

## Lemon sole (*Microstomus kitt*) in Subarea 4 and divisions 3.a and 7.d (North Sea, Skagerrak and Kattegat, eastern English Channel)

### ICES advice on fishing opportunities

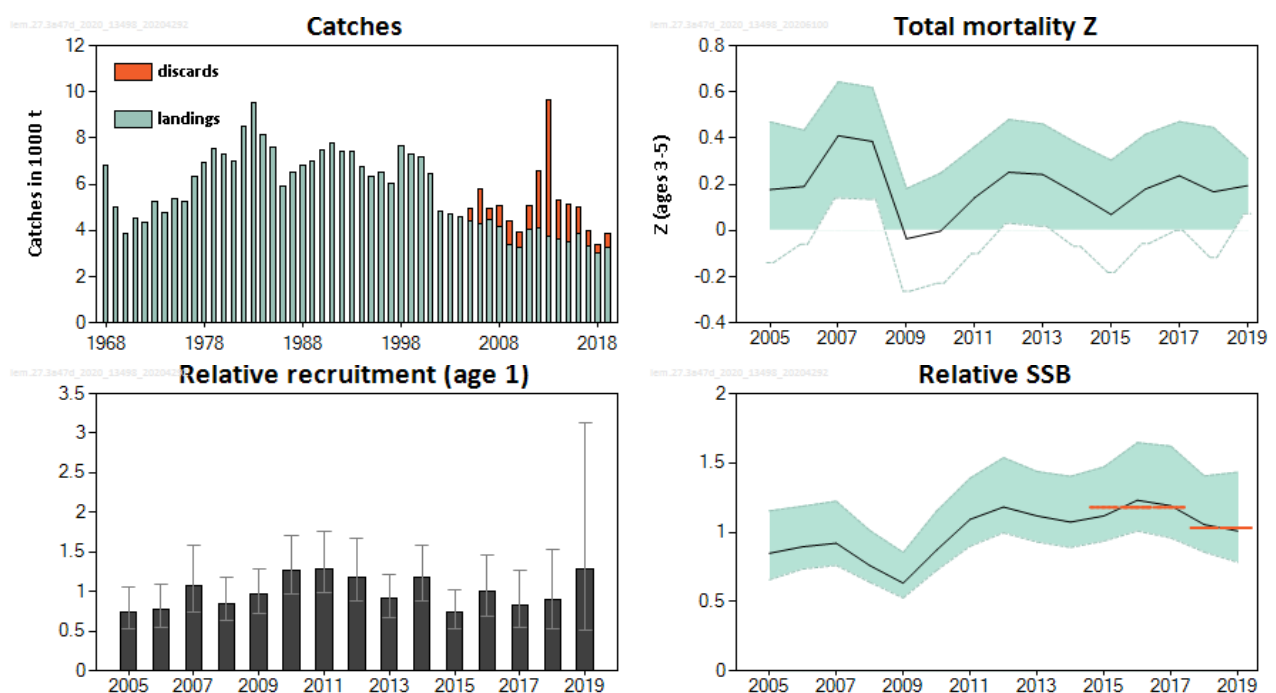
**Please note: The present advice replaces the advice given in June 2019 for catches in 2021**

ICES advises that when the precautionary approach is applied, catches in 2021 should be no more than 3742 tonnes.

Management of lemon sole and witch under a combined species TAC prevents effective control of the single-species exploitation rates and could lead to the overexploitation of either species. ICES advises that management should be implemented at the species level in the entire stock distribution area (Subarea 4 and divisions 3.a and 7.d).

*Note: This advice sheet is abbreviated due to the COVID-19 disruption. The previous biennial advice issued for 2020 and 2021 is attached as Annex 1. The advice for lemon sole is now issued annually.*

### Stock development over time

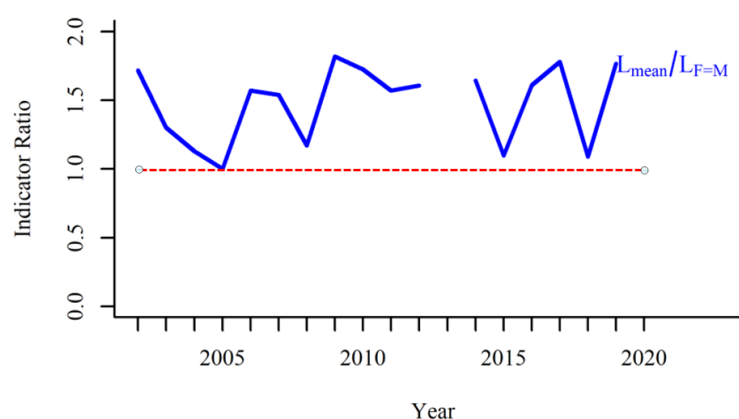


**Figure 1** Lemon sole in Subarea 4 and divisions 3.a and 7.d. Summary of the stock assessment. Left: Official landings (1968–2004) and ICES-estimated landings and discards (2005–2019 only). Upper right: SURBAR-estimated relative recruitment with 90% confidence intervals. Lower left: SURBAR-estimated mean  $Z$  over ages 3–5, with 90% confidence intervals. Lower right: SURBAR-estimated relative SSB with 90% confidence intervals. The red horizontal lines show the mean stock indicators for 2018–2019 and 2015–2017.

## Stock and exploitation status

**Table 1** Lemon sole in Subarea 4 and divisions 3.a and 7.d. State of the stock and the fishery relative to reference points. The fishing pressure status indicators are based on the LBI analyses shown in Figure 2.

		Fishing pressure				Stock size			
		2017	2018	2019		2017	2018	2019	
Maximum sustainable yield	$F_{MSY}$ proxy	✓	✓	✓ Below proxy		MSY $B_{trigger}$	?	?	? Undefined
Precautionary approach	$F_{pa}$ , $F_{lim}$	✓	✓	✓ Below possible reference points		$B_{pa}$ , $B_{lim}$	?	?	? Undefined
Management plan	$F_{MGT}$	—	—	— -		$B_{MGT}$	—	—	— Not applicable
Qualitative evaluation	-	—	—	— -		-	→	↘	↘ Decreasing



**Figure 2** Lemon sole in Subarea 4 and divisions 3.a and 7.d. The indicator ratio  $L_{mean} / L_{F=M}$  from the length-based indicator (LBI; ICES, 2020) method is used for the evaluation of the exploitation status. The exploitation status is below the  $F_{MSY}$  proxy when the indicator ratio value is higher than 1 (shown by a dotted red line).

## Catch scenarios

**Table 2** Lemon sole in Subarea 4 and divisions 3.a and 7.d. The basis for the catch scenarios.\*

Index A (2018–2019)	1.03 (relative SSB index)	
Index B (2015–2017)	1.18 (relative SSB index)	
Index ratio (A/B)	0.88	
Uncertainty cap	Not applied	-
Advised catch for 2020	4279 tonnes	
Discard rate (2017–2019)	13.9%	
Precautionary buffer	Not applied (last applied in 2019)	-
Catch advice **	3742 tonnes	
Projected landings corresponding to the advice ***	3221 tonnes	
% advice change	-12.5%	

\*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.

\*\* [Advised catch for 2020] × [index ratio].

\*\*\* [Advised catch for 2020] × [index ratio] × [1–discard rate].

## History of the advice, catch, and management

**Table 3** Lemon sole in Subarea 4 and divisions 3.a and 7.d. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC * in Subarea 4 and Division 2.a	Division 3.a, Subarea 4, and Division 7.d				
					ICES estimated total catch	ICES estimated landings	ICES estimated discards	Official landings	
				lemon sole and witch	lemon sole	lemon sole	lemon sole	lemon sole and witch	lemon sole
2006		-		6175	5809	4294	1515	6593	4290
2007		-		6175	4919	4468	451	6725	4488
2008		-		6793	5051	4153	898	5929	3975
2009		-		6793	4401	3405	996	5212	3394
2010		-		6521	3907	3234	673	4691	32.01
2011		-		6391	5055	4030	1024	5552	4022
2012	No increase in catch	-		6391	6560	4099	2461	5922	4026
2013	No new advice, same as for 2012	-		6391	9663	3725	5938	5754	3761
2014	No more than 16% increase in landings (last 3 years average)	< 4350		6391	5335	3645	1690	6335	3689
2015	No new advice, same as for 2014	< 4350		6391	5116	3480	1636	5752	3394
2016	Precautionary approach (decrease catches by 9%)		< 5655	6391	5000	3834	1167	6463	3803
2017	Precautionary approach (same advised catch value as given for 2016)		< 5655	6391	3966	3315	651	6064	3323
2018	Precautionary approach (decrease catches by 3%)		< 5484	6391	3376	3046^	332	5966	3014
2019	Precautionary approach (same advised catch value as given for 2016)		< 5484	7874	3873	3273^	600	5806	3238**
2020	Precautionary approach		≤ 4279	6785					
2021	Precautionary approach		≤ 3742***						

\* EU combined TAC for lemon sole and witch in EU waters of Division 2.a and Subarea 4.

\*\* Preliminary.

\*\*\* Advice for 2021 was originally drafted in 2019 (≤ 4279 tonnes), but is no longer valid.

^ Includes estimated BMS landings. **Summary of the assessment**

**Table 4** Lemon sole in Subarea 4 and divisions 3.a and 7.d. Assessment summary. Weights for landings and discards are in tonnes.

Year	Relative recruitment			Relative SSB			Landings*	Discards	Total mortality		
	Age 1	High	Low	SSB	High	Low			Ages 3–5 **	High	Low
1968							6792				
1969							5000				
1970							3859				
1971							4497				
1972							4315				
1973							5233				
1974							4761				
1975							5379				
1976							5233				

Year	Relative recruitment			Relative SSB			Landings*	Discards	Total mortality		
	Age 1	High	Low	SSB	High	Low			Ages 3–5 **	High	Low
1977							6325				
1978							6954				
1979							7521				
1980							7298				
1981							7016				
1982							8487				
1983							9507				
1984							8111				
1985							7575				
1986							5937				
1987							6495				
1988							6798				
1989							7024				
1990							7485				
1991							7780				
1992							7442				
1993							7417				
1994							6760				
1995							6303				
1996							6523				
1997							6058				
1998							7680				
1999							7300				
2000							7171				
2001							6456				
2002							4823				
2003							4722				
2004							4574				
2005	0.75	1.06	0.53	0.848	1.154	0.657	4429	527	0.177	0.47	-0.139
2006	0.78	1.09	0.55	0.896	1.188	0.735	4294	1515	0.190	0.43	-0.059
2007	1.07	1.58	0.75	0.921	1.224	0.761	4468	451	0.41	0.64	0.140
2008	0.85	1.19	0.63	0.76	1.013	0.64	4153	898	0.39	0.62	0.135
2009	0.97	1.29	0.73	0.633	0.854	0.526	3405	996	-0.036	0.181	-0.26
2010	1.27	1.72	0.97	0.872	1.153	0.725	3234	673	-0.0030	0.25	-0.23
2011	1.29	1.76	0.98	1.093	1.39	0.899	4030	1024	0.142	0.36	-0.100
2012	1.19	1.67	0.89	1.182	1.538	0.996	4099	2461	0.25	0.48	0.030
2013	0.91	1.22	0.66	1.118	1.438	0.93	3725	5938	0.24	0.46	0.0190
2014	1.19	1.59	0.87	1.073	1.403	0.89	3645	1690	0.158	0.38	-0.069
2015	0.74	1.02	0.54	1.118	1.471	0.936	3480	1636	0.069	0.30	-0.181
2016	1	1.46	0.7	1.231	1.646	1.009	3834	1167	0.179	0.42	-0.057
2017	0.83	1.27	0.54	1.191	1.621	0.959	3315	651	0.24	0.47	0.00100
2018	0.89	1.53	0.53	1.055	1.406	0.857	3046	332	0.167	0.45	-0.117
2019	1.28	3.13	0.52	1.009	1.433	0.783	3273	600	0.194	0.31	0.073

\* Official landings statistics 1968–2004, ICES-estimated landings 2005–2019.

\*\* See the “Quality of the assessment” section in Annex 1 for an explanation of negative mortality estimates.

## Sources and references

ICES. 2020. ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES Scientific Reports. 2:61. <http://doi.org/10.17895/ices.pub.6092>

*Recommended citation:* ICES. 2020. Lemon sole (*Microstomus kitt*) in Subarea 4 and divisions 3.a and 7.d (North Sea, Skagerrak and Kattegat, eastern English Channel). In Report of the ICES Advisory Committee, 2020. ICES Advice 2020, lem.27.3a47d. <https://doi.org/10.17895/ices.advice.5833>.

## Annex 1

ICES Advice on fishing opportunities, catch, and effort  
Greater North Sea ecoregion  
Published 28 June 2019  
Version 2: 3 September 2019

### Lemon sole (*Microstomus kitt*) in Subarea 4 and divisions 3.a and 7.d (North Sea, Skagerrak and Kattegat, eastern English Channel)

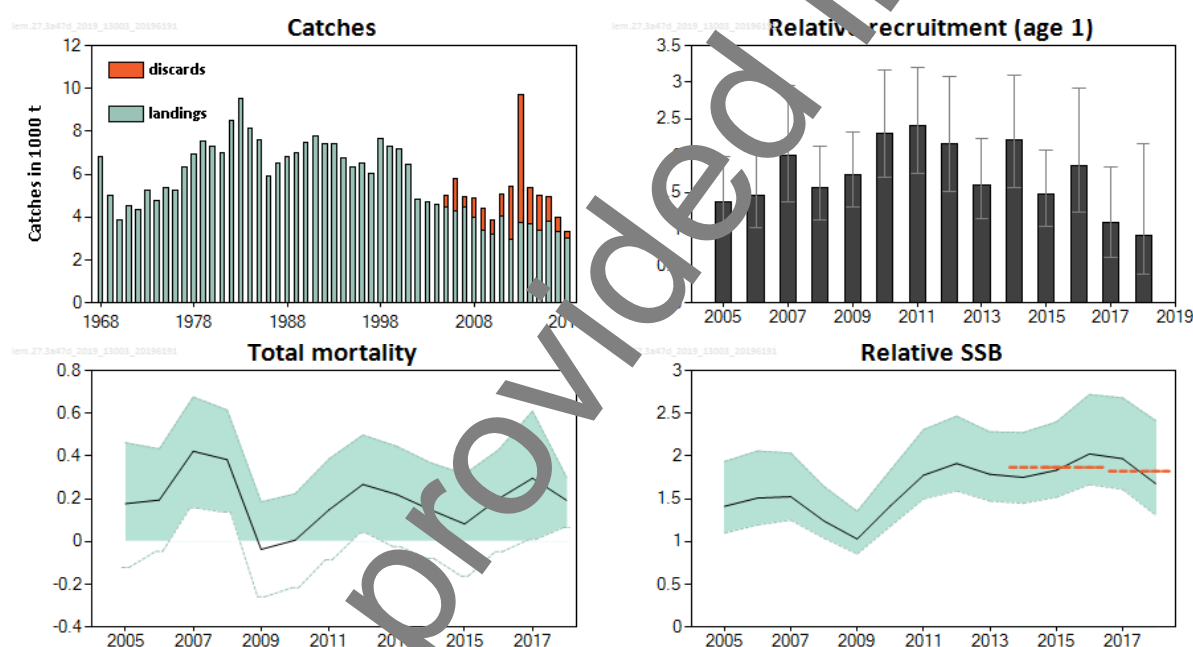
#### ICES advice on fishing opportunities

ICES advises that when the precautionary approach is applied, catches should be no more than 4279 tonnes in each of the years 2020 and 2021.

ICES advises that if lemon sole continues to be managed using a total allowable catch (TAC), then it should be a single-species TAC covering an area appropriate to the relevant stock distribution (ICES Subarea 4 and divisions 3.a and 7.d).

#### Stock development over time

Total mortality  $Z_{3-5}$  has fluctuated without trend. Spawning-stock biomass (SSB) increased from 2007 to 2012, and has remained stable since, albeit with a small decline in 2018. Recruitment has shown a modest downwards trend since a peak in 2011.



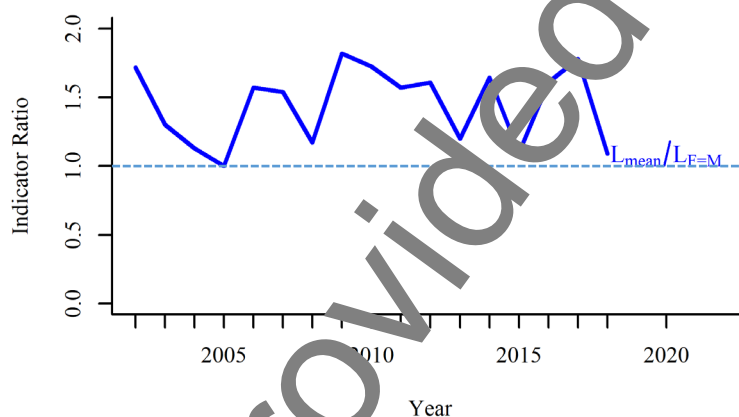
**Figure 1** Lemon sole in Subarea 4 and divisions 3.a and 7.d. Summary of the stock assessment. Left: ICES estimated landings and discards (2005–2017 only). Upper right: SURBAR-estimated relative recruitment with 90% confidence intervals. Lower left: SURBAR-estimated mean  $Z$  over ages 3–5, with 90% confidence intervals. Lower right: SURBAR-estimated relative SSB with 90% confidence intervals, including horizontal lines showing the DLS 3.2 decision rule.

## Stock and exploitation status

ICES assesses that fishing pressure on the stock is below  $F_{MSY}$ . No reference points for stock size have been defined for this stock.

**Table 1** Lemon sole in Subarea 4 and divisions 3.a and 7.d. State of the stock and fishery relative to reference points. The fishing pressure status indicators are based on the LBI analyses shown in Figure 2<sup>†</sup>.

		Fishing pressure			Stock size		
		2016	2017	2018	2016	2017	2018
Maximum sustainable yield	$F_{MSY}$	✓	✓	✓ Below proxy	?	?	?
Precautionary approach	$F_{pa}, F_{lim}$	✓	✓	✓ Below possible reference points	?	?	?
Management plan	$F_{MGT}$	—	—	—	—	—	—
Qualitative evaluation	—	—	—	—	↗	→	↘ Decreasing



**Figure 2** Lemon sole in Subarea 4 and divisions 3.a and 7.d. The index ratio  $L_{mean} / L_{F=M}$  from the length-based indicator (LBI; ICES 2017) 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 (shown by a dotted line).

<sup>†</sup> Version 2: Stock status table updated

## Catch scenarios

The ICES framework for category 3 stocks was applied (ICES, 2012). A SURBAR assessment was used to provide the index of stock development (relative SSB). 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 decreased by less than 20%, so the uncertainty cap was not applied.

The Length-Based Indicator (LBI; ICES 2017) analysis suggests that fishing mortality is below proxies of the MSY reference points (Figure 2). Whilst there is no sign of overexploitation, the stock size is unknown. There is also no evidence that the stock size is increasing significantly, so the precautionary buffer was applied.

**Table 2** Lemon sole in Subarea 4 and divisions 3.a and 7.d. The basis for the catch scenarios.

Index A (2017–2018)		1.823 (relative SSB index)
Index B (2014–2016)		2.869 (relative SSB index)
Index ratio (A/B)		0.975
Uncertainty cap	Not applied	-
Advised catch for 2018–2019		5 484 tonnes
Discard rate (2016–2018)		15.72%
Precautionary buffer	Applied	0.8
Catch advice **		4 279 tonnes
Landings corresponding to the catch advice ***		3 607 tonnes
% advice change^		-21.97 %

\*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.

\*\* [Advised catch for 2018–2019] × [index ratio] × [precautionary buffer]

\*\*\* [Advised catch for 2018–2019] × [index ratio] × [precautionary buffer] × [1-discard rate].

The advised reduction in catch (-22%) is mainly due to the application of the precautionary buffer to the previous advised catch.

## Basis of the advice

**Table 3** Lemon sole in Subarea 4 and divisions 3.a and 7.d. The basis of the advice.

Advice basis	Precautionary approach
Management plan	The EU multiannual plan (MAP) for stocks in the North Sea (EU, 2018) and adjacent waters applies to by-catches of this stock.
	The MAP stipulates that when the FMSY ranges are not available, fishing opportunities should be based on the best available scientific advice.

## Quality of the assessment

The assessment is based on survey data from the IBTS and BTS international surveys. Catchability of lemon sole at younger ages appears to be low in the IBTS survey, while the BTS survey does not cover the full extent of stock distribution.

The lemon sole advice is based on a SURBAR analysis of these survey indices. The survey indices themselves are noisy, variable from year to year (and within year), and do not track lemon sole cohort strength very well. This issue is not thought to affect estimates of relative SSB. In one or two years, however, the SURBAR estimates of mean total mortality are negative. This arises when the survey observation of cohort strength increases as the cohort ages, rather than decreasing as expected. When this happens for enough ages within a year, the estimated mean total mortality can be negative; this is an expected consequence of the use of noisy survey series. This does not affect the advice, however, which is based on the last 5 years of the relative SSB estimate.

A fishery-independent index covering the entire distribution area of the stock and targeting all length classes of lemon sole could improve the assessment.

## Issues relevant for the advice

Lemon sole is mainly a valuable bycatch species in mixed fisheries. ICES (ICES, 2018c) advised that removing the TAC for lemon sole would generate a low risk of the stock being exploited unsustainably.

Management of witch and lemon sole under a combined species TAC may hinder effective management of the exploitation rates of the individual species. If a TAC is maintained for lemon sole, then a single-species TAC covering the entire stock would be more appropriate.

Following the benchmark in 2018, the fishing pressure is estimated using a length-based indicator (LBI).

Improved information on age and length distributions in landings and discards, from most countries participating in the fishery, would be required in order to conduct a fully analytical assessment.

## Reference points

**Table 4** Lemon sole in Subarea 4 and divisions 3.a and 7.d. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B <sub>trigger proxy</sub>	Not defined		
	F <sub>MSY proxy</sub>	$\frac{L_{mean}}{L_{F=M}} = 1^*$	Relative value from LBI analysis, assuming M/K = 1.5. L <sub>F=M</sub> is based on L <sub>c</sub> (length at 50% of modal abundance) which varies each year	ICES (2018a)
Precautionary approach	B <sub>jim</sub>	Not defined		
	B <sub>pa</sub>	Not defined		
	F <sub>jim</sub>	Not defined		
	F <sub>pa</sub>	Not defined		
Management plan	SSB <sub>mgt</sub>	Not defined		
	F <sub>mgt</sub>	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 5** Lemon sole in Subarea 4 and divisions 3.a and 7.d. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2018b).
Assessment type	Survey trends-based assessment (SURBAR; ICES, 2019).
Input data	Commercial catches (international landings and discards), three survey indices (IBTS Q1 and Q3, BTS Q3), fixed maturity estimates, and annual weight-at-age data from the surveys.
Discards and bycatch	Discarding is known to take place and discards have been quantified for 2002–2018 (average rate for 2016–2018 = 15.72%).
Indicators	LBI assessment based on lengths from commercial catch data (2002–2018)
Other information	None
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

## Information from stakeholders

There is no additional available information for this stock.



## History of the advice, catch, and management

**Table 6** Lemon sole in Subarea 4 and divisions 3.a and 7.d. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC * 4 and 2.a lemon sole and witch	ICES estimated total catch 3.a, 4, and 7.d lemon sole	ICES estimated landing 3.a, 4, and 7.d lemon sole	ICES estimated discards 3.a, 4, and 7.d lemon sole	Official landings 3.a, 4, and 7.d lemon sole and witch	Official landings 3.a, 4, and 7.d lemon sole
2006		-		6175	5809	4294	1515	6593	4290
2007		-		6175	4919	4468	451	6725	4488
2008		-		6793	5051	4153	898	5929	3975
2009		-		6793	4401	3405	996	5212	3394
2010		-		6521	3907	3234	673	4691	32.01
2011		-		6391	5055	4030	1024	5552	4022
2012	No increase in catch	-		6391	6560	4099	2461	5922	4026
2013	No new advice, same as for 2012	-		6391	961	3725	5938	5754	3761
2014	No more than 16% increase in landings (last 3 years average)	< 4350		6391	5335	3645	1690	6335	3689
2015	No new advice, same as for 2014	< 4350		6391	5116	3480	1636	5752	3394
2016	Precautionary approach (decrease catches by 9%)		< 5655	6391	5000	3834	1167	6463	3803
2017	Precautionary approach (same advised catch value as given for 2016)		< 5655	6391	3966	3315	651	6064	3323
2018	Precautionary approach (decrease catches by 3%)		< 5484	6391	3377	3046	332	5966	3014 **
2019	Precautionary approach (same advised catch value as given for 2016)		< 5484	7874					
2020	Precautionary approach		≤ 279						
2021	Precautionary approach		≤ 279						

\* EU combined TAC for lemon sole and witch in EU waters of Division 2.a and Subarea 4.

\*\* Preliminary.

## History of the catch and landings

**Table 7** Lemon sole in Subarea 4 and divisions 3.a and 7.d. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings					By gears
	Otter trawl 73%	Beam trawl 22%	Seine 2%	Gillnet 2%	Other 1%	
3377 tonnes	3046 tonnes					332 tonnes

**Table 8** Lemon sole in Subarea 4 and divisions 3.a and 7.d. History of commercial catch and landings; the official landings (1950–2016) and ICES estimates (2013–2016) are presented by area for each country participating in the fishery. All weights are in tonnes.

### Area 7d: official landings

Year	Official landings						Total
	Belgium	Denmark	France	Netherlands	UK	Other	
1950	10	0	174	0	24	0	208
1951	5	0	262	0	47	0	314
1952	10	0	188	0	100	0	298
1953	7	0	196	0	183	0	386
1954	9	0	361	0	164	0	534
1955	9	0	0	0	132	0	141
1956	4	0	0	0	99	0	103
1957	7	0	0	0	95	0	102
1958	1	0	0	0	81	0	82
1959	2	0	0	0	80	0	82
1960	4	0	0	0	62	0	66
1961	1	0	0	0	106	1	108
1962	2	0	0	0	99	0	101
1963	3	0	0	0	63	0	66
1964	5	0	0	0	72	0	77
1965	16	0	0	0	89	0	105
1966	7	0	0	0	194	0	201
1967	6	0	0	0	325	0	331
1968	8	0	0	0	329	0	337
1969	12	0	0	0	303	0	315
1970	16	0	0	0	240	0	256
1971	22	0	0	0	335	0	357
1972	18	0	0	0	457	0	475
1973	25	0	0	0	426	0	451
1974	16	0	0	1	334	0	351
1975	19	0	0	0	14	0	33
1976	24	0	0	0	18	0	42
1977	21	1	0	0	15	0	37
1978	45	2	63	0	31	0	141
1979	60	0	165	0	35	0	260
1980	31	0	109	0	10	0	152
1981	66	0	212	0	12	0	290
1982	55	0	406	1	81	0	584
1983	108	0	298	0	85	0	491
1984	110	0	367	0	109	0	586
1985	117	0	164	0	66	0	347
1986	77	0	133	0	41	0	251
1987	81	0	185	0	44	0	310
1988	74	0	155	0	29	0	258
1989	68	0	252	0	44	0	364
1990	68	0	272	0	83	0	423
1991	83	0	272	0	73	0	428
1992	66	0	176	0	122	0	364
1993	36	0	311	0	75	0	422

Year	Official landings						
	Belgium	Denmark	France	Netherlands	UK	Other	Total
1994	97	0	505	0	93	0	695
1995	138	0	584	0	155	0	877
1996	213	0	720	0	218	0	1151
1997	143	0	305	0	115	0	563
1998	53	0	198	0	95	0	346
1999	50	0	0	0	90	0	140
2000	62	0	200	0	126	0	388
2001	104	0	191	0	188	0	483
2002	101	0	256	0	117	0	474
2003	128	0	251	0	112	0	491
2004	120	0	198	1	10	0	424
2005	90	0	187	2	7	0	350
2006	98	0	100	0	48	0	246
2007	70	0	72	1	21	0	164
2008	140	0	46	3	45	0	234
2009	149	0	176	9	108	0	442
2010	101	0	85	5	32	0	223
2011	153	0	178	15	7	0	403
2012	171	0	167	20	0	0	358
2013	176	0	179	26	110	0	491
2014	162	0	108	4	72	0	357
2015	123	0	84	5	41	0	253
2016	115	0	69	9	47	0	240
2017	87	0	34	8	29	0	158
2018	57	0	21	5	15	0	99

**Area 7.d: ICES estimates of landings and discards**

Year	ICES estimates of landings							ICES estimates of discards
	Belgium	Denmark	France	Netherlands	UK	Other	Total	Total
2013	241	0	179	27	110	0	557	99
2014	237	0	109	22	72	0	431	149
2015	192	0	85	10	42	0	329	104
2016	158	0	69	7	47	0	282	57
2017	105	0	35	7	30	0	177	22
2018	73	0	20	5	16	0	114	27

**Area 4: official landings**

Year	Official landings								
	Belgium	Denmark	France	Germany	Netherlands	Norway	UK	Other	Total
1950	112	435	139	31	156	0	2855	26	3754
1951	115	825	90	21	167	0	3430	42	4710
1952	98	311	227	26	168	0	3953	59	4922
1953	73	409	189	18	132	0	4590	29	5440
1954	2	272	177	24	112	0	3368	17	3972
1955	49	31	0	15	78	0	3374	9	3836
1956	48	222	0	19	58	0	3034	14	3395
1957	39	249	0	24	64	0	3032	11	3419
1958	8	171	0	13	43	0	2835	12	3104
1959	85	242	0	40	43	0	3226	11	3647
1960	15	577	0	46	67	0	3178	12	4035
1961	28	488	0	79	102	0	3934	11	4900
1962	175	501	0	54	106	0	3794	0	4630
1963	365	222	0	36	71	0	3097	0	3791
1964	484	358	0	62	75	0	3142	0	4121
1965	562	385	0	91	93	0	3818	0	4949
1966	594	548	0	98	65	0	4110	0	5415
1967	601	791	0	136	61	0	4599	0	6188

Year	Official landings								
	Belgium	Denmark	France	Germany	Netherlands	Norway	UK	Other	Total
1968	422	775	0	96	34	0	4943	0	6270
1969	292	639	0	80	36	0	3423	0	4470
1970	241	307	0	52	58	0	2776	0	3434
1971	348	514	0	54	122	0	2929	0	3967
1972	423	530	0	59	130	0	2530	0	3672
1973	566	478	0	73	217	16	3218	0	4568
1974	486	447	0	59	269	0	2966	0	4227
1975	748	521	0	83	299	0	3397	11	5029
1976	493	506	0	68	308	0	3443	12	4830
1977	618	321	0	71	262	0	4381	2	5661
1978	760	517	28	54	231	0	4118	0	6108
1979	674	876	136	41	390	0	4318	3	6428
1980	484	599	102	49	303	0	4815	2	6424
1981	555	605	237	39	412	0	4081	1	5933
1982	879	670	419	52	759	0	4386	3	7168
1983	1122	735	402	28	1009	0	4957	4	8257
1984	1144	567	344	22	0	0	4850	3	6930
1985	989	555	157	26	0	0	4703	5	6435
1986	511	577	103	16	0	0	3839	1	5047
1987	448	742	174	14	0	0	4137	1	5516
1988	539	639	184	14	30	0	4220	1	5898
1989	441	828	176	40	391	0	4083	2	5967
1990	491	1007	208	49	0	0	4431	4	6190
1991	544	1099	250	41	0	12	4666	6	6618
1992	577	1149	177	30	0	13	4175	5	6126
1993	525	966	240	37	0	9	4059	3	5839
1994	436	597	436	27	0	11	3754	1	5262
1995	588	585	412	70	0	9	3046	2	4712
1996	592	547	534	57	0	18	2976	3	4737
1997	504	499	224	71	0	29	3391	4	4727
1998	815	796	197	149	838	23	3643	5	6466
1999	662	1015	0	62	681	24	3866	6	6316
2000	711	1277	184	72	492	17	3222	5	5980
2001	694	1281	191	77	451	22	2666	7	5389
2002	604	971	10	116	402	17	1521	6	3827
2003	517	1008	239	136	369	16	1399	4	3688
2004	667	1113	120	81	355	12	1192	3	3543
2005	595	1057	102	85	402	13	1188	2	3444
2006	552	968	1	183	412	13	1440	2	3627
2007	542	1136	65	143	367	23	1610	6	3892
2008	527	915	47	120	434	26	1383	4	3466
2009	389	884	88	64	294	31	927	2	2693
2010	375	821	32	102	323	35	935	2	2625
2011	387	991	56	96	641	27	1157	2	3365
2012	406	999	34	61	587	30	NA *	2	2119
2013	527	649	27	67	479	16	1214	2	2981
2014	648	626	27	63	425	23	1202	3	3017
2015	635	794	16	82	423	12	1116	3	2871
2016	448	1054	15	82	443	23	1196	5	3266
2017	355	1032	0	42	356	14	1028	4	2822
2018	370	815	9	52	347	14	1025	3	2635

\* NA = not available.

**Area 4: ICES estimates of landings and discards**

Year	ICES estimates of landings									ICES estimates of discards
	Belgium	Denmark	France	Germany	Netherlands	Norway	UK	Other	Total	Total
2013	457	679	28	66	426	17	1214	4	2891	1664
2014	575	645	27	63	363	23	1202	8	2906	1481
2015	375	829	17	82	427	12	1119	4	2965	1514
2016	406	1075	15	133	420	23	1195	7	3171	1018
2017	326	1059	4	45	342	14	1026	7	2823	551
2018	354	858	10	52	343	13	1029	5	2664	260

**Area 3.a: Official landings**

Year	Official landings						
	Belgium	Denmark	Germany	Netherlands	Sweden	Other	Total
1950	0	100	1	0	206	0	307
1951	0	74	1	0	173	0	248
1952	0	64	0	0	179	0	243
1953	0	35	0	0	97	0	132
1954	0	33	0	0	95	0	128
1955	0	29	0	0	83	0	102
1956	0	33	0	0	63	0	96
1957	0	27	0	0	51	0	78
1958	0	38	0	0	56	0	94
1959	0	71	0	0	59	0	130
1960	0	95	1	0	57	0	153
1961	0	90	0	0	71	0	161
1962	0	92	1	0	0	0	93
1963	0	99	0	0	0	0	99
1964	0	133	1	0	0	0	134
1965	0	163	1	0	0	0	164
1966	0	159	0	0	0	0	159
1967	0	189	1	0	0	1	191
1968	0	184	0	0	0	1	185
1969	0	215	0	0	0	0	215
1970	0	169	0	0	0	0	169
1971	0	173	0	0	0	0	173
1972	0	168	0	0	0	0	168
1973	0	214	0	0	0	0	214
1974	0	183	0	0	0	0	183
1975	0	213	1	1	52	0	317
1976	10	294	1	19	37	0	361
1977	9	528	2	37	51	0	627
1978	4	628	2	12	59	0	705
1979	7	704	1	10	111	0	833
1980	12	622	0	0	87	1	722
1981	1	710	0	3	75	4	793
1982	2	647	0	9	77	0	735
1983	1	636	0	10	110	0	759
1984	6	525	0	0	64	0	595
1985	0	729	0	0	64	0	793
1986	7	576	0	0	56	0	639
1987	24	577	0	0	68	0	669
1988	11	569	0	6	56	0	642
1989	8	610	0	0	75	0	693
1990	16	782	0	0	74	0	872
1991	11	640	0	0	83	0	734
1992	22	793	0	0	120	17	952
1993	14	980	4	0	141	17	1156
1994	10	648	2	0	127	16	803

Year	Official landings						
	Belgium	Denmark	Germany	Netherlands	Sweden	Other	Total
1995	27	576	2	0	91	18	714
1996	0	513	1	0	97	24	635
1997	0	628	2	0	115	23	768
1998	0	743	3	0	100	22	868
1999	0	731	3	0	88	22	844
2000	0	722	1	0	65	1	803
2001	0	511	1	0	53	19	584
2002	0	457	4	0	41	20	522
2003	0	451	6	30	35	1	543
2004	0	472	5	82	29	1	607
2005	0	468	5	147	3	16	674
2006	0	321	8	40	3	16	417
2007	0	374	5	16	18	19	432
2008	0	239	7	3	15	12	276
2009	0	233	4	1	15	9	262
2010	0	286	3	35	15	7	350
2011	0	223	0	0	12	16	254
2012	0	446	3	0	5	18	482
2013	0	259	3	5	10	12	289
2014	0	276	7	12	14	6	315
2015	0	250	4	0	9	6	269
2016	0	265	5	1	7	6	299
2017	0	314	5	11	6	7	343
2018	0	252	5	14	6	2	280

**Area 3.a: ICES estimates of landings and discards**

Year	ICES estimates of landings							ICES estimates of discards
	Belgium	Denmark	Germany	Netherlands	Sweden	Other	Total	Total
2013	0	251	4	5	8	12	280	4174
2014	0	274	7	1	9	6	309	60
2015	0	243	5	25	8	6	287	18
2016	0	244	5	20	5	6	280	17
2017	0	290	6	11	4	7	318	20
2018	0	239	6	15	5	2	267	45

## Summary of the assessment

**Table 9** Lemon sole in Subarea 4 and divisions 3.a and 7.d. Assessment summary. Weights are in tonnes.

Year	Relative recruitment (age 1)	High	Low	Relative SSB	High	Low	Landings	Discards	Total mortality, Ages 3–5	High	Low
1968							6792				
1969							5000				
1970							3859				
1971							4497				
1972							4315				
1973							5233				
1974							4761				
1975							5379				
1976							5233				
1977							6325				
1978							6954				
1979							7521				
1980							7298				
1981							7016				
1982							8487				
1983							507				
1984							8111				
1985							7575				
1986							5937				
1987							6495				
1988							6798				
1989							7024				
1990							7485				
1991							7780				
1992							7442				
1993							7417				
1994							6760				
1995							6303				
1996							6523				
1997							6058				
1998							7680				
1999							7300				
2000							7171				
2001							6456				
2002							4823				
2003							4722				
2004							4574				
2005	1.38	1.95	0.5	1.411	1.935	1.098	4468	527	0.177	0.46	-0.122
2006	1.46	2.09	1.02	1.508	2.058	1.194	4290	1515	0.194	0.43	-0.046
2007	2.01	2.95	1.38	1.524	2.034	1.25	4488	451	0.42	0.68	0.157
2008	1.57	2.3	1.13	1.24	1.644	1.04	3976	898	0.38	0.62	0.137
2009	0.75	2.32	1.3	1.029	1.353	0.854	3397	996	-0.037	0.185	-0.26
2010	2.1	3.17	1.7	1.416	1.832	1.178	3198	673	0.0060	0.22	-0.22
2011	2.1	3.2	1.76	1.776	2.308	1.498	4019	1024	0.148	0.39	-0.085
2012	2.17	3.07	1.51	1.912	2.465	1.592	2959	2461	0.27	0.50	0.039
2013	2.59	2.23	1.14	1.786	2.282	1.473	3761	5938	0.22	0.45	-0.024
2014	2.21	3.1	1.57	1.75	2.274	1.447	3688	1690	0.148	0.37	-0.080
2015	1.47	2.08	1.03	1.833	2.397	1.517	3393	1636	0.082	0.32	-0.162
2016	1.87	2.93	1.23	2.024	2.719	1.666	3805	1167	0.20	0.43	-0.048
2017	1.08	1.84	0.62	1.969	2.679	1.61	3323	651	0.30	0.61	0.0100
2018	0.91	2.17	0.39	1.676	2.413	1.308	3014	332	0.193	0.30	0.065

## Sources and references

- EU. 2018. Regulation (EU) 2018/973 of the European Parliament and of the council of 4 July 2018 establishing a multiannual plan for demersal stocks in the North Sea and the fisheries exploiting those stocks, specifying details of the implementation of the landing obligation in the North Sea and repealing Council Regulations (EC) No 676/2007 and (EC) No 1382/2008. Official Journal of the European Union, L 179: 1–13. <http://data.europa.eu/eli/reg/2018/973/oj>
- ICES. 2012. ICES Implementation of Advice for Data-limited Stocks in 2012 in its 2012 Advice. ICES CM 2012/ACOM:68. 42 pp. <https://doi.org/10.17895/ices.pub.5322>
- ICES. 2017. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 26 April–5 May 2017, ICES Headquarters, Copenhagen, Denmark. ICES CM 2017/ACOM:21. <https://doi.org/10.17895/ices.pub.5323>
- ICES. 2018a. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA 2018), 5–9 February 2018, Copenhagen, Denmark. ICES CM 2018/ACOM:33. 634 pp. <https://doi.org/10.17895/ices.pub.5326>
- ICES. 2018b. 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. 2018c. EU request for ICES to provide advice on a revision of the contribution of ICs to fisheries management and stock conservation. ICES Special Request Advice Northeast Atlantic ecoregions sr.2018.15, <https://doi.org/10.17895/ices.pub.4531>
- ICES. 2019. Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES Scientific Reports. 1:7. <http://doi.org/10.17895/ices.pub.5402>

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