

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 mostly downwards trend since a peak in 2011.

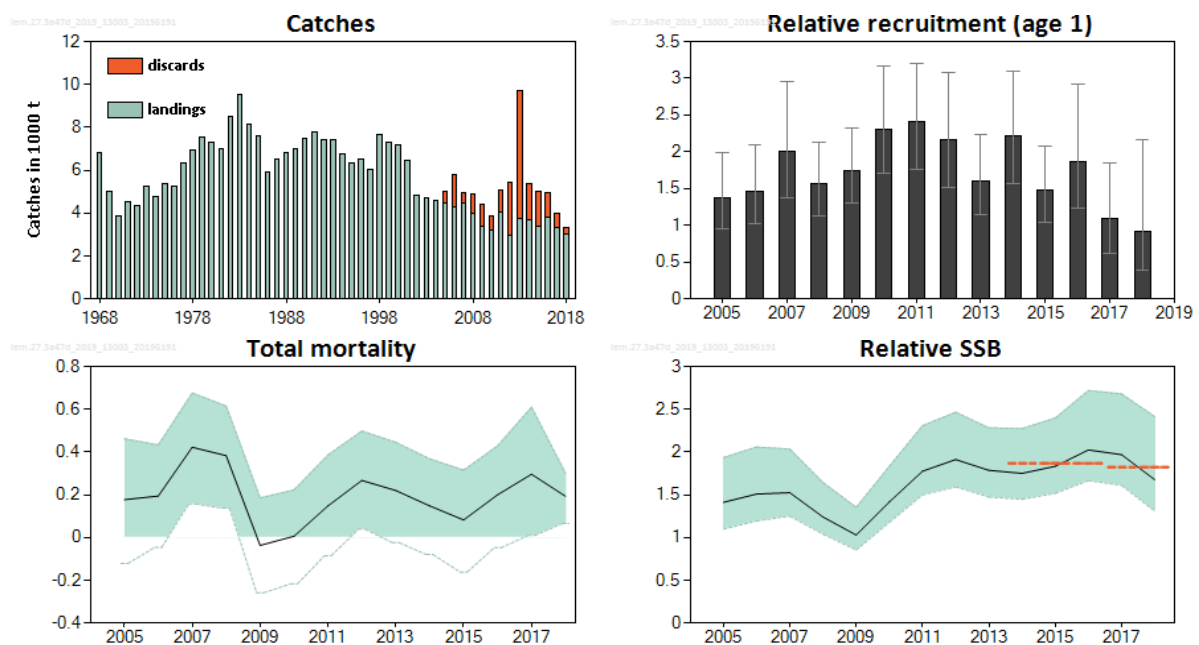


Figure 1 Lemon sole in Subarea 4 and divisions 3.a and 7.d. Summary of the stock assessment. Left: ICES estimated landings and discards (2005–2018 only). Upper right: SURBAR-estimated relative recruitment with 90% confidence intervals. Lower left: SURBAR-estimated mean Z over ages 3–5, with 90% confidence 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[†].

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

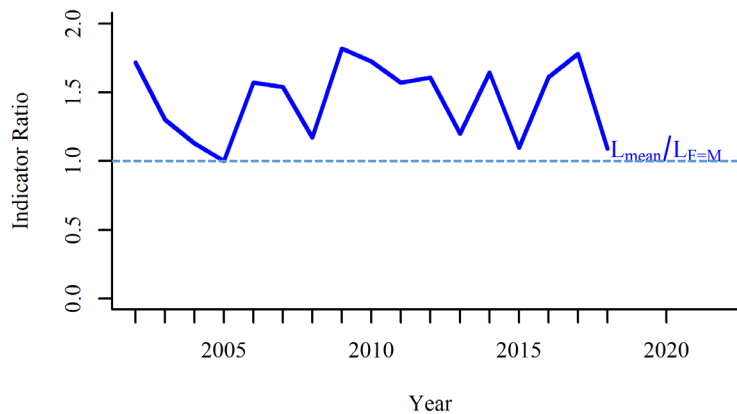


Figure 2 Lemon sole in Subarea 4 and divisions 3.a and 7.d. The index ratio $L_{mean} / L_{E=M}$ from the length-based indicator (LBI; ICES 2017) method is used for the evaluation of the exploitation status. The exploitation status is below the F_{MSY} proxy when the index ratio value is higher than 1 (shown by a dotted line).

[†] 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) | | 1.869 (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 _{trigger proxy} | Not defined | | |
| | F _{MSY proxy} | $\frac{L_{mean}}{L_{F=M}} = 1^*$ | 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 (2018a) |
| 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 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 landings 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 | 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 | 3377 | 3046 | 332 | 5966 | 3014 ** |
| 2019 | Precautionary approach (same advised catch value as given for 2016) | | < 5484 | 7874 | | | | | |
| 2020 | Precautionary approach | | ≤ 4279 | | | | | | |
| 2021 | Precautionary approach | | ≤ 4279 | | | | | | |

* 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 | | | | | Discards |
|--------------|-------------|------------|-------|---------|-------|------------|
| | Otter trawl | Beam trawl | Seine | Gillnet | Other | |
| 3377 tonnes | 73% | 22% | 2% | 2% | 1% | 332 tonnes |
| | 3046 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 | 33 | 0 | 109 | 0 | 10 | 0 | 152 |
| 1981 | 66 | 0 | 212 | 0 | 12 | 0 | 290 |
| 1982 | 96 | 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 | | | | | | | Total |
|------|-------------------|---------|--------|-------------|-----|-------|------|-------|
| | Belgium | Denmark | France | Netherlands | UK | Other | | |
| 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 | 105 | 0 | 424 | |
| 2005 | 90 | 0 | 187 | 2 | 71 | 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 | 57 | 0 | 403 | |
| 2012 | 171 | 0 | 167 | 20 | 0 | 0 | 358 | |
| 2013 | 176 | 0 | 179 | 26 | 110 | 0 | 491 | |
| 2014 | 162 | 0 | 108 | 14 | 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 | Netherla | UK | Other | Total | Total |
| 2013 | 241 | 0 | 179 | 27 | 110 | 0 | 557 | 99 |
| 2014 | 237 | 0 | 109 | 13 | 72 | 0 | 431 | 149 |
| 2015 | 192 | 0 | 85 | 10 | 42 | 0 | 329 | 104 |
| 2016 | 158 | 0 | 69 | 8 | 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 | 845 | 90 | 21 | 167 | 0 | 3430 | 42 | 4710 |
| 1952 | 98 | 391 | 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 | 311 | 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 | 30 | 171 | 0 | 13 | 43 | 0 | 2835 | 12 | 3104 |
| 1959 | 85 | 242 | 0 | 40 | 43 | 0 | 3226 | 11 | 3647 |
| 1960 | 155 | 577 | 0 | 46 | 67 | 0 | 3178 | 12 | 4035 |
| 1961 | 286 | 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 | 3367 | 11 | 5029 |
| 1976 | 493 | 506 | 0 | 68 | 308 | 0 | 3443 | 12 | 4830 |
| 1977 | 618 | 321 | 0 | 71 | 262 | 0 | 4387 | 2 | 5661 |
| 1978 | 760 | 517 | 28 | 54 | 231 | 0 | 4518 | 0 | 6108 |
| 1979 | 674 | 876 | 136 | 41 | 390 | 0 | 4308 | 3 | 6428 |
| 1980 | 484 | 599 | 102 | 49 | 303 | 0 | 4885 | 2 | 6424 |
| 1981 | 555 | 605 | 237 | 39 | 412 | 0 | 4084 | 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 | 301 | 0 | 4220 | 1 | 5898 |
| 1989 | 441 | 828 | 176 | 40 | 397 | 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 | 67 | 0 | 18 | 2976 | 3 | 4737 |
| 1997 | 504 | 499 | 224 | 76 | 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 | 190 | 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 | 57 | 183 | 412 | 13 | 1440 | 2 | 3627 |
| 2007 | 542 | 1136 | 65 | 143 | 367 | 23 | 1610 | 6 | 3892 |
| 2008 | 527 | 925 | 47 | 120 | 434 | 26 | 1383 | 4 | 3466 |
| 2009 | 389 | 898 | 88 | 64 | 294 | 31 | 927 | 2 | 2693 |
| 2010 | 375 | 821 | 32 | 102 | 323 | 35 | 935 | 2 | 2625 |
| 2011 | 387 | 999 | 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 | 425 | 794 | 16 | 82 | 423 | 12 | 1116 | 3 | 2871 |
| 2016 | 448 | 1054 | 15 | 82 | 443 | 23 | 1196 | 5 | 3266 |
| 2017 | 345 | 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 | 2865 | 1514 |
| 2016 | 406 | 1075 | 15 | 133 | 420 | 23 | 1195 | 7 | 3274 | 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 | | | | | | | Total |
|------|-------------------|---------|---------|-------------|--------|-------|------|-------|
| | Belgium | Denmark | Germany | Netherlands | Sweden | Other | | |
| 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 | 73 | 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 | 263 | 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 | 3 | 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 | | | | | | Total |
|------|-------------------|---------|---------|-------------|--------|-------|-------|
| | Belgium | Denmark | Germany | Netherlands | Sweden | Other | |
| 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 | 15 | 803 |
| 2001 | 0 | 511 | 1 | 0 | 53 | 19 | 584 |
| 2002 | 0 | 457 | 4 | 0 | 41 | 20 | 522 |
| 2003 | 0 | 451 | 6 | 30 | 35 | 21 | 543 |
| 2004 | 0 | 472 | 5 | 82 | 29 | 19 | 607 |
| 2005 | 0 | 468 | 5 | 147 | 38 | 16 | 674 |
| 2006 | 0 | 321 | 8 | 40 | 32 | 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 | 19 | 7 | 350 |
| 2011 | 0 | 223 | 0 | 0 | 12 | 16 | 254 |
| 2012 | 0 | 446 | 3 | 0 | 15 | 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 | 16 | 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 | 13 | 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 | | | | | | | 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 | 1.38 | 1.98 | 0.95 | 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 | 2.13 | 1.13 | 1.24 | 1.644 | 1.04 | 3976 | 898 | 0.38 | 0.62 | 0.137 |
| 2009 | 1.75 | 2.32 | 1.3 | 1.029 | 1.353 | 0.854 | 3397 | 996 | -0.037 | 0.185 | -0.26 |
| 2010 | 2.31 | 3.17 | 1.7 | 1.416 | 1.832 | 1.178 | 3198 | 673 | 0.0060 | 0.22 | -0.22 |
| 2011 | 2.4 | 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 | 1.59 | 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 1342/2008. 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 TACs 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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