

## Sole (*Solea solea*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters)

### ICES advice on fishing opportunities

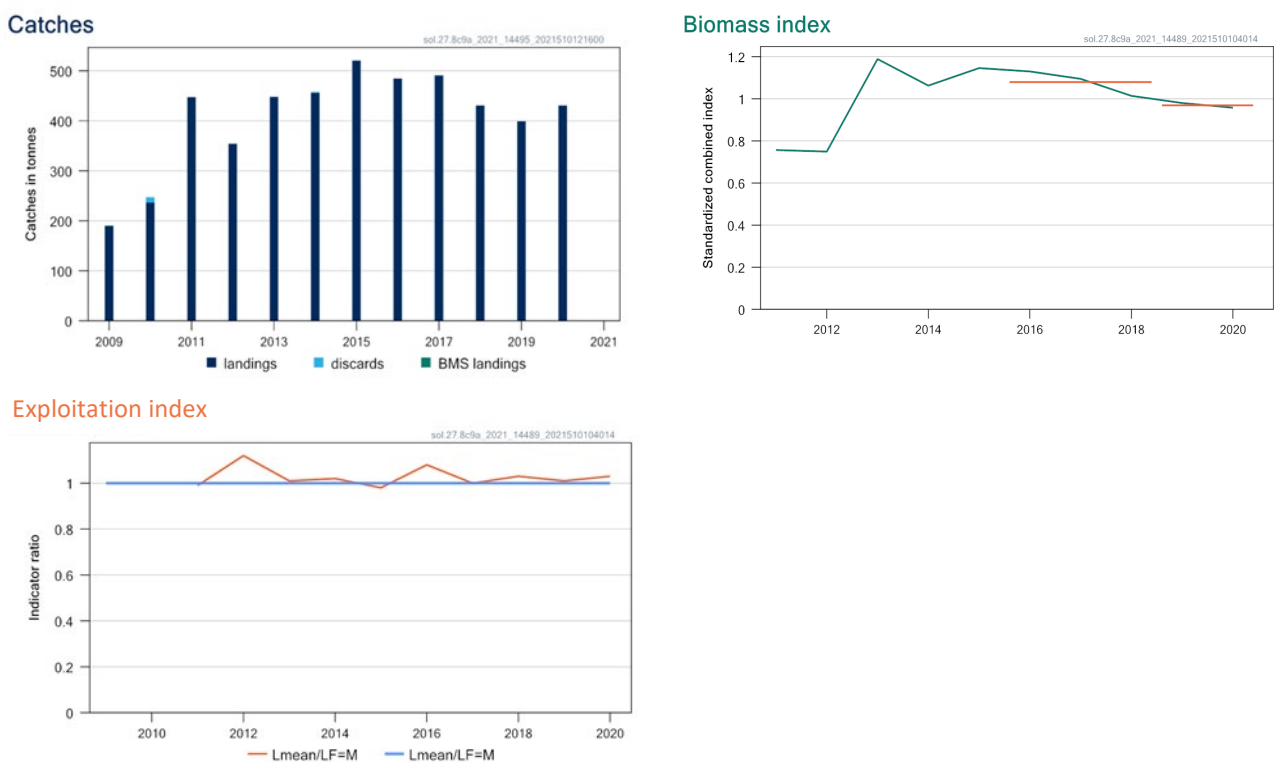
**Please note: The present advice replaces the advice given in June 2021 for catches in 2022 and 2023.**

ICES advises that when MSY approach is applied, catches should be no more than 320 tonnes<sup>†</sup> for each of the years 2022 and 2023.

Management of catches of all sole species under a combined TAC prevents effective control of each single-species exploitation rate and could potentially lead to the overexploitation of all the species.

### Stock development over time

Fishing pressure on the stock is at/below  $F_{MSY \text{ proxy}}$ ; no reference points for stock size have been defined for this stock.



**Figure 1** Sole (*Solea solea*) in divisions 8.c and 9.a. Summary of the stock assessment. Top left: Catches (Portuguese catches 2011–2020, Spanish and France catches 2009–2020). Top right: Combined stock biomass index from commercial Portuguese LPUE and the Spanish IBTS-Q4 bottom trawl survey. The horizontal orange lines indicate the average of the biomass index for 2016 to 2018 and for 2019 to 2020. Bottom left: Exploitation index ratio  $L_{\text{mean}} / LF = M$  from the length-based indicator (LBI; ICES, 2018) method is used for the evaluation of the exploitation status. The exploitation status is below the  $F_{MSY}$  proxy when the index ratio value is higher than 1.

<sup>†</sup> Value corrected. The previously published version of this advice (ICES, 2021e) was based on Method 2.1 as published in ICES, 2020. This WKLIFE X report is now updated (see ICES, 2021d) where the multiplier “m” in Method 2.1 is corrected to 0.90 instead 0.80 for stocks with  $0.2 \leq k < 0.32 \text{ yr}^{-1}$ .

## Catch scenarios

The ICES framework for category 3 stocks was applied. The advice is based on the rfb-rule to provide MSY advice (Method 2.1; ICES, 2021d). A combined stock biomass index, between the standardized commercial Portuguese LPUE and the standardized biomass index of the SP-NGFS-WIBTS-Q4 bottom trawl survey, was used as the indices of stock development.

The advice is based on the ratio of the mean of the last two index values (index A) and the mean of the three preceding values (index B), multiplied by the recent catches, a ratio of observed mean length in the catch relative to the target mean length, a biomass safeguard and a precautionary multiplier. The stability clause was not applied because  $b$  is less than 1.

Discard rates are considered to be negligible.

**Table 1** Sole (*Solea solea*) in divisions 8.c and 9.a. The basis for the catch scenarios\*.

Index A (2020, 2019)		0.97
Index B (2016, 2017, 2018)		1.08
r: Index ratio (A/B)		0.90
m: Multiplier to maintain the biomass above $B_{lim}$ to with 95% probability		0.90
f: Multiplier for relative mean length in catches ( $L_{mean} / L_{F=M 2020}$ )		1.03
b: Multiplier for index relative to trigger ( $I_{2020} / I_{trigger}$ ; $I_{trigger} = I_{loss} \times 1.4 = 1.05$ )		0.91
Stability clause	Not Applied	-
$C_y$ : Average catches of the last three years (2018, 2019, 2020)		420 tonnes
Discard rate		Negligible
Catch advice for 2022 **		320 tonnes
% advice change ***		-36%

\* The figures in the table are rounded. Calculations were done with unrounded inputs and computed values may not match exactly when calculated using the rounded figures in the table.

\*\* 2-over-3 rules for data-limited stocks  $C_{y+1} = C_y \times r \times f \times b \times m$  (Method 2.1, ICES 2020)

\*\*\*Advice value for each of the years 2022 and 2023 relative to the advice value for each of the years 2020 and 2021 (502 tonnes).

The catch advice is 36% lower than the previous advice. The catch data were revised during the recent benchmark (ICES, 2021b) and the advice is now based on a category 3 stock assessment using the ICES framework for data-limited stocks (Method 2.1; ICES, 2020). The change in advice is due to the new method, the decline in the biomass index, and the revision of catch data applied.

## Basis of the advice

**Table 2** Sole (*Solea solea*) in divisions 8.c and 9.a. The basis of the advice.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP; EU, 2019) for stocks in the Western Waters and adjacent waters applies to this stock. The MAP stipulates that when the $F_{MSY}$ ranges are not available, fishing opportunities should be based on the best available scientific advice.

## Quality of the assessment

This stock was benchmarked in 2021 (ICES, 2021b) and the time series of catches from 2011 to 2020 was revised using port-sampling data to distinguish between the different Soleidae species (*Solea solea*, *Solea senegalensis*, and *Pegusa lascaris*).

The collection of data from the commercial fishery during 2020 was affected by COVID-19 restrictions to a varying degree across member states. For this stock, the diagnostics for the assessment were deemed acceptable and the effect on the perception of the stock status and advice is considered minimal.

### Issues relevant for the advice

Management of all sole species under a combined species TAC prevents the effective control of the single-species exploitation rates and could lead to the overexploitation of either species. *S. solea* accounts for 55% of the catches in the last three years.

The advice this year is based on the MSY approach, while the precautionary approach was applied in previous years.

### Reference points

**Table 3** Sole in divisions 8.c and 9.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	Not defined		
	$F_{MSY}$	$\frac{L_{mean}}{L_{F=M}} = 1$ *	Relative value from LBI analysis, assuming $M/K = 1.5$ . $L_{F=M}$ is based on $L_c$ (Length at 50% of modal abundance) which varies each year.	(ICES, 2018)
Precautionary approach	$B_{lim}$	Not defined		
	$B_{pa}$	Not defined		
	$F_{lim}$	Not defined		
	$F_{pa}$	Not defined		
Management plan	$SSB_{mgt}$	Not defined		
	$F_{mgt}$	Not defined		

\* No reference points are defined for this stock in terms of absolute values. The LBI-estimated values of the ratio  $L_{mean}/L_{F=M}$  is used to estimate exploitation status relative to the proxy MSY reference point.

### Basis of the assessment

**Table 4** Sole in divisions 8.c and 9.a. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2021a).
Assessment type	Trends from combined biomass index between commercial Portuguese LPUE and Spanish bottom trawl survey index and Length Based Indicator (ICES, 2021c).
Input data	Commercial catches (Portuguese catches 2011–2020, Spanish and French catches 2009–2020), biomass standardized index from the Spanish North Coast Bottom Trawl Survey (IBTS Q4 [G2784], 2009–2020), standardized LPUE index from the Portuguese polyvalent fleet (2011–2020), length composition from commercial catches (Portugal and Spain 2011–2020), life-history parameters.
Discards and bycatch	Discards are known to take place and are considered negligible.
Indicators	None.
Other information	This stock was last benchmarked in 2021 (ICES, 2021b).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

### History of the advice, catch, and management

**Table 5** Sole in divisions 8.c and 9.a. ICES advice, Agreed TAC and official landings and discards. All weights are in tonnes.

Year	ICES advice	Predicted catches correspond. to advice	Agreed TAC *	Total official landings <i>Solea</i> spp.**	ICES landings <i>Solea solea</i> ***	ICES discards of <i>Solea solea</i> ***
2000		-	2000	274		
2001		-	2000	225		
2002		-	2000	141		
2003		-	1600	247		
2004		-	1520	653		
2005		-	1216	58		
2006		-	-	179		
2007		-	1216	324		
2008		-	1216	401		
2009		-	1216	501	190	0

Year	ICES advice	Predicted catches correspond. to advice	Agreed TAC *	Total official landings <i>Solea</i> spp.**	ICES landings <i>Solea solea</i> ***	ICES discards of <i>Solea solea</i> ***
2010		-	1094	543	236	11
2011		-	1072	928	447	0
2012	No increase in catch	-	1072	759	354	0
2013	20% reduction in catches	-	1072	855	448	0
2014	Same catch value advised for 2013	-	1072	867	456	2
2015	Same catch value advised for 2013	-	1072	787	521	0
2016	Precautionary approach (same catch value advised for 2013)	-	1072	707	485	0
2017	Precautionary approach (same catch value advised for 2013)	-	1072	751	491	0
2018	Precautionary approach (>20% reduction in catch relative to 2014–2016 average)	≤ 502	1072	698	430	0
2019	Precautionary approach (same catch value advised as 2018)	≤ 502	1072	745	399	0
2020	Precautionary approach	≤ 502	1072	864 ^ *	430 ^	0 ^
2021	Precautionary approach (same catch value advice as 2020)	≤ 502				
2022	MSY approach	≤ 320^^				
2023	MSY approach	≤ 320^^				

\* TAC set for *Solea* spp.

\*\* Include *Solea solea* landings. ICES landings updated since 2011 (ICES, 2021b)

\*\*\* Corrected landings after benchmark (ICES 2021b). For 2009–2010, no Portuguese landings and discards available.

^ Preliminary.

^^ The previously published version advised a catch of no more than 284 tonnes.

## History of the catch and landings

**Table 6** Sole in divisions 8.c and 9.a. Catch distribution by fleet in 2020 as estimated by ICES.

Catch (2020)	Landings		Discards
	2% bottom otter trawl	98% artisanal gears	
430 tonnes	430 tonnes		Negligible

## Summary of the assessment

**Table 7** Sole in divisions 8.c and 9.a. Assessment summary. All weights are in tonnes.

Year	Combined biomass index * (ratio)	Landings **	Discards **	$L_{\text{mean}} / L_{F=M}$
2009		190	0	
2010		236	11	
2011	0.76	447	0	0.99
2012	0.75	354	0	1.12
2013	1.19	448	0	1.01
2014	1.06	456	2	1.02
2015	1.15	521	0	0.98
2016	1.13	485	0	1.08
2017	1.10	491	0	1
2018	1.01	430	0	1.03

Year	Combined biomass index * (ratio)	Landings **	Discards **	$L_{\text{mean}} / L_F = M$
2019	0.98	399	0	1.01
2020	0.96	430	0	1.03

\* Standardized combined biomass index between the Spanish North Coast Bottom Trawl Survey index IBTS Q4 (G2784) and the commercial Portuguese LPUE

\*\* For 2009–2010, no Portuguese landings and discards available.

## Sources and references

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

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