No increase in F	7600	6000	4334	6027	127	6154
1999	Reduce F below F_{pa}	< 5000	5400	3784	5249	110	5359
2000	F at F_{pa}	< 5800	5800	5749	5760	51	5811
2001	TAC 2001, at most TAC 2000	< 5800	6314	4912	4836	39	4875
2002	Establish rebuilding plan or no fishing	-	4000	3985	5486	22	5508
2003	Establish rebuilding plan or no fishing	-	3800	4105	4108	21	4129
2004	65% reduction in F or recovery plan#	< 2000	3600	4072	4002	-	-
2005	F at F_{pa}	< 4100	4140	4371	4539	-	-
2006	F at F_{pa}	< 4200 or management plan	4060	4432	4793	-	-
2007	Management plan: 10% reduction in F	4540	4540	4117	4363	-	-
2008	Reach B_{pa} in 2009	3850	4582	3336	4299	-	-
2009	F at F_{pa}	< 4430	4390	4755	3650	-	-
2010	F at *status quo* (F_{sq})	< 4900	4829	4699	3966		
2011	See scenarios	-	4250	4645	4632		
2012	MSY transition	4000	4250	4204##	4321##		
2013	MSY transition	3500	4100	4492	4235		
2014	MSY transition	3270	3800	4110	3928		
2015	MSY approach	2407	3800	3775	3644	62^	3706^
2016	MSY approach	≤ 2393	3420	3346	3232	134^	3366^
2017	MSY approach	≤ 3107	3420	3236	3249	55^	3304^
2018	MSY approach	≤ 3725	3621	3468	3469	215^	3684^
2019	MSY approach	≤ 3967	3872				
2020	Management plan	3768 (range 2209–5196)**					

* Not reported for all countries.

** Catches corresponding to F_{MSY}, EU MAP range in brackets.

Single-stock boundaries; the exploitation of this stock should be conducted in the context of mixed fisheries.

A carry-over of 10% for the French quota was decided.

^ Calculated from the landings estimate and an estimated discard rate (1.64% in 2015, 4% in 2016, 1.7% in 2017, 6.2% in 2018).

History of the catch and landings

Table 8   Sole in divisions 8.a–b. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings				Discards
3684 tonnes	70% fixed net	14% offshore otter trawlers	9% offshore beam trawlers	7% inshore trawlers	215 tonnes
	3469 tonnes				

Table 9   Sole in divisions 8.a–b. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	Official landings						ICES landings	Discards	ICES catches
	Belgium	France #	Netherlands	Spain	Others	Total			
1979	0	2376		62*		2443	2619	-	-
1980	33*	2549		107*		2689	2986	-	-
1981	4*	2581*	13*	96*		2694	2936	-	-
1982	19*	1618*	52*	57*		1746	3813	-	-
1983	9*	2590	32*	38*		2669	3628	-	-
1984	na	2968	175*	40*		3183	4038	99##	4137
1985	25*	3424	169*	308*		3925	4251	64##	4315
1986	52*	4228	213*	75*		4567	4805	27##	4832
1987	124*	4009	145*	101*		4379	5086	198##	5284
1988	135*	4308		0		4443	5382	254##	5636
1989	311*	5471		0		5782	5845	356##	6201
1990	301*	5231		0		5532	5916	303##	6219
1991	389*	4315		3		4707	5569	198##	5767
1992	440*	5928		0		6359	6550	123##	6673
1993	400*	6096		13		6496	6420	104##	6524
1994	466*	6627		2***		7095	7229	184##	7413
1995	546*	5326		0		5872	6205	130##	6335
1996	460*	3842		0		4302	5854	142##	5996
1997	435*	4526		0		4961	6259	118##	6377
1998	469*	3821	44	0		4334	6027	127##	6154
1999	504	3280		0		3784	5249	110##	5359
2000	451	5293		5***		5749	5760	51##	5811
2001	361	4350	201	0		4912	4836	39##	4875
2002	303	3680		2***		3985	5486	21##	5507
2003	296	3805		4***		4105	4108	20##	4128
2004	324	3739		9***		4072	4002	-	-
2005	358	4003		10		4371	4539	-	-
2006	393	4030		9		4432	4793	-	-
2007	401	3707		9		4117	4363	-	-
2008	305	3018		11	2*	3336	4299	-	-
2009	364	4391				4755	3650	-	-
2010	451	4248				4699	3966	-	-
2011	386	4259				4645	4632	-	-
2012	385	3819				4204	4321	-	-
2013	312	4181				4492	4235	-	-
2014	307	3793		10		4110	3928	-	-
2015	302	3465		8		3775	3644	62^	3706
2016	288	3054		4		3346	3232	134^	3366
2017	274	2953		8		3236	3249	55^	3304
2018**	295	3165		8		3468	3469	215^	3684

* Reported in Subarea 8.
** Preliminary.
*** Reported as *Solea* spp. (*Solea lascaris* and *Solea solea* in Subarea 8).
# Including reported in Subarea 8 or in divisions 8.c and 8.d.
Discards = partial estimates for the French offshore trawler fleet.
^ Calculated from the landings estimate and an estimated discard rate (1.64% in 2015, 4% in 2016, 1.7% in 2017, 6.2% in 2018).

Summary of the assessment

Table 10 Sole in divisions 8.a–b. Assessment summary. Weights are in tonnes and recruitment is in thousands.

Year	Recruitment (Age 2)	SSB	Discards	F (Ages 3-6)
1984	24150	12315		0.31
1985	29511	13358		0.31
1986	28307	14466		0.37
1987	24892	15458	198	0.37
1988	26724	15331	254	0.40
1989	28130	14432	356	0.50
1990	32075	14779	303	0.45
1991	35698	14736	198	0.42
1992	35317	15928	123	0.61
1993	24876	16328	104	0.53
1994	26190	15797	184	0.65
1995	23560	14194	130	0.58
1996	29367	13770	142	0.55
1997	23700	13280	118	0.61
1998	22577	13199	127	0.54
1999	24385	12298	110	0.63
2000	24969	11813	51	0.63
2001	16902	10546	39	0.57
2002	24809	9779	22	0.83
2003	24368	9609	21	0.49
2004	17042	11122		0.37
2005	18157	11489		0.46
2006	18362	12087		0.44
2007	17587	11138		0.46
2008	18364	11025		0.50
2009	33750	10836		0.48
2010	24426	12756		0.43
2011	20569	14571		0.40
2012	13790	14152		0.47
2013	13971	13244		0.46
2014	16611	10597		0.45
2015	17984	10178	62	0.44
2016	16539	10617	134	0.38
2017	13003	12503	55	0.30
2018	16815	11338	215	0.37
2019	20829*	12653		

*Geometric mean (1993–2016).

Sources and references

CNPMEM. 2019. Note from the French National Committee for Marine Fisheries and Sea Farming (CNPMEM) to ICES concerning stakeholders' information for the 2019 ICES advice on the stock of sole (*Solea solea*) in ICES divisions 8.a–b. Received by ICES 29 April 2019. 2 pp.

EU. 2019. Regulation (EU) 2019/472 of the European Parliament and of the Council of 19 March 2019 establishing a multiannual plan for stocks fished in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulations (EU) 2016/1139 and (EU) 2018/973, and repealing Council Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007 and (EC) No 1300/2008. Official Journal of the European Union, L 83: 1–17. http://data.europa.eu/eli/reg/2019/472/oj.

ICES. 2013. Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk, and Megrim (WGHMM), 10–16 May 2013, ICES Headquarters, Copenhagen. ICES CM 2013/ACOM:11A. 701 pp.

ICES. 2016a. EU request to ICES to provide F_{MSY} ranges for selected stocks in ICES subareas 5 to 10. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 5, Section 5.4.1. 13 pp. http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2016/Special_Requests/EU_FMSY_ranges_for_selected_Western_Waters_Stocks.pdf.

ICES. 2016b. Report of the Workshop to consider F_{MSY} ranges for stocks in ICES categories 1 and 2 in Western Waters (WKMSYREF4), 13–16 October 2015, Brest, France. ICES CM 2015/ACOM:58. 187 pp.

ICES. 2018. Advice basis. *In* Report of the ICES Advisory Committee, 2018. ICES Advice 2018, Book 1, Section 1.2. https://doi.org/10.17895/ices.pub.4503.

ICES. 2019. Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE). ICES Scientific Reports. 1:31. 692 pp. http://doi.org/10.17895/ices.pub.5299