

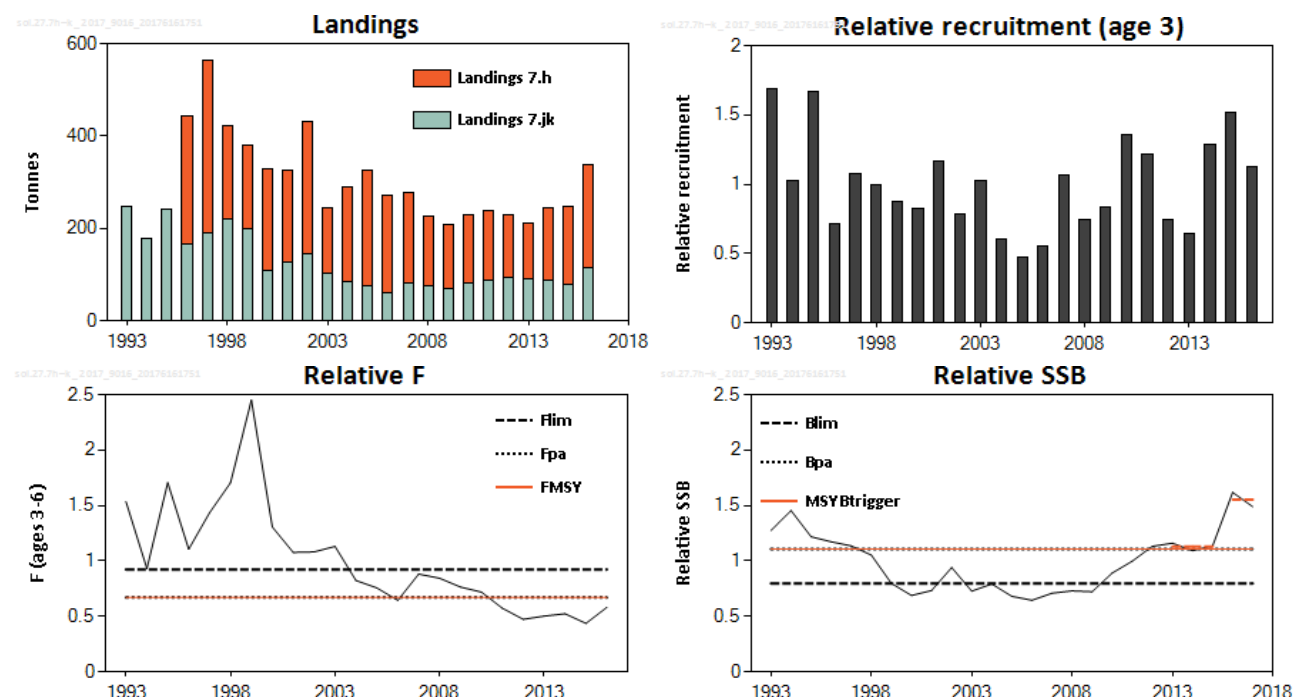
## Sole (*Solea solea*) in divisions 7.h–k (Celtic Sea South, southwest of Ireland)

### ICES stock advice

ICES advises that when the precautionary approach is applied, catches in 2018 should be no more than 268 tonnes.

### Stock development over time

The assessment is indicative of trends only. The spawning-stock biomass (SSB) shows an increasing trend since the mid-2000s and is above  $MSY B_{trigger}$  since 2015. Fishing mortality shows a declining trend and has been below  $F_{MSY}$  since 2012. Recruitment has fluctuated without trend over the time-series.



**Figure 1** Sole in divisions 7.h–k. Summary of the stock assessment, based on divisions 7.j and 7.k. The landings are for the full stock area (divisions 7.h–k), only landings from divisions 7.j and 7. k are used in the assessment. Recruitment, F, and SSB values are relative to the average of the time-series. Dashed lines denote the average of relative SSB of the respective year ranges.

### Stock and exploitation status

**Table 1** Sole in divisions 7.h–k. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size		
		2014	2015	2016		2015	2016	2017
Maximum sustainable yield	$F_{MSY}$ proxy	✓	✓	✓	Below proxy	$MSY B_{trigger}$ proxy	✓	✓
Precautionary approach	$F_{pa}, F_{lim}$	✓	✓	✓	Harvested sustainably	$B_{pa}, B_{lim}$	✓	✓
Management plan	$F_{MGT}$	—	—	—	Not applicable	$B_{MGT}$	—	—
								✓ Above proxy
								✓ Full reproductive capacity
								— Not applicable

## Catch options

The ICES framework for category 3 stocks was applied (ICES, 2012). The relative SSB estimated by the assessment model is used as the index of stock development. The advice is based on a comparison of the two latest index values (index A) with the three preceding values (index B), multiplied by the recent advised catch.

The index is estimated to have increased by more than 20% and thus the uncertainty cap was applied. The fishing mortality and the SSB are estimated to be below and above MSY reference point proxies respectively. Therefore, no additional precautionary buffer was applied. Discards are negligible.

**Table 2** Sole in divisions 7.h–k. The basis for the catch options\*.

Index A (2016–2017)		1.55
Index B (2013–2015)		1.13
Index ratio (A/B)		1.38
Uncertainty cap	Applied	1.2
Advised catch for 2017		223 tonnes
Discard rate		Negligible
Precautionary buffer	Not applied	-
Catch advice**		268 tonnes

\*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.

\*\* advice for 2017 × uncertainty cap

## Basis of the advice

**Table 3** Sole in divisions 7.h–k. The basis of the advice.

Advice basis	Precautionary approach
Management plan	ICES is not aware of any agreed precautionary management plan for sole in this area.

## Quality of the assessment

The advice is based on a trends-based assessment because the available landings-at-age data do not cover the whole area and fishery. Furthermore, there is a lack of reliable information on younger fish, no fishery-independent information on abundance, and a tendency for the assessment to underestimate stock size and overestimate fishing mortality.

The assessment is carried out on the landings in divisions 7.j and 7.k but is also considered representative for Division 7.h. The advice does take into account the landings from Division 7.h.

## Issues relevant for the advice

The catches are taken in mixed fisheries and should be managed as such. The TAC is currently not restrictive, but for some countries the quota appears to have become restrictive.

## Reference points

**Table 4** Sole in divisions 7.h–k. Reference points, values, and their technical basis.

Framework	Reference point	Relative Value*	Technical basis	Source
MSY approach	MSY $B_{trigger\ proxy}$	1.11	$B_{pa}$	ICES (2017)
	$F_{MSY\ proxy}$	0.67	Median point estimates of EqSim with segmented regression S–R relationship	ICES (2017)
Precautionary approach	$B_{lim}$	0.80	Break point segmented regression S–R relationship	ICES (2017)
	$B_{pa}$	1.11	$B_{lim} \times \exp(1.645 \times \sigma)$ ; $\sigma = 0.20$	ICES (2017)
	$F_{lim}$	0.92	F with 50% probability of $SSB < B_{lim}$	ICES (2017)
	$F_{pa}$	0.67	$F_{lim} \times \exp(-1.645 \times \sigma)$ ; $\sigma = 0.20$	ICES (2017)
Management plan	$SSB_{mgt}$			
	$F_{mgt}$			

\* All values are relative to the average of the time-series in the stock assessment (see Table 9).

## Basis of the assessment

**Table 5** Sole in divisions 7.h–k. Basis of assessment and advice.

ICES stock data category	3 ( <a href="#">ICES, 2016</a> )
Assessment type	Age-based analytical assessment (XSA) indicative of stock trends (ICES, 2017)
Input data	Commercial catches (international landings from divisions 7.j and 7.k, Irish age composition from catch sampling); commercial tuning index (IRL-VMS-OTB); natural mortalities and maturity are assumed to be the same as for sole in divisions 7.f and 7.g.
Discards and bycatch	Discarding is considered negligible and is not included
Indicators	None
Other information	None
Working group report	Working Group for the Celtic Seas Ecoregion (WGCSE)

## Information from stakeholders

There is no additional available information for this stock.

## History of the advice, catch, and management

**Table 6** Sole in divisions 7.h–k. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC	Official landings	ICES catch
1996	No advice	-	-	826	443
1997	No advice	-	-	742	564
1998	No advice	-	-	759	423
1999	No advice	-	-	406	381
2000	No advice	-	-	303	329
2001	No advice	-	650	352	325
2002	No advice	-	650	517	430
2003	Reduce TAC to recent landings	330	390	486	245
2004	Reduce TAC to recent average (2000–2002)	360	390	450	290
2005	Reduce TAC to recent average (2001–2003)	335	650	395	326
2006	Reduce TAC to recent average (2002–2004)	380	650	279	272
2007	Reduce TAC to recent average (2003–2005)	287	650	278	277
2008	Reduce TAC to recent average (2004–2006)	300	650	219	225
2009	Same advice as last year	300	553	208	208
2010	No advice	-	498	229	228
2011	No increase in catches	-	423	218	237
2012	No increase in catches	-	423	233	228
2013	Decrease catches by 8% (15% increase, followed by 20%	< 200	402	212	211

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC	Official landings	ICES catch
	PA reduction)				
2014	Increase catches by 11%	< 252	382	239	243
2015	Average catch (2011–2013)	< 225	382	237	248
2016	Precautionary approach (decrease recent advised value by no more than 9%)	≤ 205	382	329	344
2017	Precautionary approach (increase recent advised value by no more than 9%)	≤ 223	382		
2018	Precautionary approach (increase recent advised value by no more than 20%)	≤ 268			

### History of the catch and landings

**Table 7** Sole in divisions 7.h–k. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings			Discards
329 tonnes	Otter trawl 55%	Beam trawl 44 %	Other 2%	Negligible
	329 tonnes			

**Table 8** Sole in divisions 7.h–k. 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	7.h					7.j				7.k			7.h	7j-k	7h-k	7h-k
	Bel.	Fra.	Ire.	NL	UK	Bel.	Fra.	Ire.	UK	Fra.	Ire.	UK	Total	Total	Total	ICES estim.
1993	0	43	0	0	206	0	1	237	8	0	0	0	249	246	495	
1994	0	42	8	0	172	0	0	176	2	0	0	0	222	178	400	
1995	0	44	11	0	186	0	1	232	6	2	0	0	241	241	482	
1996	0	48	20	70	147	0	2	162	1	0	1	0	285	166	451	443
1997	0	56	16	0	111	0	2	187	1	0	0	1	183	191	374	564
1998	0	65	13	7	109	0	8	208	2	1	0	0	194	219	413	423
1999	5	0	8	1	96	96	0	199	1	0	0	0	110	200	310	381
2000	0	72	8	10	95	8	4	103	0	2	0	0	185	109	294	329
2001	6	86	11	0	111	7	11	113	0	2	1	0	214	127	341	325
2002	85	85	9	0	124	69	8	120	0	15	1	0	303	144	447	430
2003	122	113	23	0	78	48	20	82	0	0	0	0	336	102	438	245
2004	155	95	33	0	79	2	7	78	0	0	0	0	362	85	447	290
2005	90	86	28	0	112	0	7	69	0	0	1	0	316	77	393	326
2006	36	81	14	1	86	0	11	49	1	0	0	0	218	61	279	272
2007	31	69	4	0	91	0	9	73	0	0	1	0	195	83	278	277
2008	10	49	3	0	80	0	8	69	0	0	0	0	142	77	219	225
2009	11	70	0	0	58	0	9	60	0	0	0	0	139	69	208	208
2010	20	73	3	0	51	0	14	68	0	0	0	0	147	82	229	228
2011	10	70	1	0	54	0	23	63	0	1	0	0	135	87	222	237
2012	18	74	2	0	46	0	11	83	0	0	0	0	140	94	234	228
2013	4	69	1	0	47	0	7	84	0	0	0	0	121	91	212	211
2014	42	56	3	0	53	0	5	78	0	0	0	0	154	83	237	243
2015*	40	70	3	0	53	0	4	74	0	0	0	0	166	78	244	248
2016*	91	67	4	0	61	0	10	94	2	0	0	0	223	115	329	344

\* Preliminary.

## Summary of the assessment

**Table 9** Sole in divisions 7.h–k. Summary of the stock assessment; assessment results are for divisions 7.j and 7.k. Recruitment, SSB, and F are relative to the mean of the time-series.

Year	Relative Recruitment Age 3	Relative SSB	Landings used in assessment (7.jk)	Total landings in 7.h-k	Relative F Ages 3-6
1993	1.685	1.275	246		1.54
1994	1.026	1.455	178		0.93
1995	1.670	1.218	241		1.71
1996	0.710	1.173	166	443	1.11
1997	1.071	1.136	191	564	1.44
1998	0.996	1.053	219	423	1.71
1999	0.874	0.798	200	381	2.45
2000	0.821	0.689	109	329	1.31
2001	1.171	0.734	127	325	1.08
2002	0.787	0.941	144	430	1.08
2003	1.026	0.728	102	245	1.13
2004	0.603	0.792	85	290	0.82
2005	0.470	0.681	77	326	0.76
2006	0.558	0.646	61	272	0.64
2007	1.069	0.710	83	277	0.88
2008	0.740	0.730	77	225	0.84
2009	0.834	0.723	69	208	0.77
2010	1.360	0.892	82	228	0.72
2011	1.212	0.999	87	237	0.57
2012	0.746	1.132	94	228	0.47
2013	0.643	1.160	91	211	0.50
2014	1.287	1.093	87	243	0.52
2015	1.514	1.136	78	248	0.44
2016	1.127	1.618	115	339	0.58
2017		1.489			

## Sources and references

ICES. 2012. ICES Implementation of Advice for Data-limited Stocks in 2012 in its 2012 Advice. ICES CM 2012/ACOM:68. 42 pp.)

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