

Sardine (*Sardina pilchardus*) in divisions 8.a–b and 8.d (Bay of Biscay)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2021 should be no more than 27 858 tonnes.

Note: This advice sheet is abbreviated due to the COVID-19 disruption. The previous advice issued for 2020 is attached as Annex 1.

Stock development over time

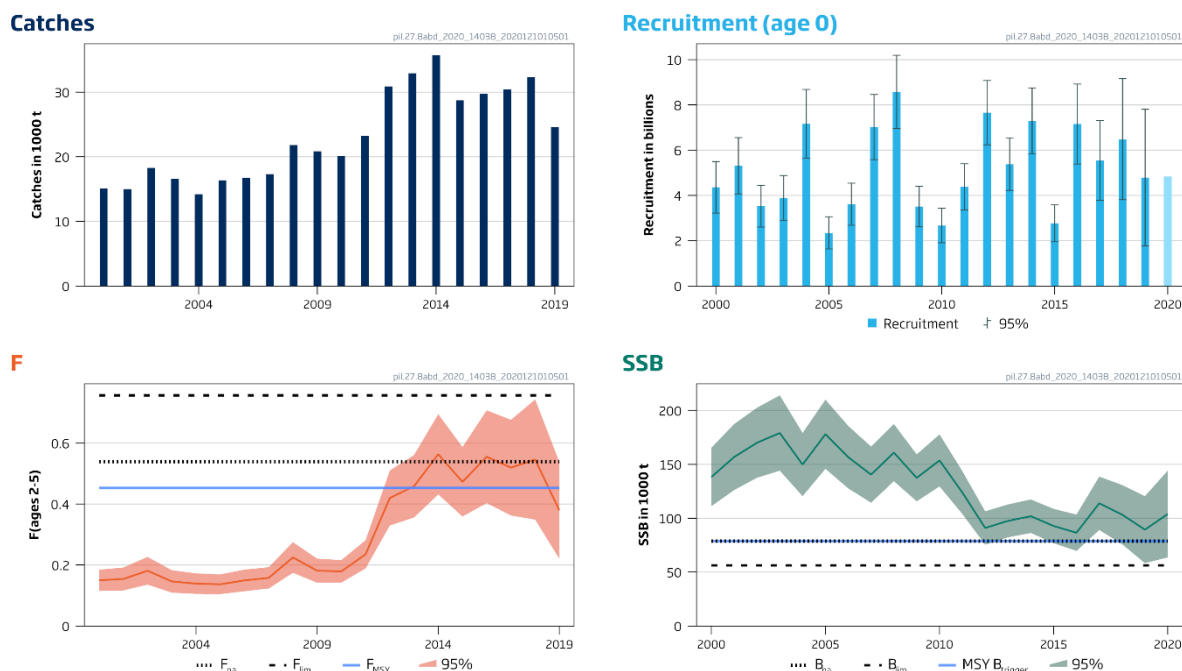


Figure 1 Sardine in divisions 8.a–b and 8.d. Summary of the stock assessment. Recruitment and SSB are estimated at the beginning of the year. The lighter blue 2020 bar in the recruitment graph represents the geometric mean (2000–2019).

Stock and exploitation status

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

| | Fishing pressure | | | Stock size | | |
|---------------------------|-------------------|-----------------------|-------|-------------------|------|----------------------------|
| | 2017 | 2018 | 2019 | 2018 | 2019 | 2020 |
| Maximum sustainable yield | F_{MSY} | ✘ | ✘ | ✔ | ✔ | ✔ |
| Precautionary approach | F_{pa}, F_{lim} | ✔ | ○ | ✔ | ✔ | ✔ |
| Management plan | F_{MGT} | — | — | — | — | — |
| | | | Below | $B_{trigger}$ | | Above trigger |
| | | Harvested sustainably | | B_{pa}, B_{lim} | | Full reproductive capacity |
| | | Not applicable | | B_{MGT} | | Not applicable |

Catch scenarios

Table 2 Sardine in divisions 8.a–b and 8.d. Basis for the catch scenarios. Assumptions made for the interim year and in the forecast.

| Variable | Value | Notes | Source |
|------------------------------|---------|---|-------------|
| F _{ages 2–5} (2020) | 0.453 | Based on estimated catches for 2020. | ICES (2020) |
| SSB (2021) | 90558 | Short-term forecast (tonnes). | ICES (2020) |
| Rage 0 (2020–2021) | 4838712 | Geometric mean (2002–2019; thousands). | ICES (2020) |
| Total catch (2020) | 31158 | Preliminary value based on reported catches until mid-November and assumed catches to the end of the year (tonnes). | ICES (2020) |
| Discards (2020) | 0 | Negligible. | ICES (2020) |

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

| Basis | Catch (2021) | F (2021) | SSB (2022) | % SSB change * | % catch change ** | % advice change *** |
|---|--------------|----------|------------|----------------|-------------------|---------------------|
| ICES advice basis | | | | | | |
| MSY approach: F _{MSY} | 27858 | 0.453 | 86609 | -4 | 13 | -20 |
| Other scenarios | | | | | | |
| F = 0 | 0 | 0 | 108239 | 20 | -100 | -100 |
| F = F _{pa} | 32217 | 0.539 | 83306 | -8 | 31 | -7 |
| F = F _{lim} | 42192 | 0.757 | 75849 | -16 | 72 | 22 |
| SSB(2022) = B _{lim} | 69659 | 1.59 | 56300 | -38 | 183 | 101 |
| SSB(2022) = B _{pa} = MSY B _{trigger} | 38353 | 0.67 | 78700 | -13 | 56 | 11 |
| F = F(2020) | 27832 | 0.453 | 86629 | -4 | 13 | -20 |

* SSB 2022 relative to SSB 2021.

** Catch in 2021 relative to catch in 2019 (24 579 tonnes).

*** Advised catch for 2021 relative to advised catch for 2020 (34 647 tonnes).

Quality of the assessment

Due to the Covid-19 disruption, the PELGAS acoustic survey was not carried out in 2020. This spring survey usually provides estimates of biomass and the associated age structure that are used in the stock assessment model. A sensitivity analysis was conducted in which the last two stock assessments where the BIOMAN Daily Egg Production Method (DEPM) index was used in the terminal year (2014 and 2017; BIOMAN DEPM is conducted every three years) were repeated with the removal of the terminal year's indices from PELGAS. This showed that the absence of stock numbers-at-age from the PELGAS survey in the terminal year is unlikely to affect the results strongly.

The assumption for the catch in 2020 relies on preliminary catch statistics available from January to mid-November. Given the (relatively) low catch in the first half of the fourth quarter (October 1 to mid-November), the standard procedure (assuming catches in the fourth quarter are equal to 44% of the annual catches) was not followed since it would result in catches too high to be achievable by the fishery by the end of the year. Therefore, the catches from mid-November and December were assumed to be equal to those already reported in the fourth quarter by mid-November 2020.

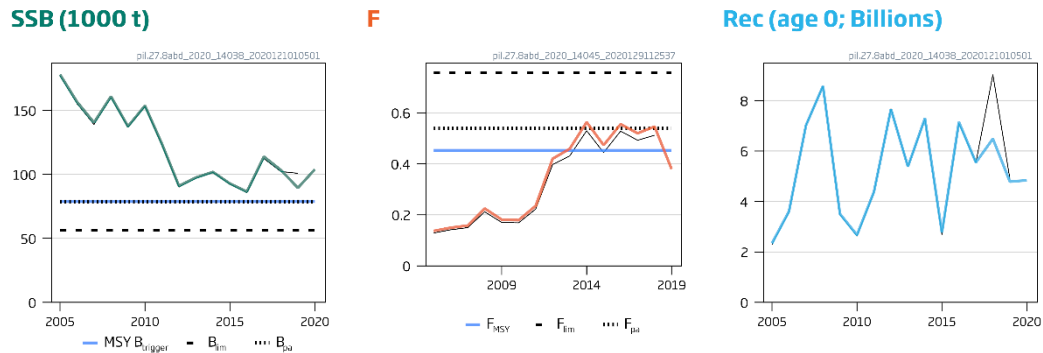


Figure 2 Sardine in divisions 8.a–b and 8.d. Historical assessment results. For each trend line in the recruitment plot, the last value is an assumption.

Issues relevant for the advice

The French catches originating from rectangles 25E5 and 25E4 (in Subarea 7) have been allocated by ICES to Division 8.a, as they occur at the boundary and are considered to be more closely associated with the sardine stock in divisions 8.a–b and 8.d. These catches have, therefore, been included in the assessment and typically represent 25% of the total stock catches and should be taken into consideration in managing the fishery.

History of the advice, catch, and management

Table 4a Sardine in divisions 8.a–b and 8.d, and in Subarea 7*. ICES advice, official landings, and ICES catches. No official TAC is set for this stock. All weights are in tonnes.*

| Year | ICES advice | Catch corresponding to advice | Reported landings | ICES landings |
|------|---|-------------------------------|-------------------|---------------|
| 2010 | None | | 32592 | 30287 |
| 2011 | None | | 28847 | 28840 |
| 2012 | None | | 37214 | 37214 |
| 2013 | None | | 40971 | 40130 |
| 2014 | 20% reduction of catches (average of last three years) | < 27554 | 45312 | 42015 |
| 2015 | No new advice, same as for 2014 | < 27554 | 36928 | 38070 |
| 2016 | Precautionary approach (increase catches by no more than 20%) | ≤ 33065 | 47324 | 49161 |
| 2017 | Precautionary approach (same advised catch value as given for 2016) | ≤ 33065 | 57889 | 43101 |

* Prior to 2017, sardine in this area was assessed as a single stock combining Subarea 7 (English Channel and Celtic Sea) and divisions 8.a–b and 8.d (Bay of Biscay).

Table 4b Sardine in divisions 8.a–b and 8.d. ICES advice, official landings, and ICES catches. No official TAC is set for this stock. All weights are in tonnes.

| Year | ICES advice | Catch corresponding to advice | Official landings | ICES catches |
|------|--------------|-------------------------------|-------------------|--------------|
| 2018 | MSY approach | ≤ 30579 | 32289 | 32299 |
| 2019 | MSY approach | ≤ 22410 | 21100 | 24579 |
| 2020 | MSY approach | ≤ 34647 | | |
| 2021 | MSY approach | ≤ 27858 | | |

Summary of the assessment

Table 5 Sardine in divisions 8.a–b and 8.d. Assessment summary. High and low refer to 97.5th and 2.5th percentiles, respectively.

| Year | Recruitment (age 0) | High | Low | SSB | High | Low | Total catch* | F (ages 2–5) | High | Low |
|------|------------------------|----------|---------|---------|--------|--------|-----------------|--------------------|-------|-------|
| | thousands | | | tonnes | | | tonnes | | | |
| 2000 | 4359590 | 5500880 | 3218300 | 138218 | 165313 | 111123 | 15097 | 0.150 | 0.185 | 0.115 |
| 2001 | 5308960 | 6553470 | 4064450 | 156793 | 187448 | 126138 | 15005 | 0.154 | 0.192 | 0.117 |
| 2002 | 3523640 | 4443890 | 2603390 | 170043 | 202524 | 137562 | 18277 | 0.181 | 0.23 | 0.136 |
| 2003 | 3892430 | 4883830 | 2901030 | 179117 | 214095 | 144139 | 16607 | 0.146 | 0.183 | 0.109 |
| 2004 | 7166540 | 8682060 | 5651020 | 149820 | 179160 | 120480 | 14197 | 0.139 | 0.173 | 0.105 |
| 2005 | 2344830 | 3055220 | 1634440 | 178001 | 210103 | 145899 | 16360 | 0.137 | 0.169 | 0.104 |
| 2006 | 3611960 | 4540400 | 2683520 | 156674 | 185693 | 127655 | 16741 | 0.150 | 0.185 | 0.114 |
| 2007 | 7018600 | 8456580 | 5580620 | 140479 | 166530 | 114428 | 17323 | 0.158 | 0.193 | 0.123 |
| 2008 | 8574730 | 10192200 | 6957280 | 160906 | 187441 | 134371 | 21821 | 0.22 | 0.28 | 0.174 |
| 2009 | 3509400 | 4405950 | 2612850 | 137472 | 159254 | 115690 | 20855 | 0.181 | 0.22 | 0.142 |
| 2010 | 2673380 | 3435460 | 1911300 | 153662 | 177815 | 129509 | 20127 | 0.179 | 0.22 | 0.142 |
| 2011 | 4384110 | 5405230 | 3362990 | 123831 | 143749 | 103913 | 23208 | 0.24 | 0.28 | 0.189 |
| 2012 | 7659010 | 9078560 | 6239460 | 90978.9 | 106471 | 75487 | 30900 | 0.42 | 0.51 | 0.33 |
| 2013 | 5381190 | 6542620 | 4219760 | 97534 | 112813 | 82255 | 32938 | 0.46 | 0.56 | 0.36 |
| 2014 | 7297240 | 8747800 | 5846680 | 101873 | 117424 | 86322 | 35704 | 0.56 | 0.70 | 0.43 |
| 2015 | 2769140 | 3586160 | 1952120 | 92801 | 108712 | 76890 | 28756 | 0.47 | 0.59 | 0.36 |
| 2016 | 7154450 | 8922470 | 5386430 | 86521.1 | 103419 | 69623 | 29754 | 0.56 | 0.71 | 0.40 |
| 2017 | 5547140 | 7310740 | 3783540 | 113857 | 138618 | 89096 | 30435 | 0.52 | 0.68 | 0.36 |
| 2018 | 6486180 | 9160360 | 3812000 | 103360 | 130852 | 75869 | 32299 | 0.55 | 0.74 | 0.35 |
| 2019 | 4785480 | 7806350 | 1764610 | 89396.6 | 120469 | 58325 | 24579 | 0.38 | 0.54 | 0.22 |
| 2020 | 4838712** | | | 103915 | 144213 | 63617 | | | | |

* Catch as estimated by ICES.

** Geometric mean (2002–2019).

Sources and references

ICES. 2020. Working Group on Southern Horse Mackerel, Anchovy and Sardine (WGHANSA). ICES Scientific Reports. 2:41. 655 pp. <http://doi.org/10.17895/ices.pub.5977>.

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