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Scientific Technical and Economic Committee for Fisheries (STECF) – Monitoring the Performance of the Common Fisheries Policy (STECF-Adhoc-24-01)

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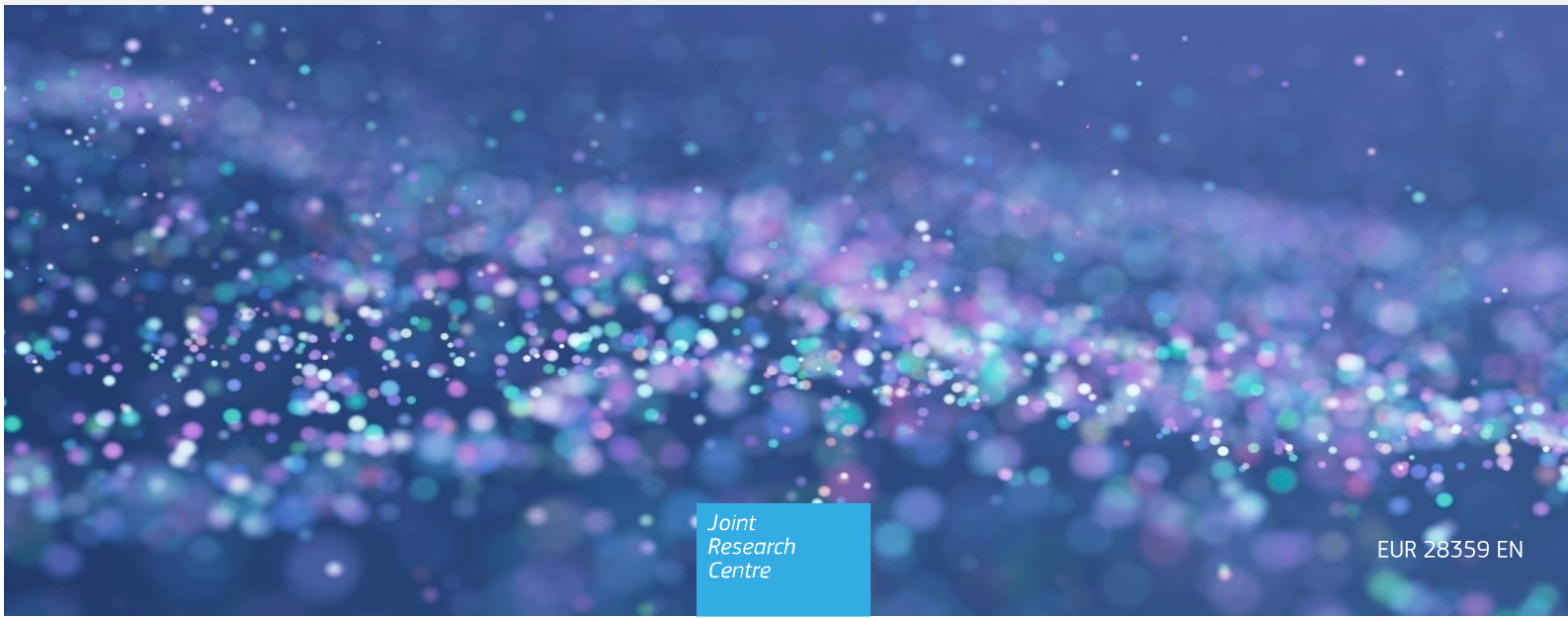
2024



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1.1 Abstract

Commission Decision of 25 February 2016 setting up a Scientific, Technical and Economic Committee for Fisheries, C(2016) 1084, OJ C 74, 26.2.2016, p. 4–10. The Commission may consult the group on any matter relating to marine and fisheries biology, fishing gear technology, fisheries economics, fisheries governance, ecosystem effects of fisheries, aquaculture or similar disciplines. This report deals with the monitoring of the performance of the Common Fisheries Policy.

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STECF advice:
Bastardie, Francois; Borges, Lisa; Casey, John; Coll Monton, Marta; Daskalov, Georgi; Döring, Ralf; Drouineau, Hilaire; Goti Aralucea, Leyre; Grati, Fabio; Hamon, Katell; Ibaibarriaga, Leire; Jardim, Ernesto; Jung, Armelle; Ligas, Alessandro; Mannini, Alessandro; Martin, Paloma; Moore, Claire; Motova, Arina; Nielsen, Rasmus; Nimmegeers, Sofie; Nord, Jenny; Pinto, Cecilia; Prellezo, Raúl; Raid, Tiit; Rihan, Dominic; Sabatella, Evelina Carmen; Sampedro, Paz; Somarakis, Stylianos; Stransky, Christoph; Ulrich, Clara; Uriarte, Andres; Valentinsson, Daniel; van Hoof, Luc; Velasco Guevara, Francisco; Vrgoc, Nedo.

EWG-Adhoc-24-01 report:
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1.2 SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF) – Monitoring the Performance of the Common Fisheries Policy (STECF-Adhoc-24-01)

This advice was provided to the Commission on 22 March 2024.

1.3 Background provided by the Commission

Article 50 of the Common Fisheries Policy (CFP; Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013) stipulates: "The Commission shall report annually to the European Parliament and to the Council on the progress on achieving maximum sustainable yield and on the situation of fish stocks, as early as possible following the adoption of the yearly Council Regulation fixing the fishing opportunities available in Union waters and, in certain non-Union waters, to Union vessels."

1.4 Request to the STECF

STECF is requested to report on progress in achieving MSY objectives in line with the Common Fisheries Policy.

1.5 STECF observations

To address the agreed Term of Reference, STECF expert group (STECF-Ad hoc-24-01) was convened between January and March 2024 to compile available assessment outputs and conduct the extensive analysis required to prepare the annual CFP monitoring report.

The expert group presented a comprehensive report accompanied by several detailed annexes to PLEN 24-01 providing:

1. Design-based indicators by ecoregion for the Mediterranean and Black Seas.
2. Numerical retrospective of model-based indicators.
3. Sensitivity analysis of model-based indicator F/F_{MSY} to the inclusion of surplus production models.
4. Outputs of JARA fits to the Median.
5. Model-based indicators input data and outputs; and
6. Histogram of the input values of F/F_{MSY} and stocks specific values of B/B_{2003} for 2022 and 2021 data for the Northeast Atlantic and the Mediterranean and Black Seas respectively.

The supporting electronic annexes include:

1. CFP monitoring protocols as agreed by STECF PLEN 23-03 (STECF, 2023b).
2. URL links to electronic annexes referring to the reports and stock advice sheets underpinning the analysis;
3. R code for processing all the data and produce indicators for the Northeast Atlantic.
4. R code for processing all the data and produce indicators for the Mediterranean and Black Seas.
5. R code for computing all the European waters' indicators provided in the STECF PLEN 24-01 report. The report and electronic annexes are available at https://stecf.jrc.ec.europa.eu/reports/cfp-monitoring.

STECF acknowledges that the report is clear and well laid out, comprehensively describing the analysis undertaken and cataloguing the changes made in the approach since the previous report (STECF-Ad hoc-23-01). STECF further notes that this is the first year that version 5.0 of the CFP protocol (Gras et al., 2023) as agreed by PLEN 23-03 (STECF, 2023b) was applied.

STECF-Ad hoc-24-01 report sets out results of the analyses separately for the Northeast Atlantic (NE Atlantic) and the Mediterranean & Black Seas (Sections 3 and 4, respectively). Based on the above results, progress towards achieving MSY objectives are summarised below. In this report, "Northeast Atlantic" refers to stocks in FAO Area 27 inside and outside EU waters, and "Mediterranean & Black Seas" refers to stocks in FAO Area 37 inside EU waters Additionally, at the request of EUROSTAT, an overview of all the stocks in European waters is also presented (Section 5 of the STECF-Ad hoc-24-01 report).

For the NE Atlantic (FAO area 27), the most recent published ICES stock assessments carried out up to (and including) 2023 incorporating data up to 2022 were downloaded from the ICES website on 10 January 2024.

For the Mediterranean & Black Seas (FAO area 37), the information was extracted from the STECF Mediterranean Expert Working Group repositories comprising the most recently published assessments carried out up to 2023 with data up to 2022, and from the GFCM quantitative stock assessment online STAR files comprising the most recently published assessments carried out up to 2022 with data up to 2021. As in previous reports, the Mediterranean and Black Sea dataset was trimmed a year before the NEA, i.e. 2021.

STECF notes that to better understand the results from the model-based indicators, the STECF-Ad hoc-24-01 report now includes additional plots comparing the model-based indicators and the underlying data. STECF recalls that the model-based indicators are closer to the geometric mean than to the median. As explained in the STECF PLEN 23-02 report (STECF, 2023a), this is an expected characteristic of the model-based indicators since they are computed as the geometric mean of the indicators from the individual stock trajectories. For comparison purposes, the STECF-Ad hoc-24-01 report includes model-based indicators based on the median of the indicators from the individual stock trajectories. While the trends are similar, model-based indicators based on the median have slightly higher values than those based on the geometric mean. In both cases, STECF recalls that model-based indicators "hide" a large diversity of situations among stocks, and as such considers that the new plots displaying model-based indicators and underlying data are valuable additions to the CFP monitoring report.

Performance perception revision

STECF notes that the current analysis shows a revision of previous CFP performance perception which can be explained by the factors detailed in the following paragraphs. This year's analysis is focused on the trends presented in the results and not on precise quantitative results of the model-based indicators. Furthermore, model-based indicators at EU waters level have not been commented on, although they are presented in the STECF-Ad hoc-24-01 report.

In recent years, STECF highlighted that the model-based indicators were becoming more unstable. This is due to several reasons: changes in the sampling frame, changes in stock assessment models used to compute indicators, inclusion of shared stocks on which CFP's influence may be limited, among others. Furthermore, in the Mediterranean and Black Seas, reduced market opportunities may be impacting the traditional species being targeted by some fleets, resulting in lower catches and consequent lower fishing mortalities. Additionally, the economic cost of fishing may be impacting some other fleet's levels of fishing effort with potentially similar consequences.

This change in perception will require STECF to revisit and discuss the process used to monitor the implementation of the CFP for future evaluations. STECF is now 10 years into this process. There are more stock assessments and with alternative stock assessment models being used, such as biomass dynamic models (17 and 15 in the current exercise for the NEA and the Mediterranean and Black Seas, respectively). There is more diversity of exploitation histories, and significantly more experience of this type of analysis.

In 2022 and 2023, STECF had a thorough discussion about the model used to compute some indicators. Following the revision of the modelling technique, a discussion about the overall monitoring process is now warranted. For example, should results derived from biomass dynamic models be included together with results from catch-at-age assessment models to compute model-based indicators? Should the sampling frame be less flexible and include only stocks that are managed by the CFP, and if so, how to define a stock managed by the CFP?

Trends towards reaching the MSY objective in the Northeast Atlantic and Mediterranean & Black Seas

The overview below describes the trends in fishing pressure observed in the NE Atlantic and the Mediterranean & Black Sea for the periods 2003 to 2022 and 2003 to 2021, respectively. It applies to the stocks with an analytical assessment and with associated reference points included in the reference list (sampling frame) of stocks for these areas.

Overview of stock status

Northeast Atlantic

The indicators provided in STECF-Ad hoc-24-01 report show that in the NE Atlantic (both EU and non-EU waters), stock status has significantly improved since 2003 (Figure A) but that some stocks are still overexploited.

Among the stocks which are fully assessed (Table 3, in STECF-Ad hoc-24-01 report), the proportion of overexploited stocks (i.e., $F>F_{MSY}$, blue line) has decreased from around 76% (2004) to 32% in 2022. The proportion of stocks outside safe biological limits ($F>F_{PA}$ or $B<B_{PA}$, yellow line, Table 5 in the STECF-Ad hoc-24-01 report), computed for the 46 stocks for which both reference points are available, follows a similar decreasing trend, from 80% in 2003 to 41% in 2022.

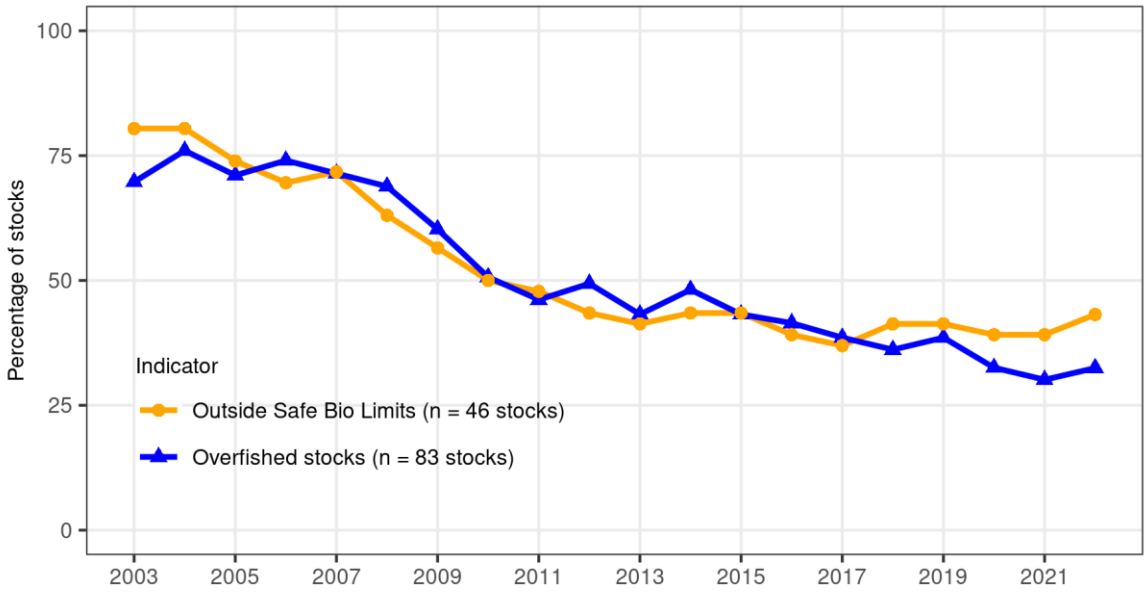

Figure A: Trends in stock status in the NE Atlantic 2003-2022. Two calculated proportions are presented: blue line: the proportion of overexploited stocks ($F>F_{MSY}$) (out of a total of 83 stocks) and yellow line: the proportion of stocks outside safe biological limits SBL ($F>F_{PA}$ or $B<B_{PA}$) (out of a total of 46 stocks).

Combining these two calculated proportions (Table A), STECF notes that in 2022, 8 stocks that were exploited below F_{MSY} were still outside safe biological limits, and 4 stocks inside safe biological limits were still exploited above F_{MSY}. In addition, 37 stocks had an unknown status with regards to safe biological limits. For the last known year, of the 83 stocks considered, only 28% (23 stocks) were neither overexploited nor outside safe biological limits, suggesting that the objective in Art. 2.2 of the CFP[1] has not been met fully.

[1] "*In order to reach the objective of progressively restoring and maintaining populations of fish stocks above biomass levels capable of producing maximum sustainable yield, the maximum sustainable yield exploitation rate shall be achieved by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks*".

Table A: Number of stocks overfished ($F>F_{MSY}$), or not overfished ($F\leq F_{MSY}$), and inside ($F\leq F_{PA}$ and $B\geq B_{PA}$) and outside ($F>F_{PA}$ or $B<B_{PA}$) safe biological limits (SBL) in 2022 in the NE Atlantic (both EU and non-EU waters). Unknown SBL refers to stocks whose status regarding SBL could not be assessed.

	Below F_{MSY}	**Above F_{MSY}**
Inside SBL	23	4
Outside SBL	8	11
Unknown SBL	27	10

Mediterranean & Black Seas

For the Mediterranean & Black Seas, the number of stocks assessed and for which data is available, has varied from year-to-year and assessment results for some stocks do not extend back to the earlier part of the time-series.

Biomass reference points are now available for 23 stocks, of which 11 were calculated during the Western Mediterranean stock assessment working group (EWG 22-09 and EWG 23-09), and 12 were estimated by GFCM.

STECF notes that for most of these stocks $F_{0.1}$ was used as a proxy for F_{MSY} and consequently, the biomass at $F_{0.1}$ is used here as a proxy for B_{MSY}. STECF-Ad hoc-24-01 report presents indicators on the number of overexploited stocks and on the number of stocks with F above F_{MSY} or SSB below B_{MSY} (STECF-Ad hoc-24-01 report). In 2024, these indicators were included in the body of the text for the first time to provide more information on the prevalence of overexploited stocks.

Trends in the fishing pressure (Ratio of F/F_{MSY})

As agreed by STECF PLEN 23-03 (STECF, 2023b), STECF-Ad hoc 24-01 computed the trends in fishing pressure using a state-space model as implemented in the R package JARA (Winker et al., 2019) (https://github.com/Henning-Winker/JARA).

The model-based results for the NE Atlantic (inside and outside EU waters), Mediterranean and Black Seas and for all EU waters are displayed in Figures 9, 11, 22 and 28 of the STECF-Ad hoc-24-01 report. Trends in the median values for F/F_{MSY} are summarised in Figure B over the time series for the NE Atlantic inside and outside EU waters and for the Mediterranean and Black Sea.

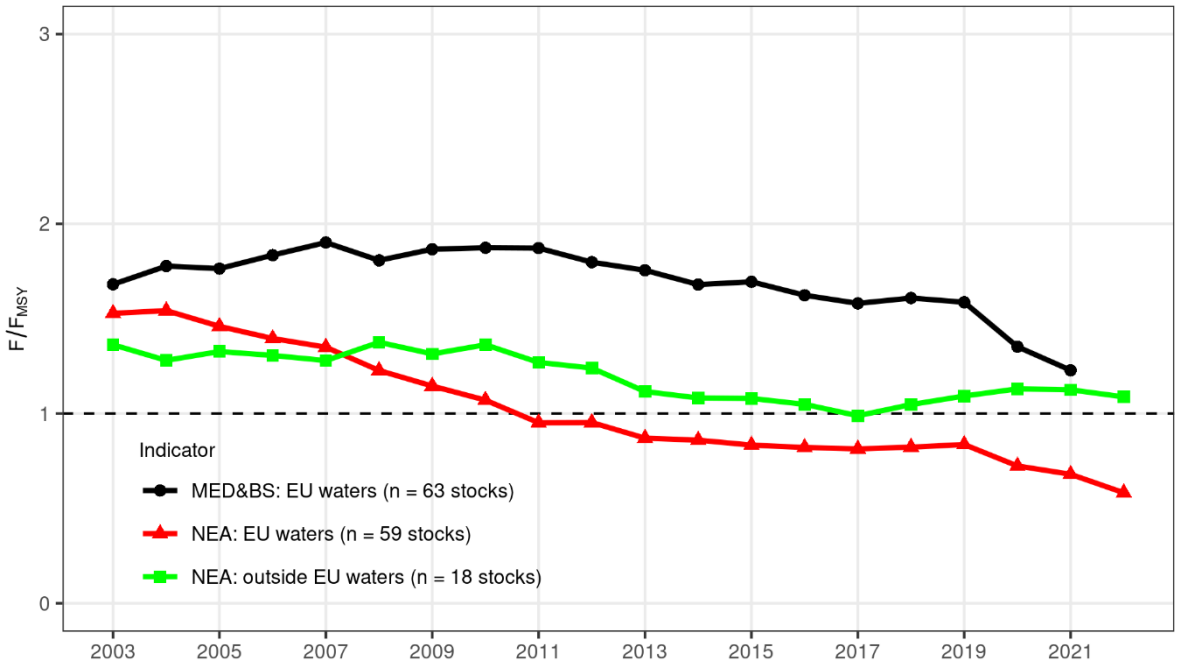

Figure B: Trends in fishing pressure 2003-2022. Three model-based indicators F/F_{MSY} are presented: red line which represents 59 stocks with appropriate information in the NE Atlantic EU waters; green line for 18 stocks also located in the NE Atlantic but outside EU waters; and black line for the 63 stocks from the Mediterranean Sea & Black Seas.

Northeast Atlantic

In the NE Atlantic EU waters, the model-based indicator of fishing pressure (F/F_{MSY}, based on 59 stocks with appropriate information – Figure 9 in the STECF-Ad hoc-24-01 report) shows a gradual downward trend over the period 2003-2022.

The same model-based indicator was computed by STECF-Ad hoc-24-01 expert group for an additional set of 18 stocks located in the NE Atlantic outside EU waters (Figure 11 in the STECF-Ad hoc-24-01 report). The indicator shows a stable situation for the period 2003-2010, followed by a decreasing trend until 2017 and a slight increase in the last five years (2018-2022).

STECF notes that the number of stocks that are assessed using surplus production models is increasing (17 stocks this year in EU and non-EU waters for the NE Atlantic and 15 for the Mediterranean and Black Seas). The latest revision of the protocol clarified that only quantitative assessments with tuning indices could be included in the analysis (STECF, 2023b; Gras et al., 2023). STECF-Ad hoc-24-01 report includes a sensitivity analysis to study how the model-based indicators change when stocks assessed using surplus production models are not included. The results indicate that while trends in model-based indicators remain similar, the inclusion of surplus production models leads to lower F/F_{MSY} values. STECF recalls that there are conceptual differences in F_{MSY} estimates from age-structured models and from surplus production models. Given the expected continued increase in the number of stocks assessed using surplus production models, STECF observes that their impact in the calculation of model-based indicators should be further monitored and studied.

Mediterranean and Black Seas

The results presented show a decrease of F/F_{MSY} since 2011 and a sharp decrease in the F/F_{MSY} values in the Mediterranean and Black Sea in the last two years. However, it is not clear which driving factors are leading or are affecting the estimated pattern. STECF is not in a position to assess whether this change reflects a temporary decrease in fishing pressure, or whether this is a longer-term positive trend.

STECF notes that the number of stocks considered in computing the indicator has been varying over time, as some stocks have been recently added and others have been revised in terms of stock boundaries (e.g., including more GSAs).

Many of these "new" stocks are small pelagic stocks, which due to changes in local market conditions have experienced reduced fishing pressure in the last ten years, at least in some GSAs (e.g., GSA7, Gulf of Lions). In the Gulf of Lions, landings of small pelagics, especially sardine, have drastically reduce during the 2000s (GFCM 2022). This is thought to be mainly related to a drop in the size and fat content and the disappearance of old individuals resulting from a change in environmental conditions, which in turn have reduced their economic value (Saraux et al., 2019). This has acted as a disincentive to land such fish.

These changes may have resulted in a reduction of the fishing pressure, and in the sharp reduction of the observed F/F_{MSY} in recent years. This, is however not reflected in the trend in the Biomass indicator which is not showing any increase (Figure C).

Some sensitivity analyses have been attempted removing stocks not included in previous years and/or stocks for which the exploitation rate has been estimated very low (in some cases close to zero). Those sensitivity analyses showed a scaling effect in the F/F_{MSY} values, but no change in the sharply decreasing trend was observed in the last 2 years. As reported in TOR 6.5 of the PLEN 24-01 report, the inconsistency of the trends between F/F_{MSY} and Biomass indicator could be due to a reduction in the catches coupled to a lack of reaction in the biomass which results in a lower F but not a higher SSB.

In conclusion, if a decreasing trend in F/F_{MSY} seems to be taking place in the Mediterranean and Black Seas, the order of magnitude of this reduction as predicted by the model may be overly optimistic. It may be led by a change in input data (i.e., stocks, type of assessment models), change in the market request, or a combination of both.

Trends in Biomass

The model-based results for the NE Atlantic (EU waters), the Mediterranean and Black Seas and for data-limited stocks in the NE Atlantic (ICES "category 3" stocks) are provided in Figures 13, 24 and 15 respectively of the STECF-Ad hoc 24-01 report. Trends in the median values for biomass over time are summarized in Figure C below. STECF notes there is large uncertainty around this indicator (see Figure 27 in the STECF-Ad hoc-24-01 report).

The model-based indicators for the trend in biomass (Figures 13 and 24 of the STECF-Ad hoc-24-01 report) show a general increase over time since 2007 in the NE Atlantic (EU waters only) for assessed stocks (ICES categories 1 and 2 stocks), whereas data limited stocks (ICES category 3 stocks) for which only a relative biomass index is available from scientific survey data, reached a first peak in 2017 followed by a decreasing trend until 2021, the final value in 2022 being the maximum of the time series due largely to one anchovy stock (Ane.27.9a) as shown in Figure C. In the Mediterranean & Black Seas, the median biomass was slightly higher at the beginning of the time-series, but declined until 2011, after which it remained stable.

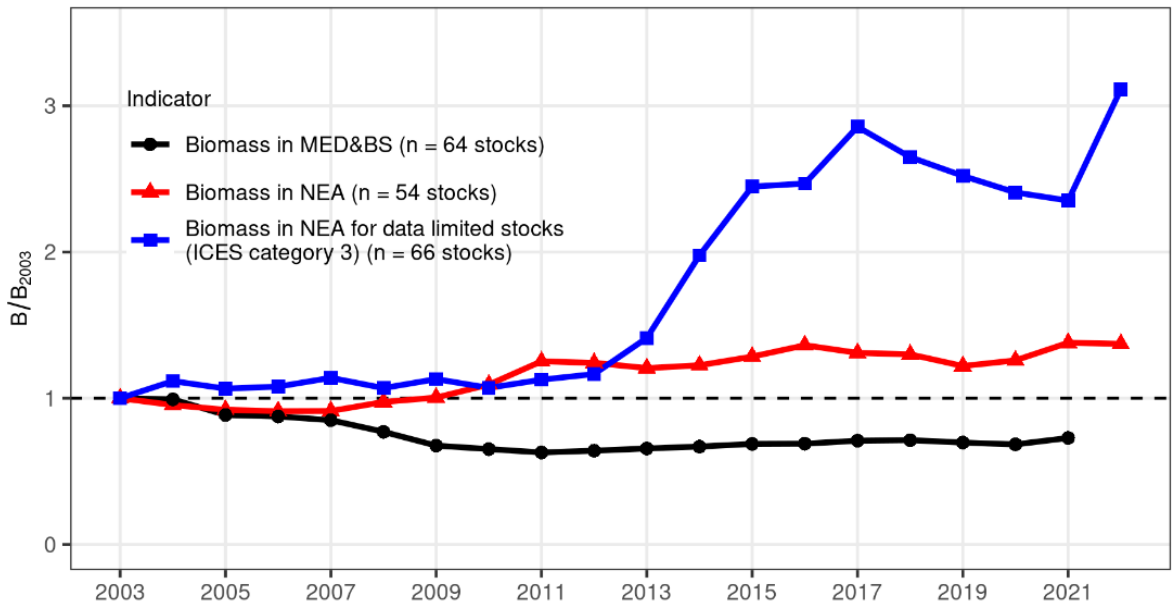

Figure C: Trends in the indicators of stock biomass. Three indicators are presented: red line for the NE Atlantic EU waters (54 stocks); black line for the Mediterranean & Black Seas (64 stocks); and blue line for data limited stocks in NE Atlantic (ICES category 3, 66 stocks).

Trends in Recruitment

The model – based results for the trend in decadal recruitment are given in Figure 16 in the STECF-Ad hoc-24-01 report. This indicator aims to identify long-term trends of recruitment for all stocks and is calculated over a twenty-year moving average. For example, the decadal recruitment for 2019 for a single stock is the ratio between the average recruitment from 2010 to 2019 over the average recruitment from 2000 to 2009 (see Gras et al., 2023 for more details). This indicator is subject to high year-on-year variability. The model output median values are displayed in Figure D. The average decadal recruitment indicator shows a decreasing trend until 2011 and an inversion afterwards, the maximum was reached in 2022.

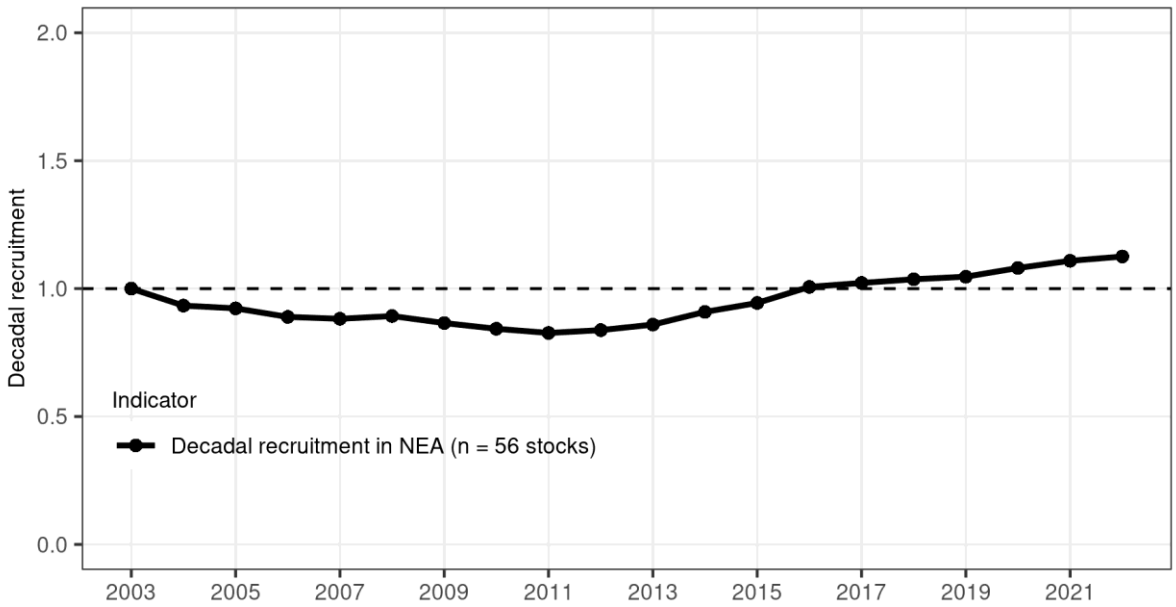

Figure D: Trend in median values for decadal recruitment scaled to 2003 in the NE Atlantic area (based on 56 stocks).

Trends per Ecoregion

STECF-Ad hoc-24-01 report provides indicator trends by Ecoregion for EU waters in the NE Atlantic and the Mediterranean & Black Sea. However, STECF notes that the trends of the model-based indicators by ecoregion in the Med & BS are variable and difficult to interpret. STECF refers to TOR 6.5 for a detailed discussion of the regional trend of the Western Mediterranean where a Multiannual Management Plan (Regulation (EU) 2019/1022) has been implemented since 2020.

In EU waters, the overall fishing pressure in all ICES Ecoregions has decreased and the status of stocks has improved compared to the start of the time-series (Figures 4 and 10 in the STECF-Ad hoc-24-01 report). Accepting the inherent variability in the indicator, for the stocks analysed, the trends give a clear signal that fishing pressure in each region has reduced over the time-series.

Historical performance

STECF notes that the trends in fishing pressure and biomass observed in this year's STECF-Ad hoc-24-01 report differ from previous STECF reports and that a state-space model was introduced for the first time following the change in protocol.

Changes of historical perceptions over time (Section 7 of the STECF-Ad hoc-24-01 report) show that in the Northeast Atlantic from 2017 to 2021, there is a tendency to underestimate F/F_{MSY} when compared to the previous year's estimate, and, conversely, overestimates B/B_{2003}. That pattern changed for B/B_{2003} in 2021 and 2022 (Figures 30 and 31 in the STECF-Ad hoc-24-01 report). The shift in historical perceptions is due to a combination of the new model, used for the first time this year, as well as changes in the dataset.

In the Mediterranean and Black Seas, the current analysis shows a substantial revision of the previous perception of the F/F_{MSY} and B/B_{2003}'s indicators (Figures 32 and 33 in the STECF-Ad hoc-23-01 report). In both cases, the report indicators show lower values for these indicators. This change is due to a combination of the new model and changes in the dataset used for fitting the model. These patterns should be addressed in the future discussion of the monitoring process.

Coverage of the scientific advice

Coverage of biological stocks by the CFP monitoring

The analyses of progress in achieving the MSY objective in the NE Atlantic includes all stocks with advice provided by ICES that are at least partially inside EU waters. According to the ICES database accessed for the analysis, ICES provided scientific advice for 224 biological stocks included in EU waters (at least partially). Of these, 100 stocks (45%) are data limited (ICES category 3 and above, Table B).

Table B: Total number of stocks assessed by ICES for different stock categories in different areas. Note that not all of these stocks are considered of EU relevance (STECF 15-04). Therefore, the numbers are higher than those used in the CFP monitoring analysis.

	ICES Stock Category						Total
	1	2	3	4	5	6	
Arctic Ocean	7	0	3	0	0	0	10
Azores	0	0	2	0	0	0	2
Baltic Sea	8	1	8	0	0	0	17
Bay of Biscay & Iberia	14	6	18	0	3	0	41
Celtic Seas	25	3	14	0	5	4	51
Greater North Sea	27	5	16	0	3	3	54
Iceland, Greenland and Faroes	19	1	4	0	1	0	25
Widely	7	1	7	0	2	7	24
Total	107	17	72	0	14	14	224

The present CFP monitoring analysis for the NE Atlantic is focused on stocks with a TAC in 2017 and for which estimates of fishing mortality, biomass and biological reference points are available. In 2024, the expert group included in the analysis any stock that was not retained by the sampling frame but had a TAC. As detailed in the STECF-Ad hoc-24-01 report, not all indicators can be calculated for all stocks in all years. The ad hoc group was able to compute indicators for 33 and 83 of category 1 and 2 stocks respectively depending on indicators, years, and areas, and 66 category 3 stocks (Table 2 in the STECF-Ad hoc-24-01 report). Combined these stocks represent a large share of catches, but there is still a significant number of biological stocks present in EU waters that are not included in the sampling frame of the CFP monitoring analysis.

In the Mediterranean and Black Seas region, stock status and trends are only assessed for a limited number of stocks. Regarding the Mediterranean and Black Seas, and following the change in protocol, all stocks having a quantitative assessment are now included in the analysis. STECF notes that, despite the last 2 years' increase in the number of stocks available, there is still a need to increase the coverage of stocks in the CFP monitoring analysis to increase the representativeness of the indicator values for the Mediterranean and Black Sea.

Coverage of TAC regulation by scientific advice

STECF notes that 158 TACs (combination of species and fishing management zones) in the EU waters of the NE Atlantic are derived using the agreed sampling frame (Gibin, 2017; Scott et al 2017a, Scott et al 2017b) with two additional TACs added in 2023 (STECF-Adhoc-23-01).

STECF underlines that in many cases, the boundaries of the TAC management areas are not aligned with the biological limits of stocks used in ICES assessments. Therefore, the ad hoc group computed an indicator of advice coverage, where a TAC is "covered" by a stock assessment when at least one of its divisions match the spatial distribution of a stock for which reference points have been estimated from an ICES full assessment. Based on this indicator, 53% of the 158 TACs are covered, at least partially, by stock assessments that provide estimates of F_{MSY} (or a proxy), 48% by stock assessments that have B_{PA}, with 18% covered by stock assessments that provide estimates or proxies of B_{MSY} (Table 17 of STECF-Adhoc-2024).

Additionally, STECF notes that, using this index, some TACs can be considered as "covered" if they relate to: (i) part of a given management area, (ii) several assessments contributing to a single TAC (e.g., *Nephrops* functional units in the North Sea) or (iii) scientific advice covering a different (but partially common) area (e.g. whiting in the Bay of Biscay). Such an approach overestimates the spatial coverage of advice (i.e., the proportion of TACs based on a single and aligned assessment) and means that many TACs are still not covered by scientific advice based on F_{MSY} reference values.

1.6 **STECF conclusions**

Regarding the progress made in the achievement of F_{MSY} in line with the CFP, STECF concludes that the latest results indicate a reduction in overall fishing mortality and a general increase in stock biomass in the NE Atlantic over the period 2003-2022.

Nevertheless, STECF concludes several stocks remain overfished and/or outside safe biological limits. Thus, it can be concluded that the objective of the CFP which aims to ensure that all stocks are above biomass levels capable of producing maximum sustainable yield has still not been fully achieved.

In the Mediterranean and Black Seas, STECF concludes there are indications that fishing pressure has decreased since 2019, although no substantial increase in biomass has been observed since 2011.

STECF acknowledges recent advances in increasing the number of stocks included in the analysis and supports ongoing work in ICES, GFCM and STECF EWGs to increase the number of stocks with key reference points further. However, STECF concludes that many stocks still lack definition of some key reference points (B_{PA}, F_{PA}, F_{MSY} or B_{MSY}).

STECF concludes that there is a need for STECF to discuss the CFP monitoring process to account for the increasing diversity of stocks available for the monitoring exercise.

References

Gras, M., Vasilakopoulos, P., Pierucci, A., Kupschus, S., Mantopoulou Palouka, D., Winker, H. and Konrad, C., Protocol for the Monitoring of the Common Fisheries Policy, Publications Office of the European Union, Luxembourg, 2023, JRC136235.

GFCM 2022. Report of the Working Group on Stock Assessment of Small Pelagic Species (WGSASP). Scientific Advisory Committee on Fisheries (SAC). url: https://www.fao.org/gfcm/technical-meetings/detail/en/c/1634928/.

Saraux, C., Van Beveren, E., Brosset, P., Queiros, Q., Bourdeix, J.-H., Dutto, G., Gasset, E., et al. 2019. Small pelagic fish dynamics: A review of mechanisms in the Gulf of Lions. Deep Sea Research Part II: Topical Studies in Oceanography, 159: 52–61.

STECF, 2023a. 73rd plenary report (STECF-PLEN-23-02), Rihan, D. and Doerner, H. editor(s), Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/89951, JRC136363.

STECF, 2023b. 74thPLENARY REPORT (STECF-PLEN-23-03), Rihan, D. and Doerner, H. editor(s), Publications Office of the European Union, Luxembourg, 2023, JRC136255.

Winker, H., Pacoureau, N., Sherley, R.B. JARA: 'Just Another Red-List Assessment'. BioRxiv, 2019, p. 672899.

1.7 Contact details of STECF members

[1] - Information on STECF members' affiliations is displayed for information only. In any case, Members of the STECF shall act independently. In the context of the STECF work, the committee members do not represent the institutions/bodies they are affiliated to in their daily jobs. STECF members also declare at each meeting of the STECF and of its Expert Working Groups any specific interest which might be considered prejudicial to their independence in relation to specific items on the agenda. These declarations are displayed on the public meeting's website if experts explicitly authorized the JRC to do so in accordance with EU legislation on the protection of personnel data. For more information: http://stecf.jrc.ec.europa.eu/adm-declarations

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REPORT TO THE STECF

EXPERT WORKING GROUP ON MONITORING THE PERFORMANCE OF THE COMMON FISHERIES POLICY (EWG-ADHOC-24-01)

Virtual meeting, January-March 2024

This report does not necessarily reflect the view of the STECF and the European Commission and in no way anticipates the Commission's future policy in this area

1 Introduction

Article 50 of the EU Common Fisheries Policy (Regulation (EU) No 1380/2013) states:

"The Commission shall report annually to the European Parliament and to the Council on the progress of achieving maximum sustainable yield and on the situation of fish stocks, as early as possible following the adoption of the yearly Council Regulation fixing the fishing opportunities available in Union waters and, in certain non-Union waters, to Union vessels."

To fulfil its obligations to report to the European Parliament and the Council, each year, the European Commission requests the Scientific, Technical and Economic Committee for Fisheries (STECF) to compute a series of performance indicators and advise on the progress towards the provision of article 50.

In an attempt to make the process of computing each of the indicators consistent and transparent and to take account of issues identified and documented in previous CFP monitoring reports, a revised protocol (Gras et al., 2023) was adopted by the STECF (STECF, 2023a). This new version of the protocol is based on the previous protocol adopted in 2019 (Jardim et al., 2019). The main changes are (i) a state-space model is now used to compute the model-based indicators and (ii) the procedure to include Mediteranean stocks has been simplified to include all quantitative assessments available from GFCM and STECF.

An ad hoc Expert Group comprising experts from the European Commission's Joint Research Centre (JRC) was convened from January to March 2024 to compute the performance indicator values according to the agreed protocol (Gras et al., 2023) and to report to the STECF plenary meeting scheduled for 11-15 March 2024.

1.1 Terms of Reference for the ad hoc EWG-24-01

The Expert Group is requested to report on progress in achieving MSY Objectives in line with CFP.

2 Data and Methods

2.1 Data sources

The data sources used are referring to coastal waters of the EU in FAO areas 27 (North East Atlantic and adjacent seas) and 37 (Mediterranean and Black Seas). The Mediterranean included FAO Geographical SubAreas (GSA) 1, 2, 5, 6, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 22, 23, 25, and 29. The NE Atlantic included the ICES subareas "3", "4", (excluding Norwegian waters of division "4.a"), "6", "7", "8", "9", and "10".

2.1.1 Stock assessment information

For the NE Atlantic (FAO area 27), the information was downloaded from the ICES website (https://standardgraphs.ices.dk) on 10 January 2024, comprising the most recent published assessments carried out up to and including 2023. Thorough data quality checks and corrections were carried out by JRC experts to ensure the information downloaded was in agreement with the summary sheets published online (online Annex 1 and 2, https://stecf.jrc.ec.europa.eu/reports/cfp-monitoring).
For the Mediterranean region (FAO area 37), the information was extracted from the STECF Mediterranean Expert Working Group repositories (https://stecf.jrc.ec.europa.eu/reports/medbs) comprising the most recent published assessments carried out up to 2023 and from GFCM stock assessment forms (https://www.fao.org/gfcm/data/star/en/) comprising the most recent published assessments carried out up to 2023.
The table reporting the URLs for the report or advice summary sheet for each stock is available online (online Annex 1, https://stecf.jrc.ec.europa.eu/reports/cfp-monitoring).

2.1.2 Management units information

For the NE Atlantic, management units are defined by Total Allowable Catches (TAC). Annual fishing opportunities for a species or a group of species in a Fishing Management Zone (FMZ). The information regarding the TACs in 2016 was downloaded from the FIDES reporting system. Subsequently, this information was cleaned and processed to identify the FMZ of relevance to this work, as well as the ICES rectangles they span to (Gibin, 2017; Scott et al., 2017a; Scott et al., 2017b). This work was done once in 2017 and has not been updated since. Nevertheless, in 2024, as in 2023, all category 1 and 2 EU stocks dropped due to the absence of stock-specific TACs in 2017 were manually checked to assess whether in 2022-2023 there was a TAC in place, in which case they were added in the analysis and kept in this year's analysis. EU category 1 and 2 skate and ray stocks managed as a stock complex under a combined TAC were not included in the analysis.

1.1 Methods

The methods applied and the definition of the sampling frames followed the protocol (Gras et al., 2023; Gibin et al., 2017) agreed by STECF (2022a). The updated protocol is presented in Annex 1 and the R code used to carry out the analysis in Annex 2 for the Northeast Atlantic and Annex 3 for the Mediterranean and Black Seas.

1.2 Points to note

- Stocks assessed with biomass dynamic models do not provide a value for F_{PA} although they may provide a B_{PA} proxy ($0.5 \cdot B_{MSY}$). Consequently, such stocks cannot be used to compute Safe Biological Limits (SBL; Section 2.2.2)
- The state-space model (JARA) used to compute model-based indicators uses a shortened time series, starting in 2003, instead of the full time series of available data. This has the advantage of balancing the dataset by removing those years with only a low number of assessment estimates. It has the disadvantage of excluding data.
- Indicators of trends computed with JARA show the average progress of the process they represent, including its uncertainty in terms of 50% and 95% confidence intervals. In the former case corresponding to the range between 25% and 75% percentiles, and for the latter between 2.5% and 97.5% percentiles.

- The biomass indicator for stocks assessed with data-limited methods (ICES stock category 3) includes both abundance and biomass indices, with a variety of measurement units. It also includes time series of abundance or biomass relative to their average or a reference point (such as B_{MSY}). As a result the range of values in the input dataset is extremely variable.

1.3 Differences from the 2023 CFP Monitoring Report

1.3.1 Northeast Atlantic and adjacent seas

The methods used in the analysis for this report differs from the 2023 CFP Monitoring report (STECF, 2023b) regarding the model-based indicators. The GLMM (Jardim et al., 2019) has been replaced by a state-space model as implemented in JARA (Winker et al., 2019), freely available online from a github repository (https://github.com/Henning-Winker/JARA). Parameters used to run the model in the case of the CFP monitoring procedure are detailed in the CFP monitoring protocol (Gras et al., 2023).
Compared to last year's analysed dataset, with relation to category 1 & 2 EU stocks:

- 2 stocks were added
  - bll.27.3a47de was upgraded from category 3 to category 2
  - pol.27.67 was upgraded from category 4 to category 2
- 1 stock was dropped
  - cod.27.22-24 was downgraded to category 3
- 2 stocks, cod.27.6a and cod.27.47d20 were combined into one advice that includes 3 assessments named in the report. As a result the analyses was run considering 3 individual stocks such as:
  - cod.27.46a7d20N for the northwestern cod stock
  - cod.27.46a7d20S fort the southern cod stock
  - cod.27.46a7d20V for Viking cod stock

With relation to category 3 EU stocks:

- 5 stocks were added
  - cod.27.22-24 (downgraded from category 1)
  - mur.27.3a47d (upgraded from category 5)
  - pol.27.89a (upgraded from category5)
  - whg.27.89a (upgraded from category 5)
  - rjr.27.23a4 (4-year advice update assessment in 2023)
- 3 stocks were dropped:
  - bll.27.3a47de (upgraded to category 2)
  - rjh.27.4bc7d (upgraded to category 2)
  - rjm.27.3a47d (upgraded to category 2)
- 1 stock ane.27.9a was split into 2 stocks
  - ane.27.9aS
  - ane.27.9aW

With relation to outside EU Waters

- 3 stocks were added
  - caa.27.5a
  - ple.27.5a
  - reb.27.5a14
- 2 stocks were removed
  - cod.2127.1f14
  - pok.27.5b

As in previous years, non-EU stock pra.27.1-2 was excluded from the dataset to compute the indicator 'F/F_{MSY} outside EU waters' due to its high impact on the scale of the indicator.

1.3.2 Mediterranean and Black Seas

Compared to CFP monitoring 2023 (STECF, 2023b), the following stock was dropped from the analysis

- PIL 1 (was not included as the stock assessment was not considered quantitative)

The following stocks had a change in GSA

- DPS_17_18_19_20
- ARA_1
- ARA_2
- ARS_8_9_10_11

The following stocks were added

- ANE_29
- DGS_29
- RPW_29
- ARS_12_13_14_15_16
- ANE_6
- MUT_11.1_11.2

In this year's analysis two stocks were assessed using CMSY, EOI_18 and SBA_25. Both assessments were considered fit for purpose as they included tuning indices and were used for advice.

1.3.3 EU Waters indicators

As in last years' reports (STECF, 2021a, 2022a, 2023b), an extra section was added to report results for two indicators of fisheries state for all EU Waters (joining FAO areas 27 and 37): one indicator for F/F_{MSY} and one for B/B_{2003}.

2 Northeast Atlantic and adjacent seas (FAO region 27)

2.1 Number of stock assessments available to compute CFP performance indicators

The number of stock assessments with estimates of F/F_{MSY} for the years 2003-2022 for FAO region 27 are given in Figure 1. The global values as well as the breakdown by Ecoregion are provided in Table 1.

The detailed time series for each category 1 and 2 stocks are presented in Figure 2. Six stocks (nep.fu.25, nep.fu2627, rju.27.7de, bli.27.5b67, dgs.27.nea, por.27.nea) were given a 2-year advice in 2022. As a result, no estimates of F/F_{MSY} were available for these 6 stocks for the year 2022. The number of stocks for which F/F_{MSY} was estimated was 83 for 2021 and 77 for 2022.

The number of stocks in category 1 and 2 for which an F/F_{MSY} estimate was available increased from 76 to 83 for the time series considered (2003-2021). The highest number of F/F_{MSY} (83) estimates was recorded for the years 2017-2020.

As in the previous reports (STECF, 2021a and 2022a, 2023b), cod.27.24-32 was not included in the analysis. Although it has been upgraded from category 3 to category 1 in 2020 (ICES, 2021b), the absence of F_{MSY} and $MSYB_{trigger}$ prevented its inclusion in the dataset according to the protocol.

Eleven EU category 1-2 stocks were excluded because they are not in the agreed sampling frame (absence of stock-specific TACs) (see section 2.1.2)

- rjn.27.678abd (category 2 – under combined skates and rays TAC)
- rjc.27.8abd (category 2 – split from rjc.27.8 – under combined skates and rays TAC)
- rjc.27.3a47d (new category 2 – under combined skates and rays TAC)
- rjm.27.3a47d (new category 2 – under combined skates and rays TAC)
- rjh.27.4bc7d (new category 2 – under combined skates and rays TAC)
- tur.27.3a (category 2 – no TAC)
- pil.27.8c9a (category 1 – no TAC)
- bss.27.4bc7ad-h (category 1 – no TAC)
- bss.27.8ab (category 1 – no TAC)
- her.27.1-24a514a (category 1 – no TAC)
- pil.27.8abd (category 1 – no TAC)

Stocks ank.27.8c9a, bll.27.3a47de, her.27.25-2932, lez.27.4a6a, lez.27.6b, nep.fu.25, nep.fu.2627, nep.fu.31, ple.27.24-32, pol.27.67, por.27.nea, rju.27.7de, rjc.27.3a47d, rjc.8abd, pra.27.1-2 (non-EU), pra.27.3a4a ghl.27.561214 (non-EU) were assessed in the framework of category 1 or 2 using surplus production models. These models provide estimates of B/B_{MSY} that were used to assess their status against CFP criteria (CFP, i.e. $F \leq F_{MSY}$ and $B \geq B_{MSY}$). Since B_{PA} is defined as a fraction of B_{MSY} or not at all, and B_{MSY} is not reported as an absolute value, these stocks are not taken into account by the SBL indicator.

There are 5 EU stocks managed with a $B_{escapment}$ strategy (san.sa.1r, san.sa.2r, san.sa.3r, san.sa.4, spr.27.3a4) for which ICES set $MSYB_{escapment}$ at B_{PA} and not at B_{MSY}.

The management of ane.27.8 is set according to the adopted plan that stipulates that a harvest control rule (HCR) with 2 biomass trigger points is used. For this stock, ICES report only B_{lim} and the 2 trigger points as SSB_{mgt} reference points.

In the case of nop.27.3a4, a probabilistic method is used to set the catches such as $C_{y+1} = C|(P[SSB<B_{lim}]=0.05)$. B_{lim} and F_{cap} are both estimated and B_{PA} is derived such as $B_{PA} = B_{lim} \cdot \exp(\sigma \cdot 1.645)$.

Out of the 73 stocks with MSY reference points, 45 stocks have $MSYB_{trigger}$ set at B_{PA} levels, 24 stocks do not have a B_{PA} defined,35 stocks have $B_{PA} = B_{lim} \cdot \exp(\sigma \cdot 1.645)$.

To keep consistency with the new ICES definition, widely distributed stocks are referred to as "Widely" in the figures and tables of this section, and not anymore as "Northeast Atlantic" as in past reports.

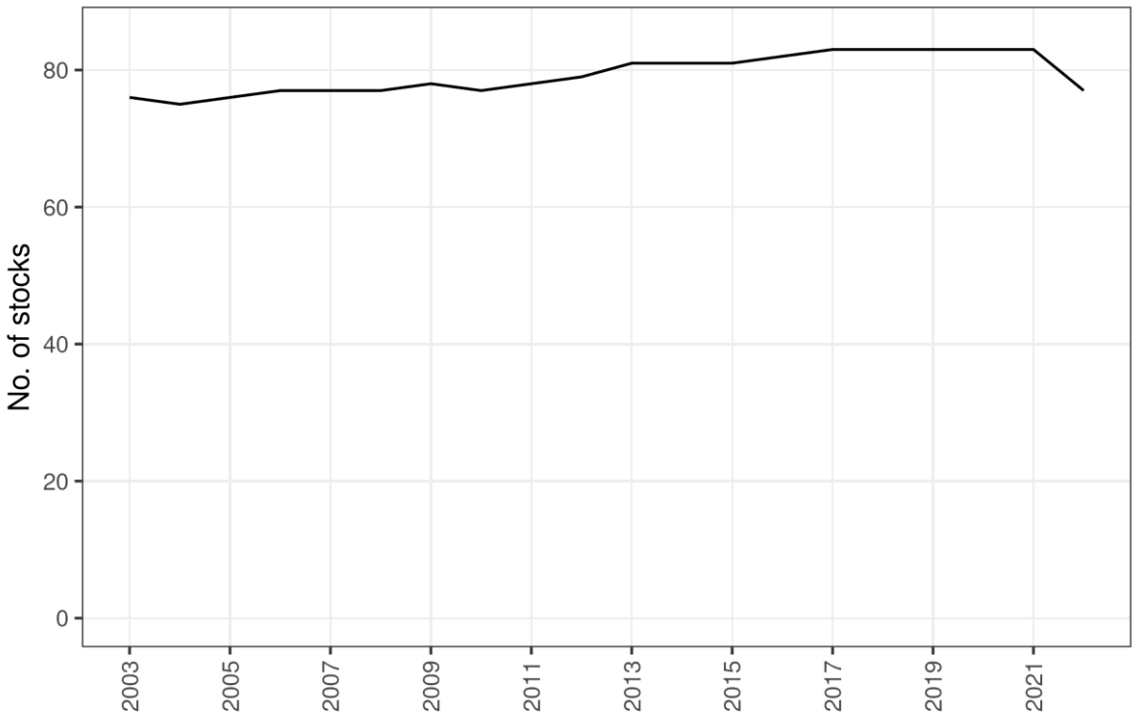

Figure 1: Number of stocks in the NE Atlantic for which estimates of F/F_{MSY} are available by year

Table 1: Number of stocks in the ICES area for which estimates of F/F_{MSY} are available by ecoregion and year

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ALL	76	75	76	77	77	77	78	77	78	79
Baltic Sea	8	8	8	8	8	8	8	8	8	8
BoBiscay & Iberia	14	14	14	14	14	14	14	14	14	14
Celtic Seas	22	21	22	23	23	23	24	23	24	25
Greater North Sea	25	25	25	25	25	25	25	25	25	25
Widely	7	7	7	7	7	7	7	7	7	7

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALL	81	81	81	82	83	83	83	83	83	77
Baltic Sea	8	8	8	8	8	8	8	8	8	8
BoBiscay & Iberia	14	14	14	15	15	15	15	15	15	13
Celtic Seas	27	27	27	27	27	27	27	27	27	26
Greater North Sea	25	25	25	25	26	26	26	26	26	26
Widely	7	7	7	7	7	7	7	7	7	4

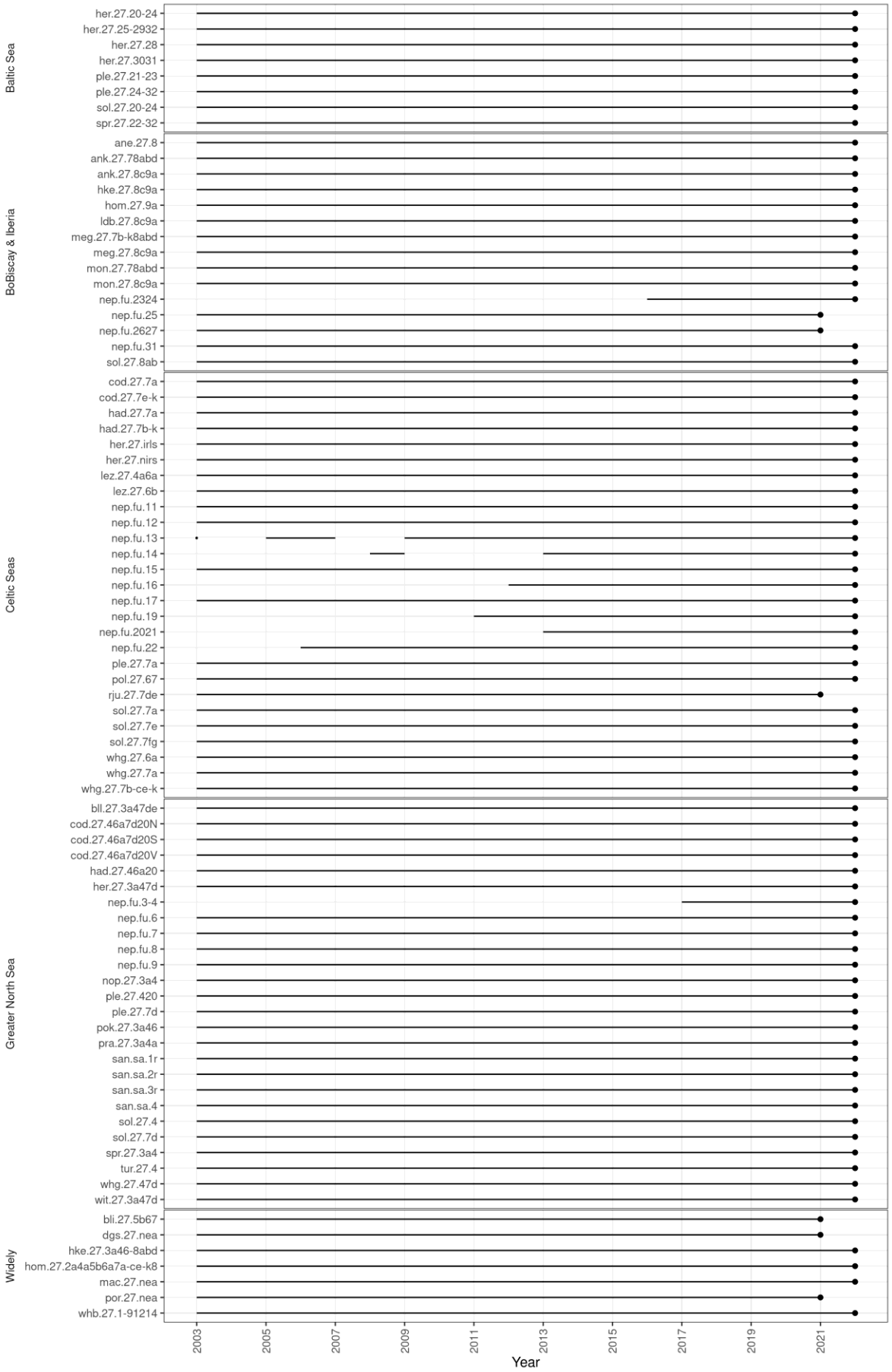

Figure 2: Time series of stock assessment results in the NE Atlantic for which estimates of F/F_{MSY} are available by year. Blank records indicate that no estimate was available for the stock in that year.

Table 2: Indicators computed for each stock

Stock Name	Year	Above/Below F_{MSY}	In/Out SBL	In/Out CFP	F/F_{MSY} trends	Biomass trends	Decadal recruitment trends	Biomass data category 3 trends
ane.27.8	2022	X				X	X	
ane.27.9aS	2022							X
ane.27.9aW	2022							X
anf.27.3a46	2022							X
ank.27.78abd	2022	X	X		X	X	X	
ank.27.8c9a	2022	X		X	X			
bli.27.5b67	2021	X	X		X	X	X	
bll.27.3a47de	2022	X		X	X			
bsf.27.nea	2021							X
bwp.27.2729-32	2021							X
cod.27.2.coasts	2021							X
cod.27.46a7d20N	2022	X	X		X	X	X	
cod.27.46a7d20S	2022	X	X		X	X	X	
cod.27.46a7d20V	2022	X	X		X	X	X	
cod.27.7a	2022	X	X		X	X	X	
cod.27.7e-k	2022	X	X		X	X	X	
dgs.27.nea	2021	X	X			X	X	
had.27.46a20	2022	X	X		X	X	X	
had.27.6b	2021							X
had.27.7a	2022	X	X	X	X	X	X	
had.27.7b-k	2022	X	X		X	X	X	
her.27.20-24	2022	X	X		X	X	X	
her.27.25-2932	2022	X		X	X		X	
her.27.28	2022	X	X		X	X	X	
her.27.3031	2022	X	X		X	X	X	
her.27.3a47d	2022	X	X	X	X	X	X	
her.27.irls	2022	X	X		X	X	X	

Stock Name	Year	Above/Below F_{MSY}	In/Out SBL	In/Out CFP	F/F_{MSY} trends	Biomass trends	Decadal recruitment trends	Biomass data category 3 trends
her.27.nirs	2022	X	X		X	X	X	
hke.27.3a46-8abd	2022	X	X		X	X	X	
hke.27.8c9a	2022	X	X		X	X	X	
hom.27.2a4a5b6a7a-ce-k8	2022	X	X	X	X	X	X	
hom.27.9a	2022	X		X	X	X	X	
ldb.27.8c9a	2022	X	X		X	X	X	
lem.27.3a47d	2022							X
lez.27.4a6a	2022	X		X	X			
lez.27.6b	2022	X		X	X			
mac.27.nea	2022	X	X		X	X	X	
meg.27.7b-k8abd	2022	X	X		X	X	X	
meg.27.8c9a	2022	X	X		X	X	X	
mon.27.78abd	2022	X	X		X	X	X	
mon.27.8c9a	2022	X	X	X	X	X	X	
nep.fu.11	2022	X		X				
nep.fu.12	2022	X		X				
nep.fu.13	2022	X		X				
nep.fu.14	2022	X		X				
nep.fu.15	2022	X		X				
nep.fu.16	2022	X						
nep.fu.17	2022	X						
nep.fu.19	2022	X		X				
nep.fu.2021	2022	X		X				
nep.fu.22	2022	X		X				
nep.fu.2324	2022	X						
nep.fu.25	2021	X		X	X			
nep.fu.2627	2021	X		X	X			
nep.fu.3-4	2022	X						
nep.fu.30	2022							X

Stock Name	Year	Above/Below F_{MSY}	In/Out SBL	In/Out CFP	F/F_{MSY} trends	Biomass trends	Decadal recruitment trends	Biomass data category 3 trends
nep.fu.31	2022	X		X	X			
nep.fu.6	2022	X		X				
nep.fu.7	2022	X		X				
nep.fu.8	2022	X		X				
nep.fu.9	2022	X		X				
nop.27.3a4	2022	X				X	X	
ple.27.21-23	2022	X	X		X	X	X	
ple.27.24-32	2022	X		X	X			
ple.27.420	2022	X	X		X	X	X	
ple.27.7a	2022	X	X	X	X	X	X	
ple.27.7d	2022	X	X		X	X	X	
ple.27.7e	2021							X
pok.27.3a46	2022	X	X		X	X	X	
pol.27.67	2022	X		X	X			
por.27.nea	2021	X		X	X			
pra.27.3a4a	2022	X		X	X		X	
rjc.27.7afg	2021							X
rjc.27.9a	2021							X
rje.27.7fg	2021							X
rjh.27.9a	2021							X
rjm.27.67bj	2021							X
rjm.27.7ae-h	2021							X
rjm.27.8	2020							X
rjm.27.9a	2021							X
rjn.27.3a4	2022							X
rjn.27.8c	2020							X
rjr.27.23a4	2022							X
rju.27.7de	2021	X		X	X			
rng.27.3a	2022							X

Stock Name	Year	Above/Below F_{MSY}	In/Out SBL	In/Out CFP	F/F_{MSY} trends	Biomass trends	Decadal recruitment trends	Biomass data category 3 trends
san.sa.1r	2022	X				X	X	
san.sa.2r	2022	X				X	X	
san.sa.3r	2022	X				X	X	
san.sa.4	2022	X				X	X	
sbr.27.10	2021							X
sbr.27.9	2021							X
sdv.27.nea	2022							X
sho.27.67	2022							X
sho.27.89a	2022							X
sol.27.20-24	2022	X	X		X	X	X	
sol.27.4	2022	X	X		X	X	X	
sol.27.7a	2022	X	X		X	X	X	
sol.27.7d	2022	X	X		X	X	X	
sol.27.7e	2022	X	X	X	X	X	X	
sol.27.7fg	2022	X	X		X	X	X	
sol.27.8ab	2022	X	X		X	X	X	
sol.27.8c9a	2022							X
spr.27.22-32	2022	X	X		X	X	X	
spr.27.3a4	2022	X				X	X	
spr.27.7de	2022							X
syc.27.3a47d	2022							X
syc.27.67a-ce-j	2022							X
syc.27.8abd	2022							X
syc.27.8c9a	2022							X
syt.27.67	2022							X
tur.27.22-32	2020							X
tur.27.4	2022	X	X	X	X	X	X	
usk.27.3a45b6a7-912b	2022							X
whb.27.1-91214	2022	X	X		X	X	X	

Stock Name	Year	Above/Below F_{MSY}	In/Out SBL	In/Out CFP	F/F_{MSY} trends	Biomass trends	Decadal recruitment trends	Biomass data category 3 trends
whg.27.3a	2021							X
whg.27.47d	2022	X	X		X	X	X	
whg.27.6a	2022	X	X		X	X	X	
whg.27.7a	2022	X	X		X	X	X	
whg.27.7b-ce-k	2022	X	X		X	X	X	
whg.27.89a	2022							X
wit.27.3a47d	2022	X	X		X	X	X	
Totals		83	46	33	59	54	56	38

2.2 Indicators of management performance

The first set of indicators (Figure 3 to Figure 8 and Table 3 to Table 8) represent the number of stocks with relation to specific thresholds. Since last year's report (STECF, 2023b) a new presentation of the design-based indicators follows the formatting that was agreed by STECF (2022d) where the mirror indicators are presented stacked on top of each other. The second set of indicators (Figure 9 to Figure 17 and Table 9 to Table 16) depicts time trends of indicators computed using a state-space model as implemented in the JARA package (Winker et al., 2019, Gras et al., 2023). Most indicators have a global and a regional depiction (indicators 1-8 and 10).

2.2.1 Number of stocks by year where fishing mortality is above/below F_{MSY}

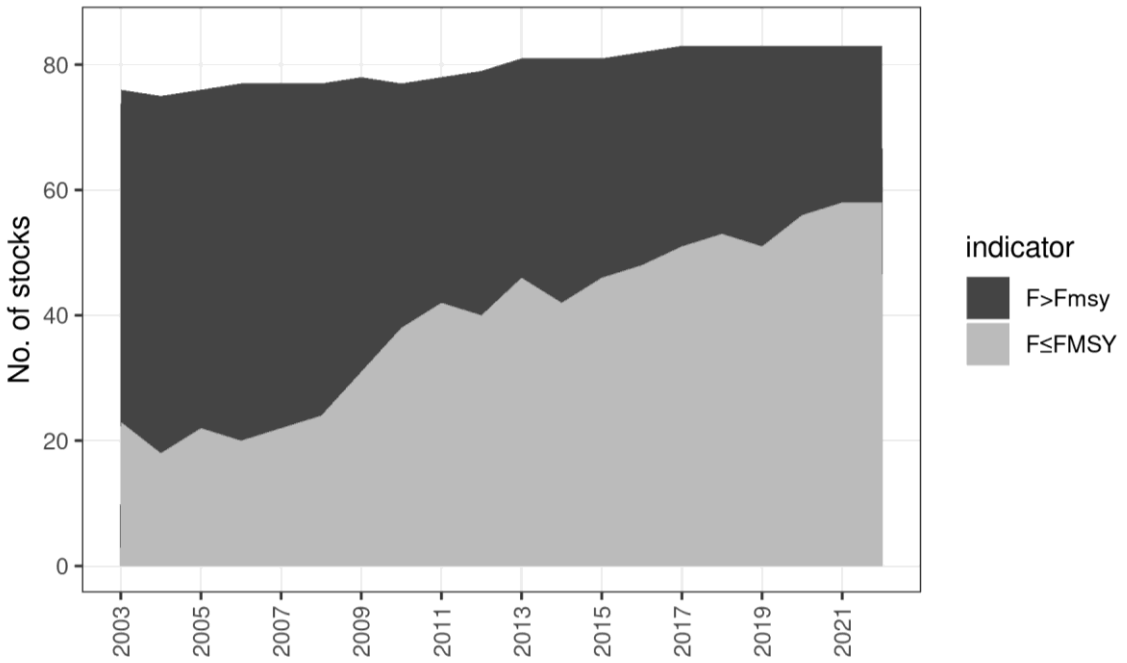

Figure 3: Number of stocks by year for which fishing mortality (F) was above/below F_{MSY} (NEAI1-2)

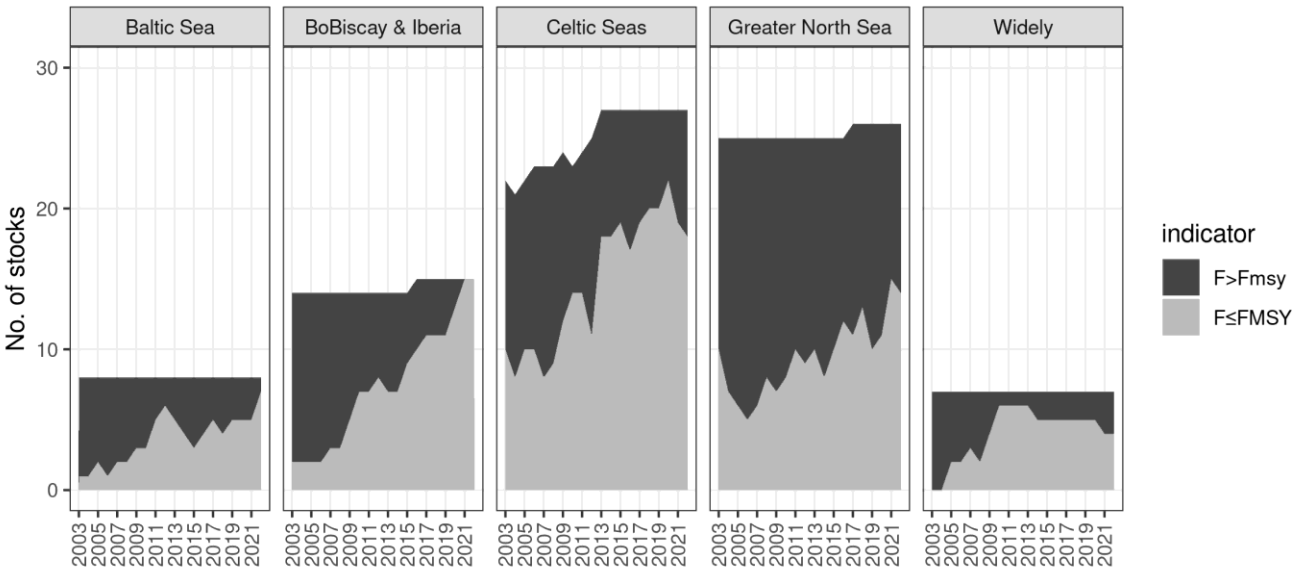

Figure 4: Number of stocks by ecoregion for which fishing mortality (F) was above/below F_{MSY} (NEAI1-2b)

Table 3: Number of stocks by ecoregion for which fishing mortality (F) exceeded F_{MSY} (NEAI1)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ALL	53	57	54	57	55	53	47	39	36	39
Baltic Sea	7	7	6	7	6	6	5	5	3	2
BoBiscay & Iberia	12	12	12	12	11	11	9	7	7	6
Celtic Seas	12	13	12	13	15	14	12	9	10	14
Greater North Sea	15	18	19	20	19	17	18	17	15	16
Widely	7	7	5	5	4	5	3	1	1	1

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALL	35	39	35	34	32	30	32	27	25	25
Baltic Sea	3	4	5	4	3	4	3	3	3	1
BoBiscay & Iberia	7	7	5	5	4	4	4	2	0	0
Celtic Seas	9	9	8	10	8	7	7	5	8	9
Greater North Sea	15	17	15	13	15	13	16	15	11	12
Widely	1	2	2	2	2	2	2	2	3	3

Table 4: Number of stocks by ecoregion for which fishing mortality (F) did not exceed F_{MSY} (NEAI2)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ALL	23	18	22	20	22	24	31	38	42	40
Baltic Sea	1	1	2	1	2	2	3	3	5	6
BoBiscay & Iberia	2	2	2	2	3	3	5	7	7	8
Celtic Seas	10	8	10	10	8	9	12	14	14	11
Greater North Sea	10	7	6	5	6	8	7	8	10	9
Widely	0	0	2	2	3	2	4	6	6	6

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALL	46	42	46	48	51	53	51	56	58	58
Baltic Sea	5	4	3	4	5	4	5	5	5	7
BoBiscay & Iberia	7	7	9	10	11	11	11	13	15	15
Celtic Seas	18	18	19	17	19	20	20	22	19	18
Greater North Sea	10	8	10	12	11	13	10	11	15	14
Widely	6	5	5	5	5	5	5	5	4	4

2.2.2 Number of stocks outside or inside safe biological limits

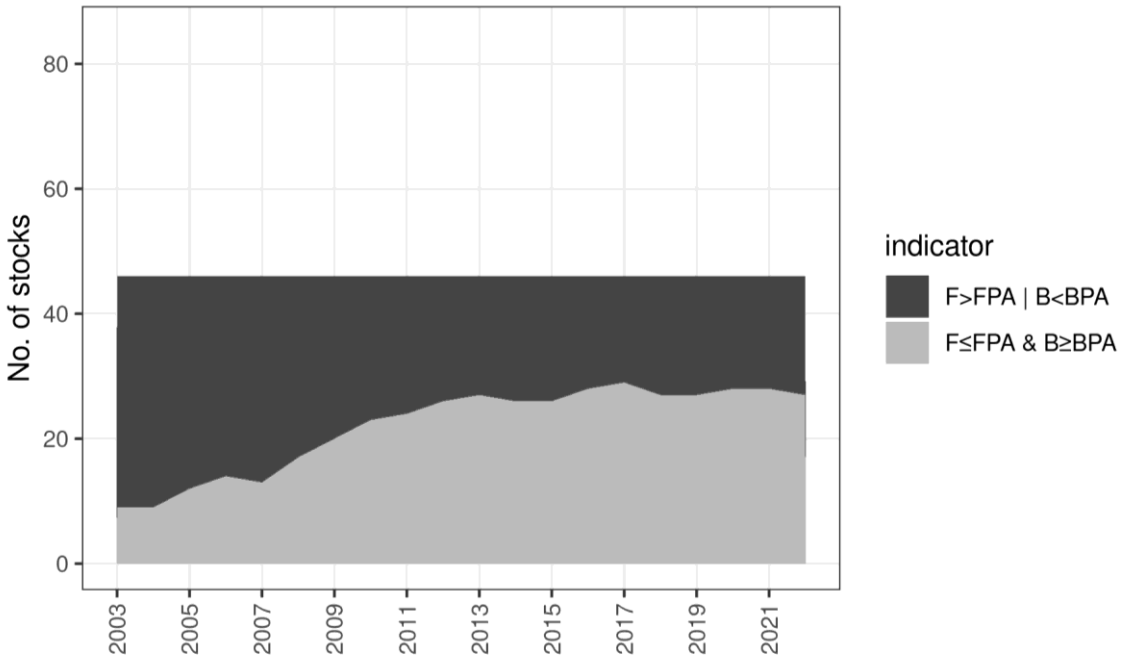

Figure 5: Number of stocks outside/inside safe biological limits by year (NEAI3-4)

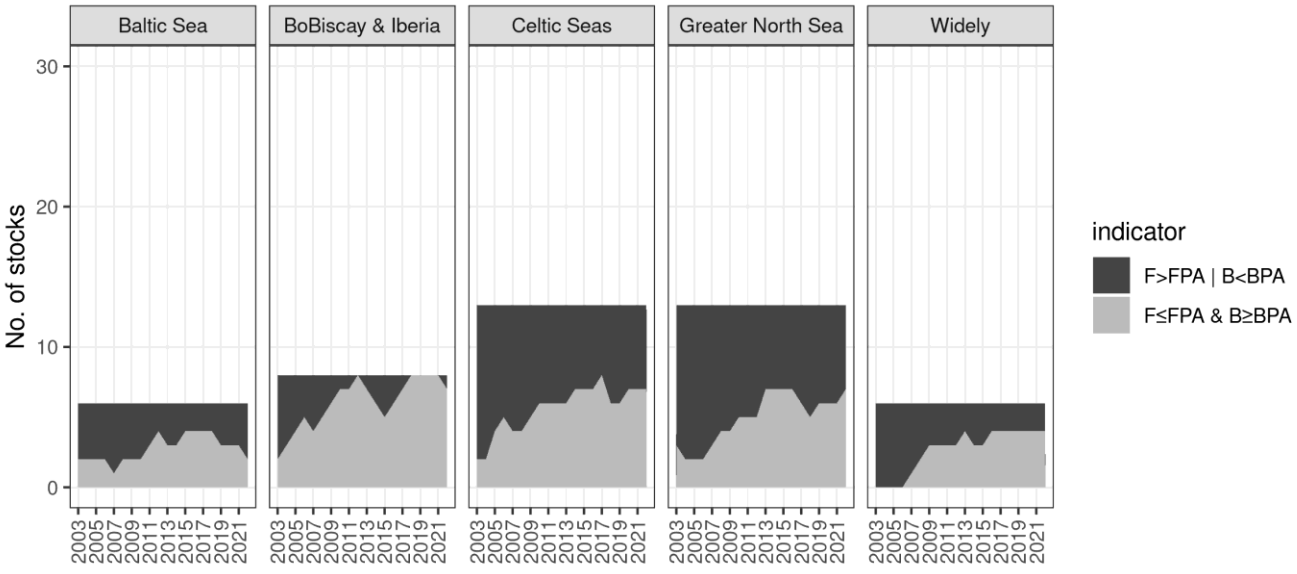

Figure 6: Number of stocks outside/inside safe biological limits by ecoregion (NEAI3-4b)

Table 5: Number of stocks outside safe biological limits by ecoregion (NEAI3)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ALL	37	37	34	32	33	29	26	23	22	20
Baltic Sea	4	4	4	4	5	4	4	4	3	2
BoBiscay & Iberia	6	5	4	3	4	3	2	1	1	0
Celtic Seas	11	11	9	8	9	9	8	7	7	7
Greater North Sea	10	11	11	11	10	9	9	8	8	8
Widely	6	6	6	6	5	4	3	3	3	3

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALL	19	20	20	18	17	19	19	18	18	19
Baltic Sea	3	3	2	2	2	2	3	3	3	4
BoBiscay & Iberia	1	2	3	2	1	0	0	0	0	1
Celtic Seas	7	6	6	6	5	7	7	6	6	6
Greater North Sea	6	6	6	6	7	8	7	7	7	6
Widely	2	3	3	2	2	2	2	2	2	2

Table 6: Number of stocks inside safe biological limits by ecoregion (NEAI4)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ALL	9	9	12	14	13	17	20	23	24	26
Baltic Sea	2	2	2	2	1	2	2	2	3	4
BoBiscay & Iberia	2	3	4	5	4	5	6	7	7	8
Celtic Seas	2	2	4	5	4	4	5	6	6	6
Greater North Sea	3	2	2	2	3	4	4	5	5	5
Widely	0	0	0	0	1	2	3	3	3	3

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALL	27	26	26	28	29	27	27	28	28	27
Baltic Sea	3	3	4	4	4	4	3	3	3	2
BoBiscay & Iberia	7	6	5	6	7	8	8	8	8	7
Celtic Seas	6	7	7	7	8	6	6	7	7	7
Greater North Sea	7	7	7	7	6	5	6	6	6	7
Widely	4	3	3	4	4	4	4	4	4	4

2.2.3 *Number of stocks with F>F_{MSY} or SSB<B_{MSY} and number of stocks with F≤F_{MSY} and SSB≥ B_{MSY}*

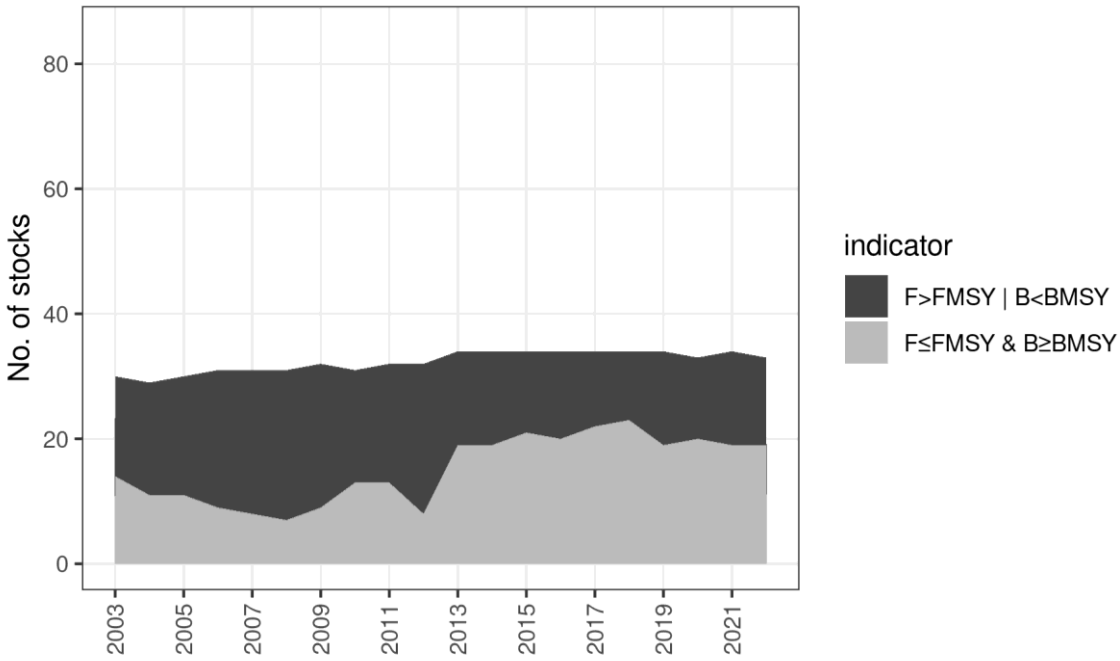

Figure 7: Number of stocks with F>F_{MSY} or SSB<B_{MSY} and number of stocks with F≤F_{MSY} and SSB≥B_{MSY} (NEAI5-6)

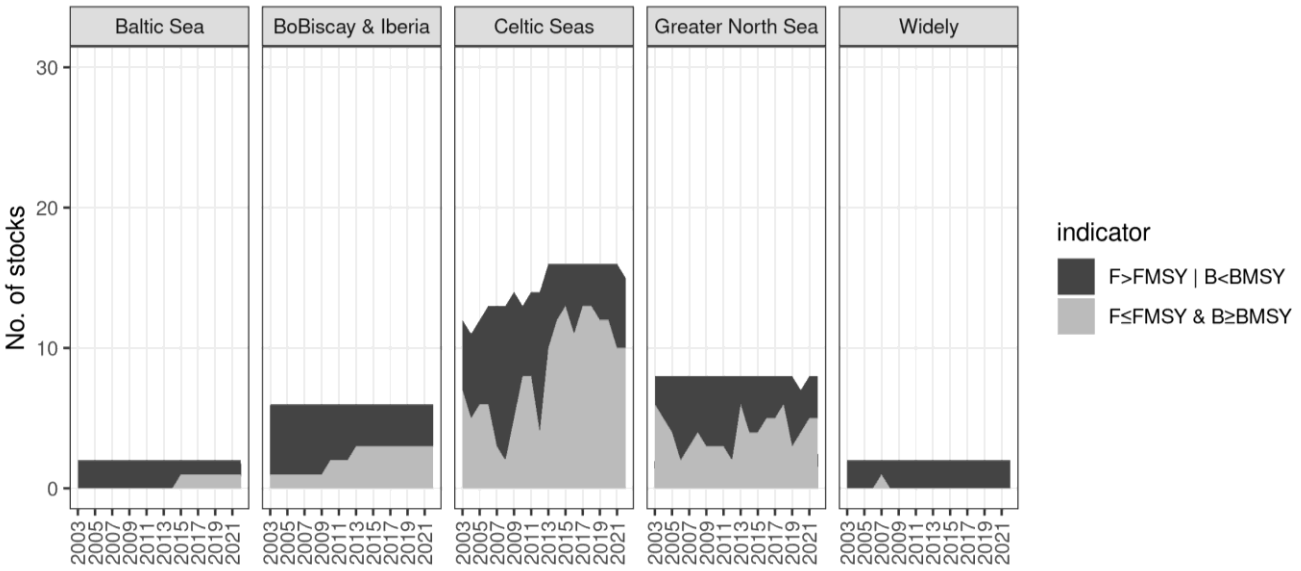

Figure 8: Number of stocks with F>F_{MSY} or SSB<B_{MSY} and number of stocks with F≤F_{MSY} and SSB≥B_{MSY} by ecoregion (NEAI5-6b)

Table 7: Number of stocks with $F>F_{MSY}$ or $SSB<B_{MSY}$ by ecoregion (NEAI5)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ALL	16	18	19	22	23	24	23	18	19	24
Baltic Sea	2	2	2	2	2	2	2	2	2	2
BoBiscay & Iberia	5	5	5	5	5	5	5	4	4	4
Celtic Seas	5	6	6	7	10	11	9	5	6	10
Greater North Sea	2	3	4	6	5	4	5	5	5	6
Widely	2	2	2	2	1	2	2	2	2	2

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALL	15	15	13	14	12	11	15	13	15	14
Baltic Sea	2	2	1	1	1	1	1	1	1	1
BoBiscay & Iberia	3	3	3	3	3	3	3	3	3	3
Celtic Seas	6	4	3	5	3	3	4	4	6	5
Greater North Sea	2	4	4	3	3	2	5	3	3	3
Widely	2	2	2	2	2	2	2	2	2	2

Table 8: Number of stocks with $F \leq F_{MSY}$ and $SSB \geq B_{MSY}$ by ecoregion (NEAI6)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ALL	14	11	11	9	8	7	9	13	13	8
Baltic Sea	0	0	0	0	0	0	0	0	0	0
BoBiscay & Iberia	1	1	1	1	1	1	1	2	2	2
Celtic Seas	7	5	6	6	3	2	5	8	8	4
Greater North Sea	6	5	4	2	3	4	3	3	3	2
Widely	0	0	0	0	1	0	0	0	0	0

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALL	19	19	21	20	22	23	19	20	19	19
Baltic Sea	0	0	1	1	1	1	1	1	1	1
BoBiscay & Iberia	3	3	3	3	3	3	3	3	3	3
Celtic Seas	10	12	13	11	13	13	12	12	10	10
Greater North Sea	6	4	4	5	5	6	3	4	5	5
Widely	0	0	0	0	0	0	0	0	0	0

2.2.4 Trend in F/F_{MSY}

The ratio F/F_{MSY} has decreased over the years 2003-2022 from 1.53 to 0.58 (Figure 9 and Table 9). A first decreasing phase happened from 2003 to 2013. That was followed by a phase of less steep decrease until 2019. The decrease became more pronounced over the last 3 years of the time series. The ratio's estimate went below 1 from 2011 and the confidence interval was below 1 from 2020 to 2022.

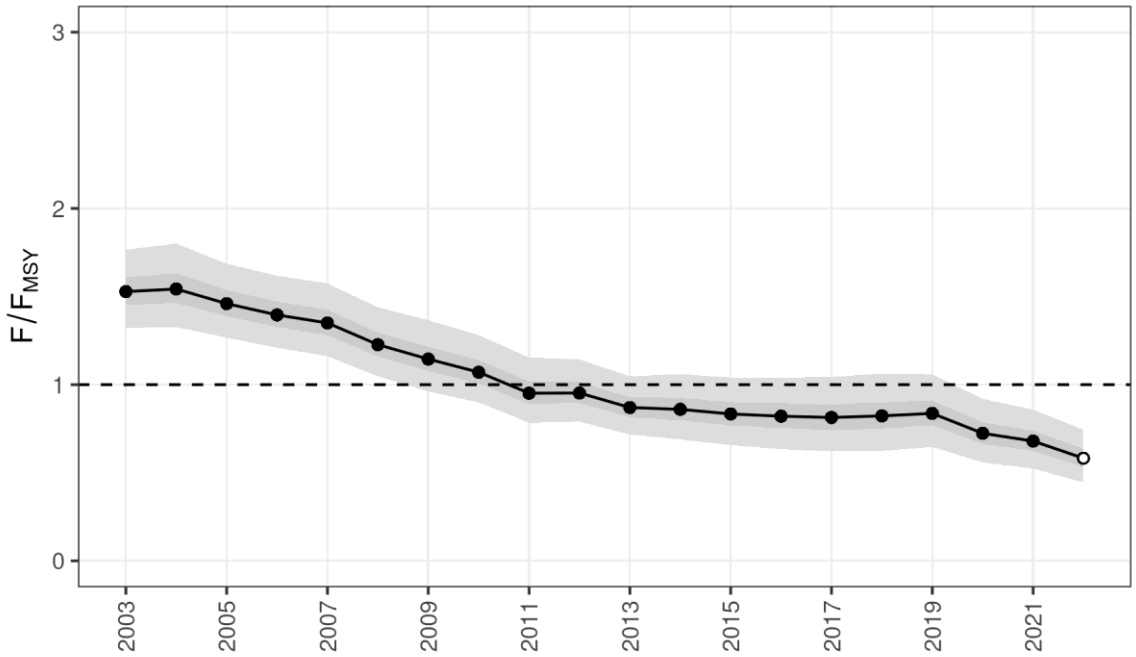

Figure 9: Trend in F/F_{MSY} (based on 59 stocks). Dark grey area shows the 50% confidence interval whereas the light grey shows the 95% confidence interval (NEAI7)

Table 9: Percentiles for F/F_{MSY} by year (NEAI7)

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.32	1.32	1.27	1.21	1.16	1.05	0.96	0.90	0.78	0.79
25%	1.45	1.46	1.39	1.33	1.28	1.16	1.08	1.01	0.89	0.90
50%	1.53	1.54	1.46	1.40	1.35	1.23	1.15	1.07	0.95	0.95
75%	1.61	1.63	1.54	1.47	1.42	1.30	1.21	1.14	1.02	1.02
97.5%	1.77	1.80	1.69	1.62	1.58	1.44	1.37	1.28	1.15	1.14

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.72	0.69	0.66	0.63	0.62	0.62	0.65	0.56	0.52	0.44
25%	0.82	0.80	0.77	0.75	0.74	0.75	0.77	0.66	0.62	0.53
50%	0.87	0.86	0.83	0.82	0.81	0.82	0.84	0.72	0.68	0.58
75%	0.93	0.92	0.90	0.89	0.89	0.90	0.91	0.79	0.74	0.64
97.5%	1.05	1.06	1.04	1.04	1.04	1.06	1.06	0.92	0.86	0.75

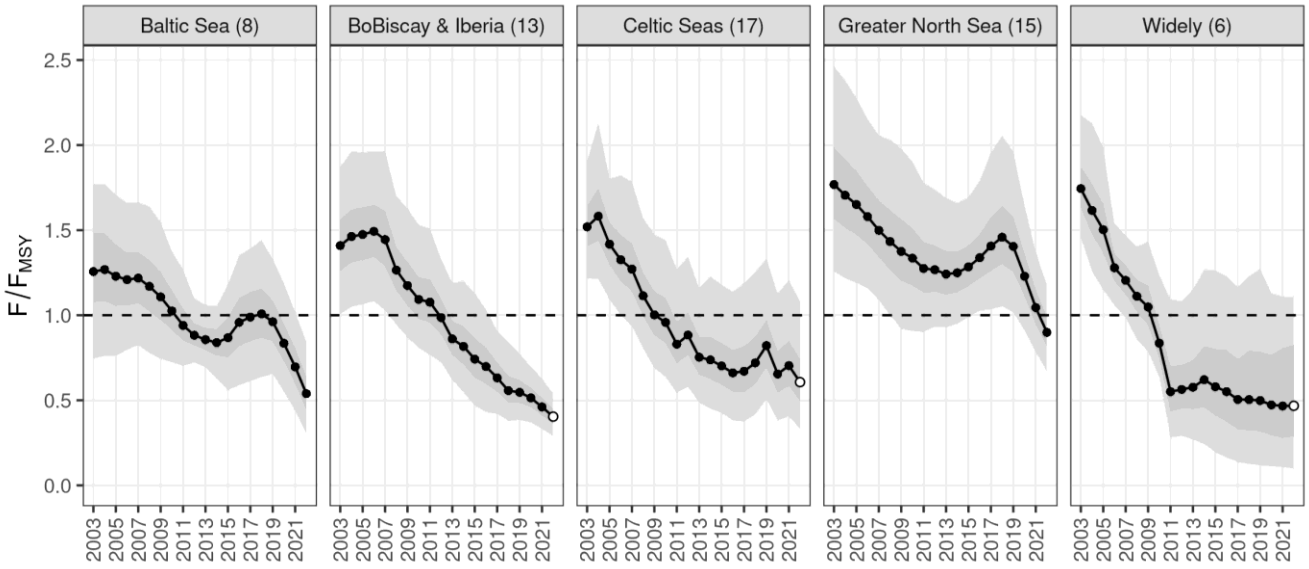

Figure 10: Trend in F/F_{MSY} by ecoregion. The number of stocks in each ecoregion are shown between parentheses (NEAI7b)

Table 10: Trend in F/F_{MSY} by ecoregion (NEAI7b)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Baltic Sea	1.26	1.27	1.23	1.21	1.22	1.17	1.11	1.03	0.94	0.88
BoBiscay & Iberia	1.41	1.46	1.47	1.49	1.44	1.27	1.17	1.09	1.08	0.99
Celtic Seas	1.52	1.58	1.42	1.33	1.27	1.11	1.00	0.96	0.83	0.88
Greater North Sea	1.77	1.71	1.65	1.58	1.50	1.43	1.38	1.34	1.27	1.27
Widely	1.74	1.62	1.50	1.28	1.20	1.11	1.05	0.84	0.55	0.56

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Baltic Sea	0.86	0.84	0.87	0.96	0.99	1.01	0.96	0.83	0.70	0.54
BoBiscay & Iberia	0.86	0.82	0.74	0.70	0.63	0.56	0.55	0.51	0.46	0.40
Celtic Seas	0.75	0.74	0.70	0.66	0.67	0.72	0.82	0.65	0.70	0.61
Greater North Sea	1.24	1.25	1.28	1.34	1.41	1.46	1.40	1.23	1.04	0.90
Widely	0.58	0.62	0.58	0.55	0.50	0.50	0.50	0.47	0.47	0.47

2.2.5 Trend in F/F_{MSY} for stocks outside EU waters

The model used in section 2.2.4 was also used with data derived from stocks assessed by ICES and spanning across areas that fall primarily outside EU waters in FAO region 27 (Figure 11 and Table 11). The analysis was based on 18 stocks for which individual F/F_{MSY} trajectories are presented in Figure 12. Throughout the time series, the ratio did not exhibit any increasing or decreasing trend. The ratio was greater than 1 throughout the time series. The confidence interval of the indicator overlapped with 1 in some years. An increase of the indicator occurred from 2017 to 2020 followed by a decrease until 2022.

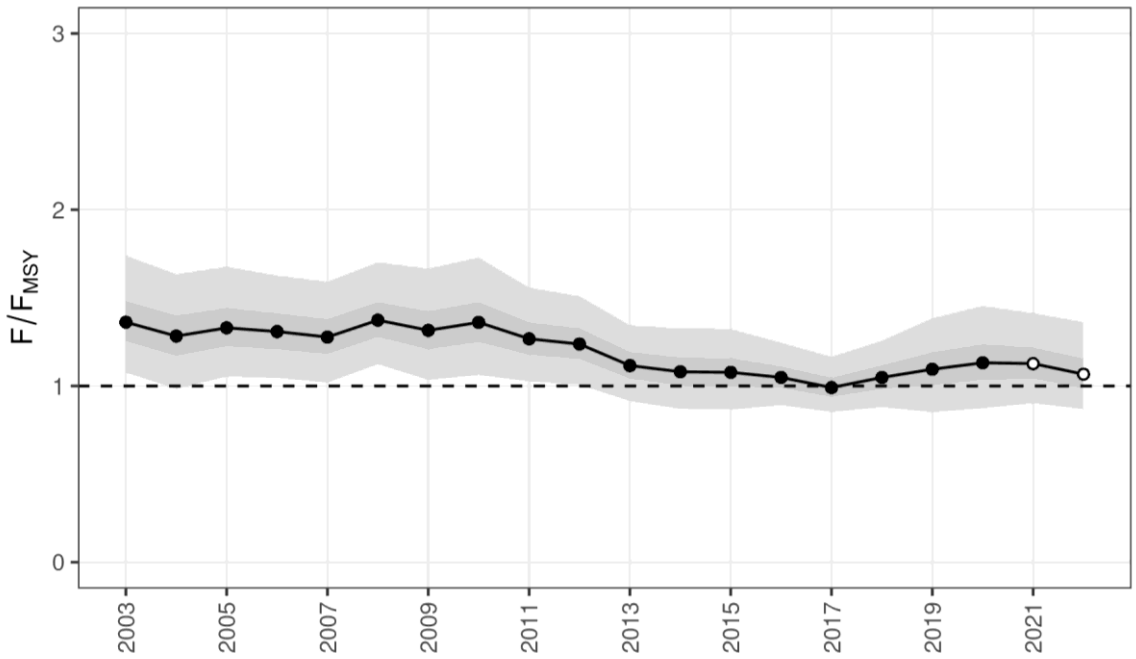

Figure 11: Trend in F/F_{MSY} for stocks outside EU waters (based on 18 stocks). Dark grey zone shows the 50% confidence interval whereas the light grey zone shows the 95% confidence interval (NEAI7out)

Table 11: Percentiles for F/F_{MSY} for stocks outside EU waters (NEAI7out)

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.08	0.98	1.05	1.04	1.02	1.12	1.03	1.06	1.02	1.01
25%	1.25	1.17	1.23	1.21	1.18	1.28	1.21	1.25	1.18	1.16
50%	1.36	1.28	1.33	1.31	1.28	1.38	1.31	1.36	1.27	1.24
75%	1.48	1.40	1.44	1.41	1.38	1.48	1.43	1.48	1.37	1.33
97.5%	1.75	1.63	1.67	1.63	1.60	1.71	1.66	1.73	1.56	1.52

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.91	0.87	0.87	0.89	0.85	0.88	0.86	0.88	0.90	0.87
25%	1.04	1.00	1.00	0.99	0.94	0.98	1.00	1.04	1.04	1.01
50%	1.12	1.08	1.08	1.05	0.99	1.05	1.09	1.13	1.13	1.09
75%	1.20	1.16	1.16	1.11	1.04	1.12	1.19	1.24	1.22	1.18
97.5%	1.35	1.33	1.33	1.25	1.17	1.26	1.39	1.46	1.40	1.40

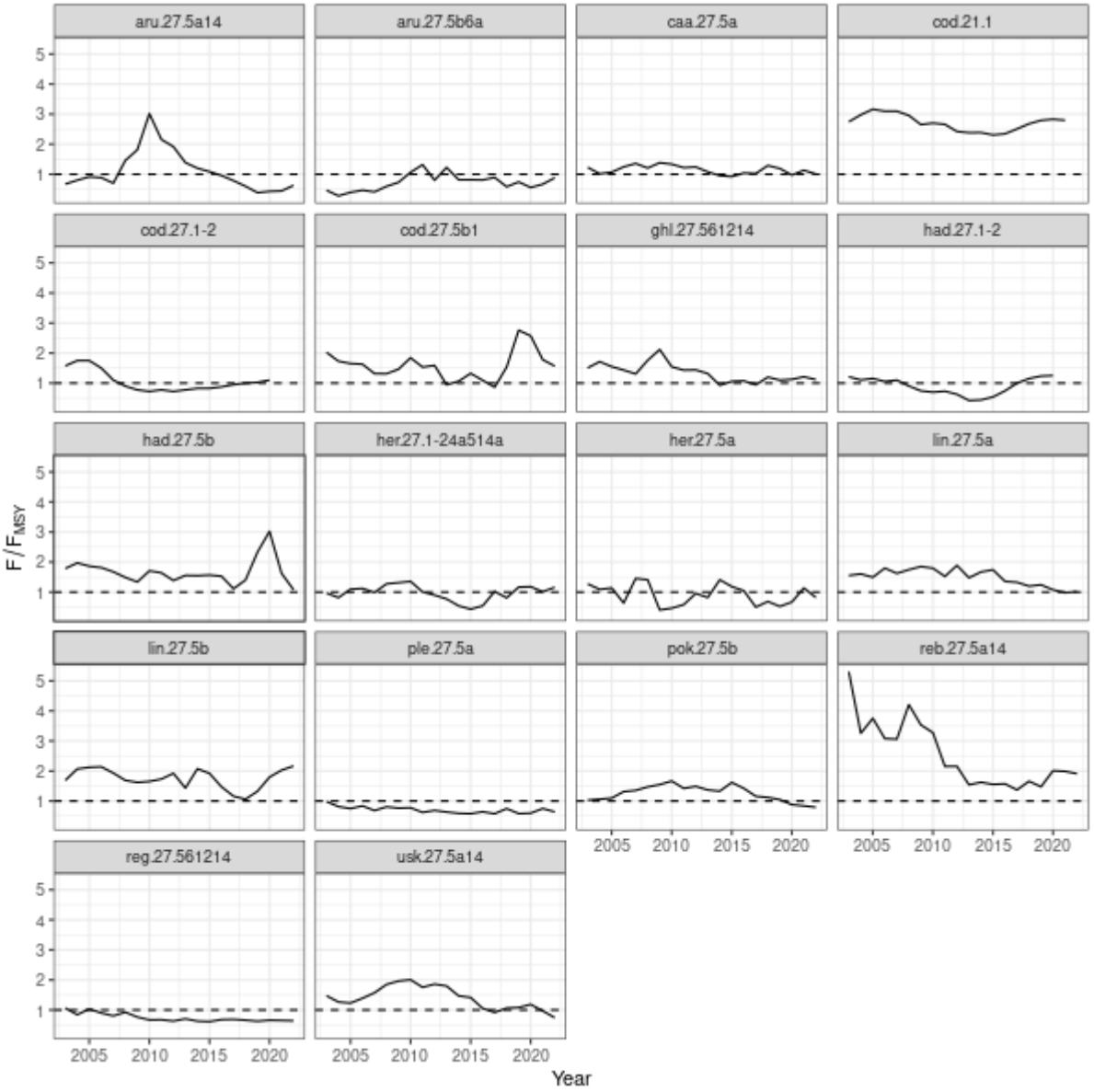

Figure 12: Trend in F/F_{MSY} of single stocks from outside EU waters. The dashed line is set at 1 (i.e. where $F=F_{MSY}$)

2.2.6 Trend in SSB (relative to SSB in 2003)

The ratio B/B_{2003} increased over the years 2003-2022 to reach 1.37 (Figure 13 and Table 12). Over the years 2003-2007, the indicator has decreased to 0.91 (minimum of the time series reached in 2006-2007). The following increasing trend reached its peak in 2011 (1.25). Over the following years, after two decreasing phases, the index followed an increasing trend to reach a maximum in 2021 (1.38) followed by a very slight decrease to 1.37 in 2022. The ratio's confidence interval overlaps with 1 throughout the time series.

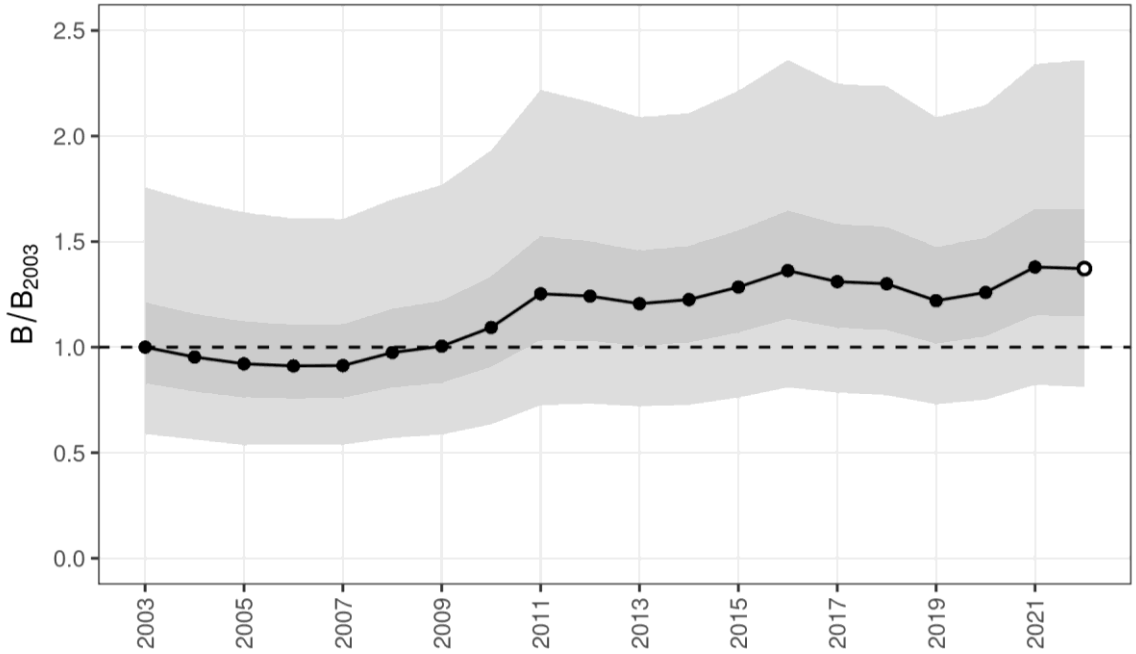

Figure 13: Trend in SSB relative to 2003 (based on 54 stocks). Dark grey zone shows the 50% confidence interval whereas the light grey zone shows the 95% confidence interval (NEAI8)

Table 12: Percentiles for SSB relative to 2003

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.59	0.56	0.53	0.54	0.54	0.57	0.58	0.63	0.72	0.73
25%	0.83	0.79	0.76	0.76	0.76	0.81	0.83	0.91	1.04	1.03
50%	1.00	0.95	0.92	0.91	0.91	0.97	1.00	1.09	1.25	1.24
75%	1.21	1.16	1.12	1.10	1.11	1.18	1.22	1.33	1.52	1.50
97.5%	1.76	1.69	1.64	1.61	1.61	1.70	1.77	1.93	2.22	2.16

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.72	0.73	0.76	0.81	0.78	0.77	0.73	0.75	0.82	0.81
25%	1.01	1.02	1.07	1.14	1.09	1.08	1.02	1.05	1.15	1.15
50%	1.21	1.23	1.28	1.36	1.31	1.30	1.22	1.26	1.38	1.37
75%	1.46	1.48	1.55	1.65	1.58	1.57	1.47	1.52	1.65	1.65
97.5%	2.09	2.11	2.21	2.36	2.25	2.24	2.09	2.15	2.34	2.36

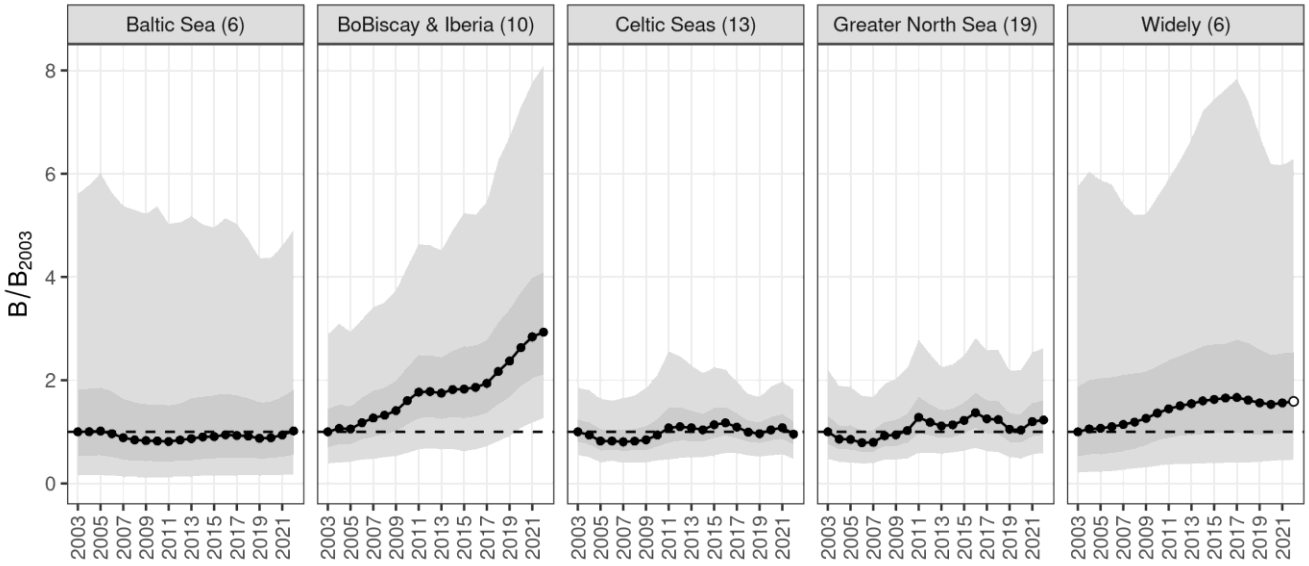

Figure 14: Trend in SSB relative to 2003 by ecoregion. The number of stocks in each ecoregion are shown between parentheses (NEAI8b)

Table 13: SSB relative to 2003 by ecoregion

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Baltic Sea	1.00	1.00	1.02	0.97	0.89	0.85	0.84	0.83	0.82	0.85
BoBiscay & Iberia	1.00	1.07	1.06	1.18	1.27	1.33	1.41	1.60	1.77	1.79
Celtic Seas	1.00	0.94	0.82	0.83	0.81	0.83	0.85	0.95	1.09	1.11
Greater North Sea	1.00	0.86	0.86	0.79	0.80	0.92	0.94	1.02	1.28	1.19
Widely	1.00	1.05	1.07	1.10	1.14	1.20	1.26	1.37	1.45	1.51

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Baltic Sea	0.88	0.91	0.92	0.95	0.95	0.93	0.89	0.90	0.95	1.03
BoBiscay & Iberia	1.75	1.82	1.83	1.87	1.95	2.17	2.37	2.64	2.83	2.93
Celtic Seas	1.09	1.05	1.15	1.18	1.10	1.00	0.97	1.04	1.09	0.96
Greater North Sea	1.11	1.14	1.22	1.37	1.25	1.23	1.05	1.03	1.19	1.22
Widely	1.54	1.60	1.63	1.65	1.67	1.61	1.56	1.54	1.56	1.59

2.2.7 Trend in stock size relative to stock size in 2003 for data-limited stocks

The stock size for category 3 stocks inside EU waters (Figure 15 and Table 14) have increased over the years 2003-2022 to reach its maximum of the series (3.11). The lower bound of the confidence interval overlapped with 1 except in years 2015-2019 and 2022. This indicator should be interpreted with caution since the input data is a mix of various units that are barely comparable. The absolute values are also quite heterogeneous explaining the large confidence interval observed.

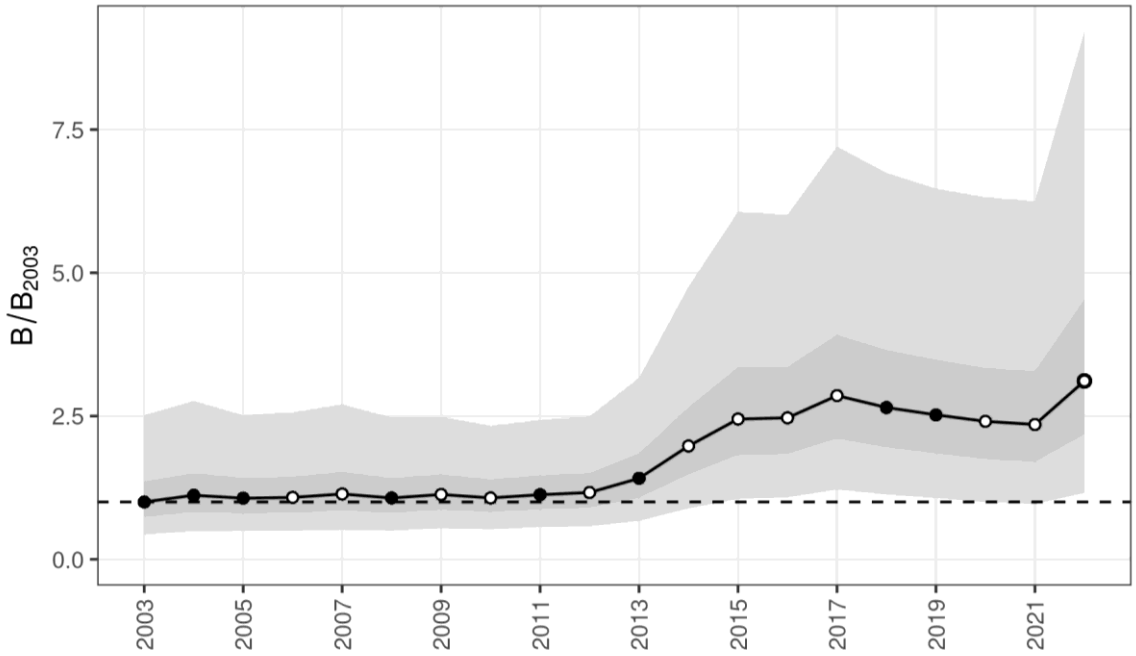

Figure 15: Trend in biomass or abundance indices relative to 2003 for data limited stocks (ICES category 3; based on 66 stocks). Dark grey zone shows the 50% confidence interval whereas the light grey zone shows the 95% confidence interval (NEAI12)

Table 14: Percentiles for biomass or abundance indices relative to 2003 for ICES category 3 stocks

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.43	0.49	0.49	0.50	0.51	0.50	0.54	0.52	0.56	0.57
25%	0.75	0.83	0.81	0.82	0.86	0.82	0.87	0.83	0.88	0.91
50%	1.00	1.12	1.07	1.08	1.14	1.07	1.13	1.07	1.13	1.17
75%	1.35	1.50	1.41	1.43	1.52	1.41	1.47	1.39	1.46	1.50
97.5%	2.52	2.77	2.52	2.57	2.71	2.47	2.49	2.33	2.43	2.49

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.67	0.88	1.05	1.08	1.21	1.13	1.07	0.99	0.96	1.16
25%	1.08	1.49	1.83	1.85	2.11	1.96	1.86	1.76	1.71	2.19
50%	1.41	1.98	2.45	2.47	2.86	2.65	2.52	2.41	2.35	3.11
75%	1.84	2.65	3.35	3.35	3.91	3.65	3.48	3.33	3.28	4.53
97.5%	3.17	4.76	6.07	6.02	7.21	6.75	6.47	6.32	6.25	9.21

2.2.8 Trend in recruitment relatively to recruitment 2003

The estimated average decadal recruitment for category 1 and 2 stocks (Figure 16 and Table 15) followed a decreasing trend from 2003 to 2011 where it reached the minimum of the time series (0.83). From 2012 to the end of the time series the decadal recruitment increased steadily and reached the maximum of the time series in 2022 (1.13). The confidence interval of the decadal recruitment was estimated below 1 in years 2009-2013 (the upper limit of the CI was estimated to be <1). It should be noted that several category 1 and 2 stocks were omitted due to them being assessed using biomass dynamic models. This trend might reflect an increase in stock production although the characteristic of the indicator, a decadal ratio, makes it difficult to interpret.

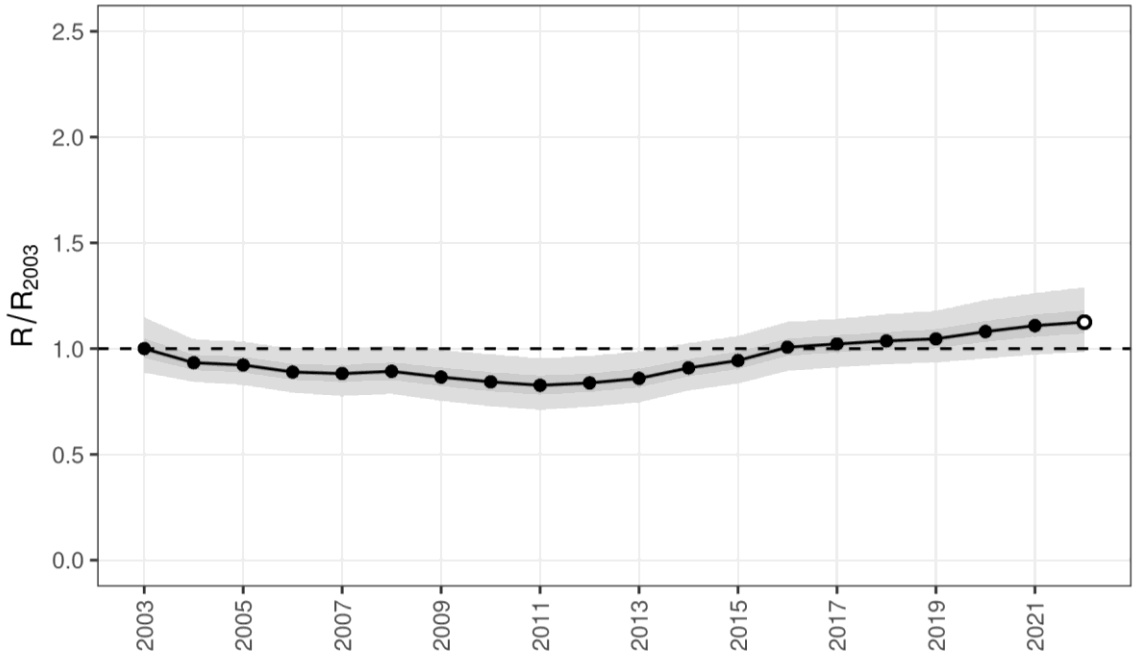

Figure 16: Trend in decadal recruitment scaled to 2003 (based on 56 stocks). Dark grey zone shows the 50% confidence interval whereas the light grey zone shows the 95% confidence interval (NEAI10)

Table 15: Percentiles for decadal recruitment scaled to 2003

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.89	0.84	0.83	0.79	0.77	0.79	0.75	0.73	0.71	0.72
25%	0.96	0.90	0.89	0.85	0.84	0.85	0.82	0.80	0.78	0.80
50%	1.00	0.93	0.92	0.89	0.88	0.89	0.87	0.84	0.83	0.84
75%	1.05	0.97	0.96	0.93	0.92	0.93	0.91	0.89	0.87	0.88
97.5%	1.15	1.05	1.03	1.00	1.00	1.01	0.99	0.97	0.95	0.97

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.74	0.80	0.83	0.89	0.91	0.93	0.93	0.95	0.97	0.98
25%	0.82	0.87	0.91	0.97	0.98	1.00	1.01	1.03	1.06	1.07
50%	0.86	0.91	0.94	1.01	1.02	1.04	1.05	1.08	1.11	1.13
75%	0.90	0.95	0.98	1.05	1.06	1.08	1.09	1.13	1.16	1.18
97.5%	0.99	1.03	1.06	1.13	1.14	1.16	1.18	1.23	1.26	1.29

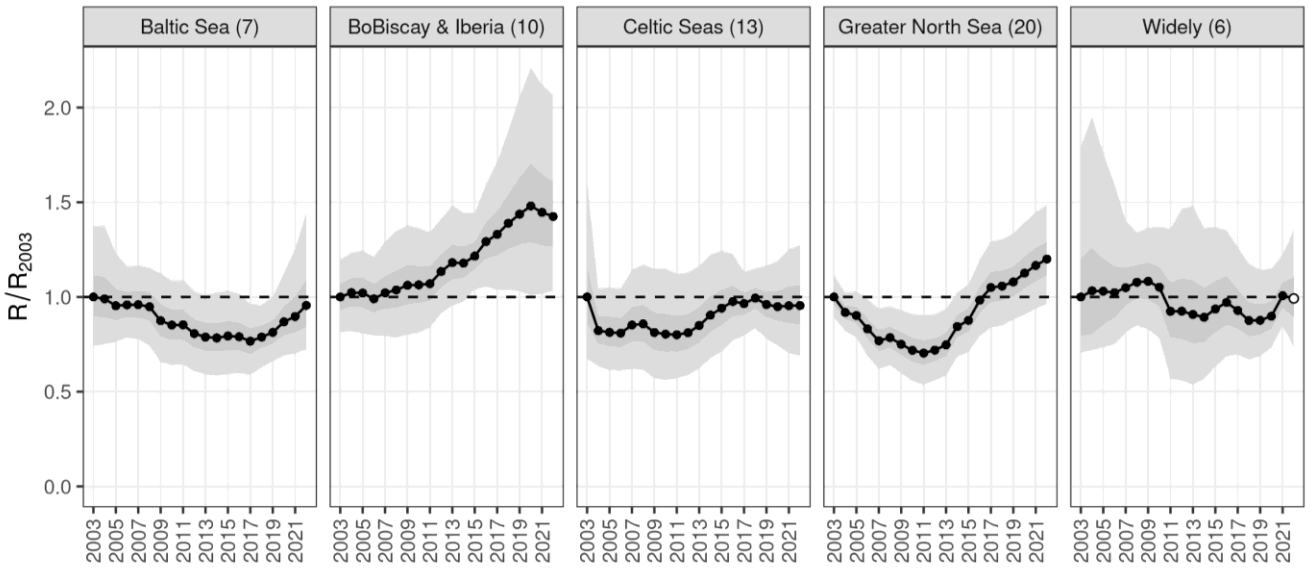

Figure 17: Trend in decadal recruitment scaled to 2003 by ecoregion. The number of stocks in each ecoregion are shown between brackets (NEAI10b)

Table 16: Decadal recruitment scaled to 2003 by ecoregion

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Baltic Sea	1.00	0.99	0.95	0.96	0.96	0.95	0.87	0.85	0.85	0.81
BoBiscay & Iberia	1.00	1.02	1.02	0.99	1.02	1.04	1.06	1.06	1.07	1.13
Celtic Seas	1.00	0.82	0.81	0.81	0.85	0.86	0.81	0.80	0.80	0.81
Greater North Sea	1.00	0.92	0.90	0.83	0.77	0.79	0.75	0.72	0.70	0.72
Widely	1.00	1.03	1.03	1.02	1.05	1.08	1.08	1.05	0.92	0.93

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Baltic Sea	0.79	0.78	0.79	0.79	0.77	0.79	0.81	0.87	0.90	0.96
BoBiscay & Iberia	1.18	1.18	1.22	1.29	1.33	1.39	1.44	1.48	1.45	1.42
Celtic Seas	0.85	0.90	0.94	0.98	0.96	0.99	0.96	0.95	0.95	0.96
Greater North Sea	0.75	0.84	0.88	0.98	1.05	1.06	1.08	1.13	1.17	1.20
Widely	0.91	0.89	0.94	0.97	0.93	0.88	0.88	0.90	1.01	0.99

2.3 Indicators of advice coverage

The indicator of advice coverage provides the number of stocks for which the reference points F_{MSY}, F_{PA}, $MSYB_{trigger}$, and B_{PA} are available (Table 17). It also provides the number of TACs that are set by the European Commission. This figure has increased since 2023 (STECF, 2023b) with the addition of "por.27.nea" and "rju.27.7de", i.e. 158. The number of stocks having reference points have increased for all the reference points except for F_{PA} for which it has reduced by 1 since last year.

Table 17: Coverage of TACs by scientific advice (ICES category 1 and 2)

	No of stocks	No of TACs	No of TACs based on stock assessment	Fraction of TACs based on Stock Assessments
F_{MSY}	83	158	83	0.53
$MSYB_{trigger}$	40	158	29	0.18
F_{PA}	47	158	64	0.41
B_{PA}	65	158	76	0.48

3 Mediterranean and Black Sea

Between 2003 and 2009 the number of available outputs of stock assessments increased from 43 to 63. Since 2009 a single stock assessment was added to the dataset (starting in 2015). In 2021 and 2022 a reduction of 37 stock assessment outputs is recorded (Figure 18 and Figure 19) due to the 3-year advice cycle in GFCM. This year's analyses for the Mediterranean and Black Sea as for Northeast Atlantic are carried out applying the new protocol to monitor the Common Fisheries Policy (Gras et al., 2023). The overall increase in numbers of stock assessment outputs is also due to the quantitative information being publicly available from GFCM (through the STAR file). The high variability of stocks assessment outputs at the start of the analysis makes the interpretation of the indicators challenging. With such differences in the number of stocks assessed in the early period, the trends in the indicators are confounded with the number of stocks available for their computation. Consequently, in previous reports, only the model-based indicators for trends in F/F_{MSY} and SSB were shown. This year 63 and 64 Mediterranean and Black Sea stocks were used for F/F_{MSY} and B/B_{2003} indicators respectively (Table 25). Since the number of stock assessment has increased and became slightly more stable, some design based indicators were computed in relation to the MSY approach and presented in Annex for this report.

Table 25: Stocks used for F/F_{MSY} ad B/B_{2003} indicators

F/FMSY						
ANE_16	ANE_17_18	ANE_29	ANE_6	ANE_7	ANE_9	ARA_1
ARA_18_19_20	ARA_2	ARA_5	ARA_6_7	ARA_9_10_11.1_11.2	ARS_12_13_14_15_16	ARS_18_19_20
ARS_8_9_10_11	CTC_17	DGS_29	DPS_1	DPS_12_13_14_15_16	DPS_17_18_19_20	DPS_5_6_7
DPS_8_9_10_11	EOI_18	HKE_1_5_6_7	HKE_12_13_14_15_16	HKE_17_18	HKE_19	HKE_20
HKE_22	HKE_8_9_10_11	MTS_17	MUR_15_16	MUR_5	MUT_1	MUT_10
MUT_11.1_11.2	MUT_15	MUT_16	MUT_17_18	MUT_19	MUT_20	MUT_22
MUT_25	MUT_29	MUT_6	MUT_7	MUT_9	NEP_15_16	NEP_17_18
NEP_5	NEP_6	NEP_9	PIL_16	PIL_17_18	PIL_6	PIL_9
RPW_29	SBA_25	SBR_1_3	SOL_17	SPR_29	TUR_29	WHG_29
B/B2003						
ANE_16	ANE_17_18	ANE_29	ANE_6	ANE_7	ANE_9	ARA_1
ARA_18_19_20	ARA_2	ARA_5	ARA_6_7	ARA_9_10_11.1_11.2	ARS_12_13_14_15_16	ARS_18_19_20
ARS_8_9_10_11	CTC_17	DGS_29	DPS_1	DPS_12_13_14_15_16	DPS_17_18_19_20	DPS_5_6_7
DPS_8_9_10_11	EOI_18	HKE_1_5_6_7	HKE_12_13_14_15_16	HKE_17_18	HKE_19	HKE_20
HKE_22	HKE_8_9_10_11	MTS_17	MUR_15_16	MUR_5	MUT_1	MUT_10
MUT_11.1_11.2	MUT_15	MUT_16	MUT_17_18	MUT_19	MUT_20	MUT_22
MUT_25	MUT_29	MUT_6	MUT_7	MUT_9	NEP_15_16	NEP_17_18
NEP_5	NEP_6	NEP_9	PIL_16	PIL_17_18	PIL_6	PIL_7
PIL_9	RPW_29	SBA_25	SBR_1_3	SOL_17	SPR_29	TUR_29
WHG_29						

In the period 2009-2020, the number of available stocks is more stable. The JARA model without back cast provided some estimates of the variance associated with the analysis, but still assumes that the entire stock population is sampled. The indicator values are presented in Figure 22 to Figure 25, and Table 19 to Table 22. The number of stock assessment outputs available for the Mediterranean and Black Seas is displayed in Figure 18.

Due to the reduced number of stock assessments available for 2022, the indicators are plotted as a time series up to 2021 only and 2022 is depicted as a separate point in Figure 18.

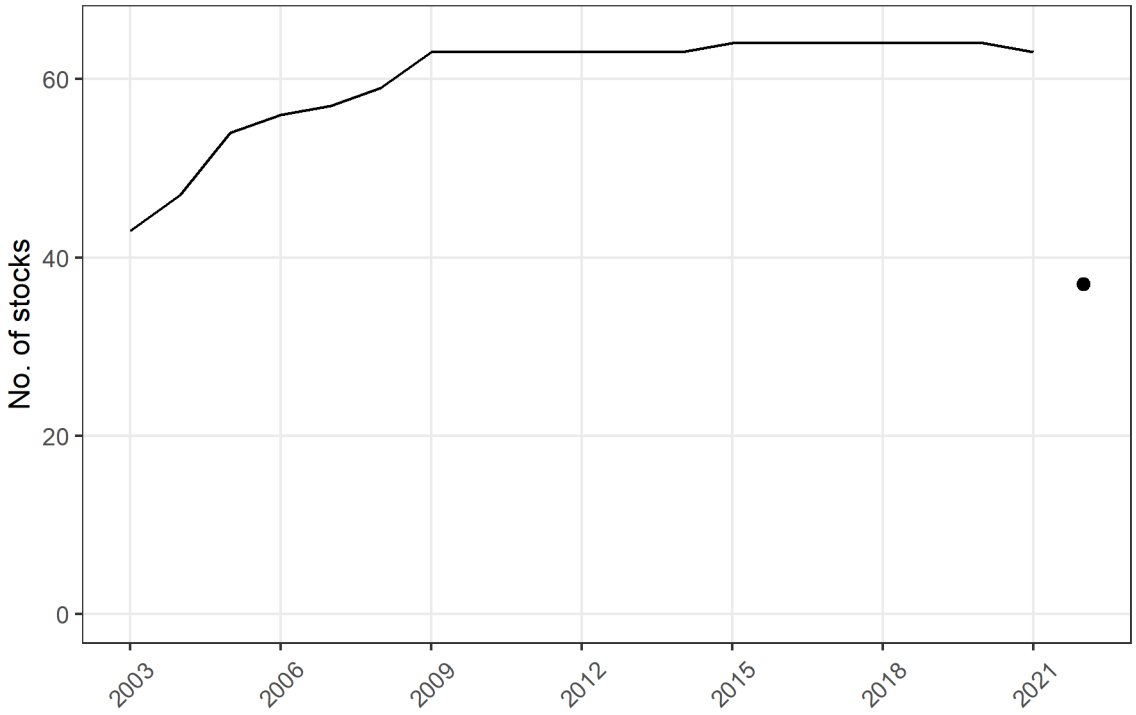

Figure 18: Number of stock assessments available in the Mediterranean and Black Sea.

As in STECF (2023b) the updated results of Sardine in GSA 7 are used only for the SSB indicator as the stock was assessed using a two-stage biomass model which provides only harvest rates and not F estimates.

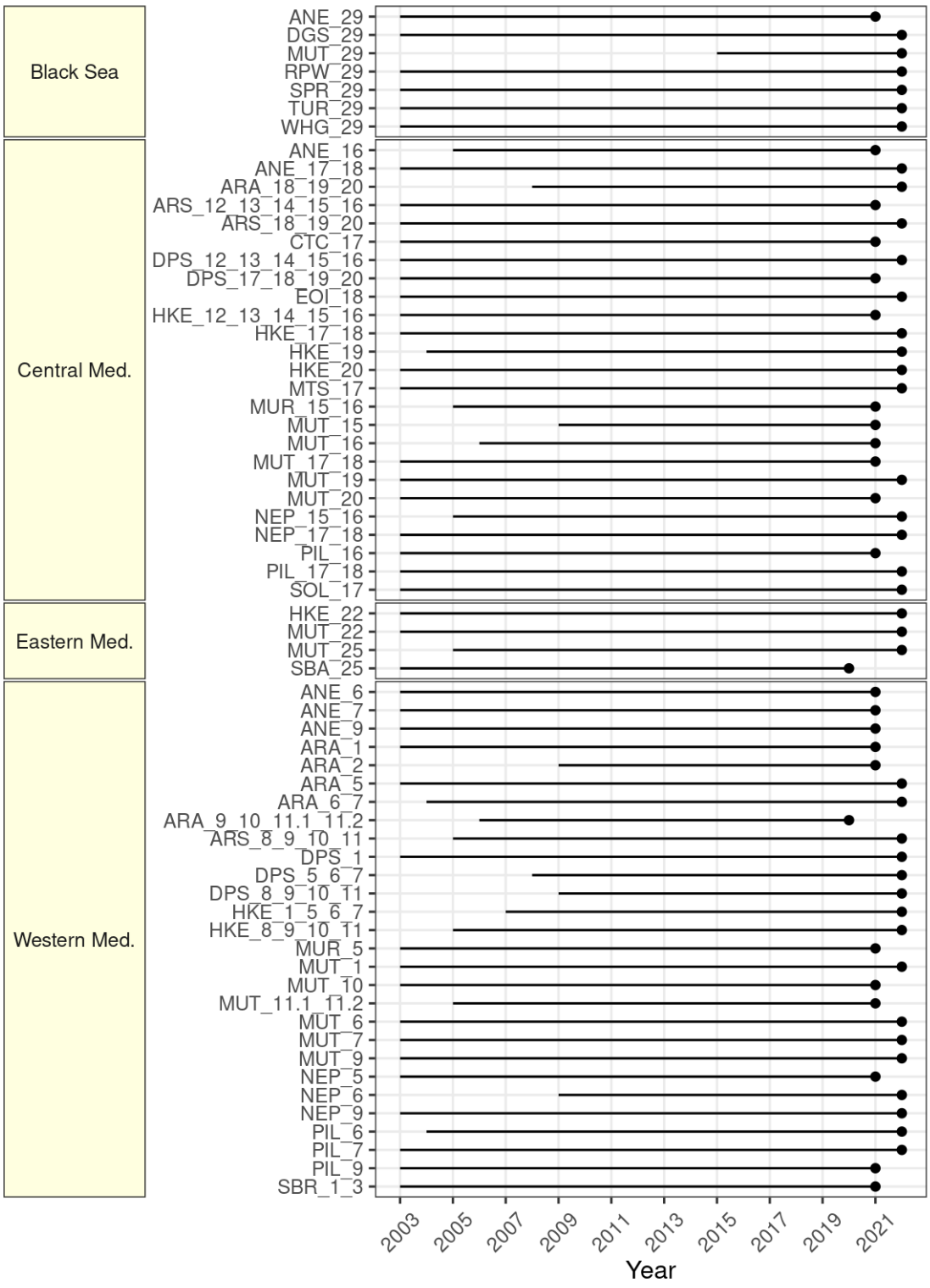

Figure 19: Time-series of stock assessments available from both STECF and GFCM for computation of model based CFP monitoring indicators for the Mediterranean and Black Seas.

Table 18: Stocks used in the 2024 CFP monitoring analysis.

EcoRegion	Final Data Year	Stock	Updated	New Stock	Source
Black Sea	2021	ANE_29	2023	Yes	GFCM
Black Sea	2022	DGS_29	2023	Yes	GFCM
Black Sea	2022	MUT_29	2023	No	GFCM
Black Sea	2022	RPW_29	2023	Yes	GFCM
Black Sea	2022	SPR_29	2023	No	GFCM
Black Sea	2022	TUR_29	2023	No	GFCM
Black Sea	2022	WHG_29	2023	No	GFCM
Central Med.	2021	ANE_16	2022	No	GFCM
Central Med.	2022	ANE_17_18	2023	No	GFCM
Central Med.	2022	ARA_18_19_20	2023	No	STECF
Central Med.	2021	ARS_12_13_14_15_16	2022	Yes	GFCM
Central Med.	2022	ARS_18_19_20	2023	No	STECF
Central Med.	2021	CTC_17	2022	No	GFCM
Central Med.	2022	DPS_12_13_14_15_16	2023	No	GFCM
Central Med.	2021	DPS_17_18_19_20	2023	Yes (GSA change)	GFCM
Central Med.	2021	EOI_18	2022	No	GFCM
Central Med.	2021	HKE_12_13_14_15_16	2022	No	GFCM
Central Med.	2022	HKE_17_18	2023	No	STECF
Central Med.	2022	HKE_19	2023	No	STECF
Central Med.	2022	HKE_20	2023	No	STECF
Central Med.	2022	MTS_17	2023	No	GFCM
Central Med.	2021	MUR_15_16	2023	No	STECF
Central Med.	2021	MUT_15	2022	No	GFCM
Central Med.	2021	MUT_16	2023	No	GFCM
Central Med.	2021	MUT_17_18	2023	No	GFCM
Central Med.	2022	MUT_19	2023	No	STECF
Central Med.	2021	MUT_20	2022	No	GFCM
Central Med.	2022	NEP_15_16	2023	No	STECF
Central Med.	2022	NEP_17_18	2023	No	STECF

EcoRegion	Final Data Year	Stock	Updated	New Stock	Source
Central Med.	2021	PIL_16	2022	No	GFCM
Central Med.	2022	PIL_17_18	2023	No	GFCM
Central Med.	2022	SOL_17	2023	No	STECF
Eastern Med.	2022	HKE_22	2023	No	STECF
Eastern Med.	2022	MUT_22	2023	No	STECF
Eastern Med.	2022	MUT_25	2022	No	GFCM
Eastern Med.	2020	SBA_25	2022	No	GFCM
Western Med.	2021	ANE_6	2022	Yes	GFCM
Western Med.	2021	ANE_7	2022	No	GFCM
Western Med.	2021	ANE_9	2022	No	GFCM
Western Med.	2021	ARA_1	2022	Yes (GSA change)	GFCM
Western Med.	2021	ARA_2	2022	Yes (GSA change)	GFCM
Western Med.	2022	ARA_5	2023	No	STECF
Western Med.	2022	ARA_6_7	2023	No	STECF
Western Med.	2020	ARA_9_10_11.1_11.2	2022	No	GFCM
Western Med.	2022	ARS_8_9_10_11	2023	Yes (GSA change)	STECF
Western Med.	2022	DPS_1	2023	No	STECF
Western Med.	2022	DPS_5_6_7	2023	No	STECF
Western Med.	2022	DPS_8_9_10_11	2023	No	STECF
Western Med.	2022	HKE_1_5_6_7	2023	No	STECF
Western Med.	2022	HKE_8_9_10_11	2023	No	STECF
Western Med.	2021	MUR_5	2022	No	GFCM
Western Med.	2022	MUT_1	2023	No	STECF
Western Med.	2021	MUT_10	2022	No	GFCM
Western Med.	2021	MUT_11.1_11.2	2022	Yes	GFCM
Western Med.	2022	MUT_6	2023	No	STECF
Western Med.	2022	MUT_7	2023	No	STECF
Western Med.	2022	MUT_9	2023	No	STECF
Western Med.	2021	NEP_5	2022	No	GFCM
Western Med.	2022	NEP_6	2023	No	STECF

EcoRegion	Final Data Year	Stock	Updated	New Stock	Source
Western Med.	2022	NEP_9	2023	No	STECF
Western Med.	2022	PIL_6	2023	No	GFCM
Western Med.	2022	PIL_7	2023	No	GFCM
Western Med.	2021	PIL_9	2022	No	GFCM
Western Med.	2021	SBR_1_3	2022	No	GFCM

3.1 Indicators of management performance

3.1.1 Number of stocks by year where fishing mortality is above/below F_{MSY}

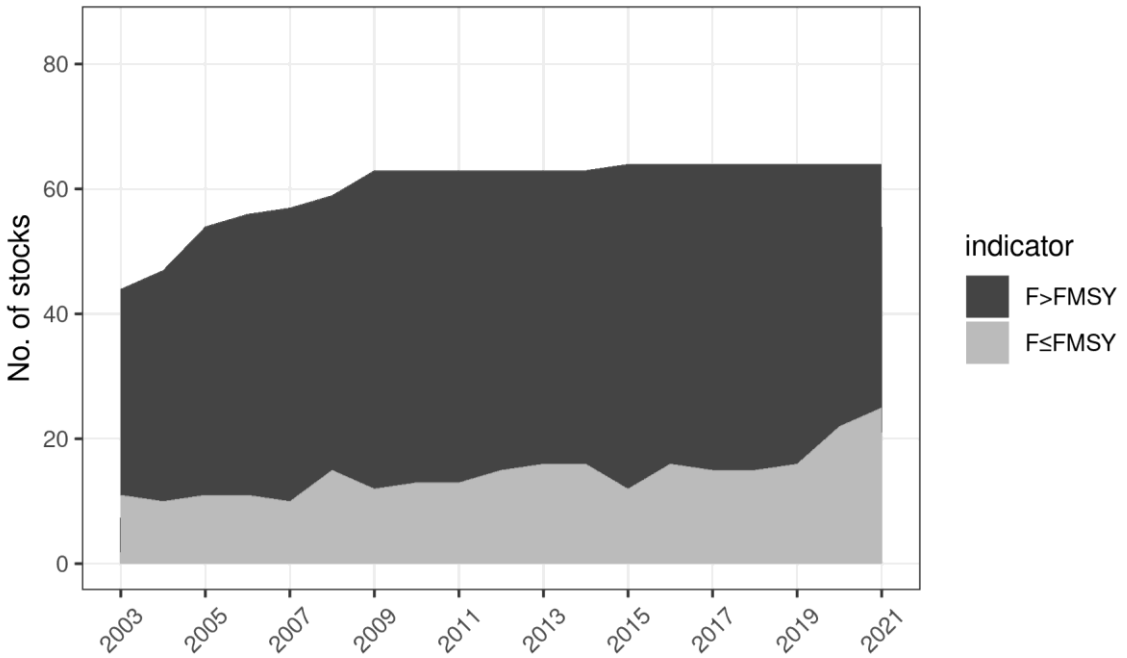

Figure 20: Number of stocks by year for which fishing mortality (F) was above/below FMSY (MEDI1-2)

Status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
$F > F_{MSY}$	33	37	43	45	47	44	51	50	50	48
$F \leq F_{MSY}$	11	10	11	11	10	15	12	13	13	15

Indicator	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
$F > F_{MSY}$	47	47	52	48	49	49	48	42	39	-
$F \leq F_{MSY}$	16	16	12	16	15	15	16	22	25	-

3.1.2 Number of stocks with F>F_{MSY} or B<B_{MSY} and number of stocks with F≤F_{MSY} and B≥B_{MSY}

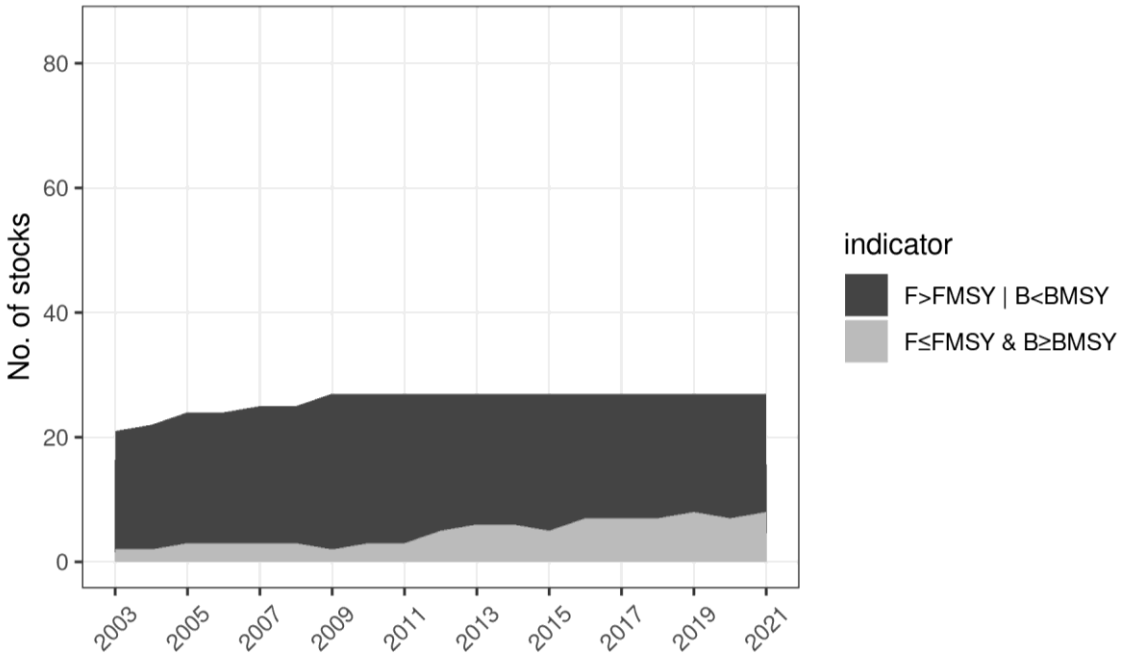

Figure 21: Number of stocks with F>FMSY or B<BMSY and number of stocks with F≤FMSY and B≥BMSY in the Mediterranean and Black Seas (MEDI5-6)

Status	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
$F > F_{MSY}$ or $B < B_{MSY}$	33	37	43	45	47	44	51	50	50	48
$F \leq F_{MSY}$ and $B \geq B_{MSY}$	11	10	11	11	10	15	12	13	13	15

Status	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
$F > F_{MSY}$ or $B < B_{MSY}$	47	47	52	48	49	49	48	42	39	-
$F \leq F_{MSY}$ and $B \geq B_{MSY}$	16	16	12	16	15	15	16	22	25	-

3.1.3 Trend in F/F_{MSY}

This indicator was computed using a state-space model as implemented in the R package JARA (Winker et al, 2019; and see Gras et al., 2023 for additional details on the settings). Model outputs for F/F_{MSY} are displayed in Figure 22 and Table 19. The median increased from 1.68 to 1.90 over the years 2003 to 2007. After a drop in 2008 F/F_{MSY} was stable at 1.87 until 2011. For the rest of the time series, a decreasing trend is noted. The indicator suggests that exploitation levels from 2007 to 2011 have been nearly twice the level of the CFP management objectives. The declining trend was particularly emphasised over the last three years, where a decline from 1.59 to 1.20 was noticed. The regional indicators (Figure 23) show a decline in exploitation rate from 2018 to 2021 in all regions. Due to the long lasting steep decline (3 years in a row) it seems likely that the decline in fishing mortality is real and not an artefact of the model.

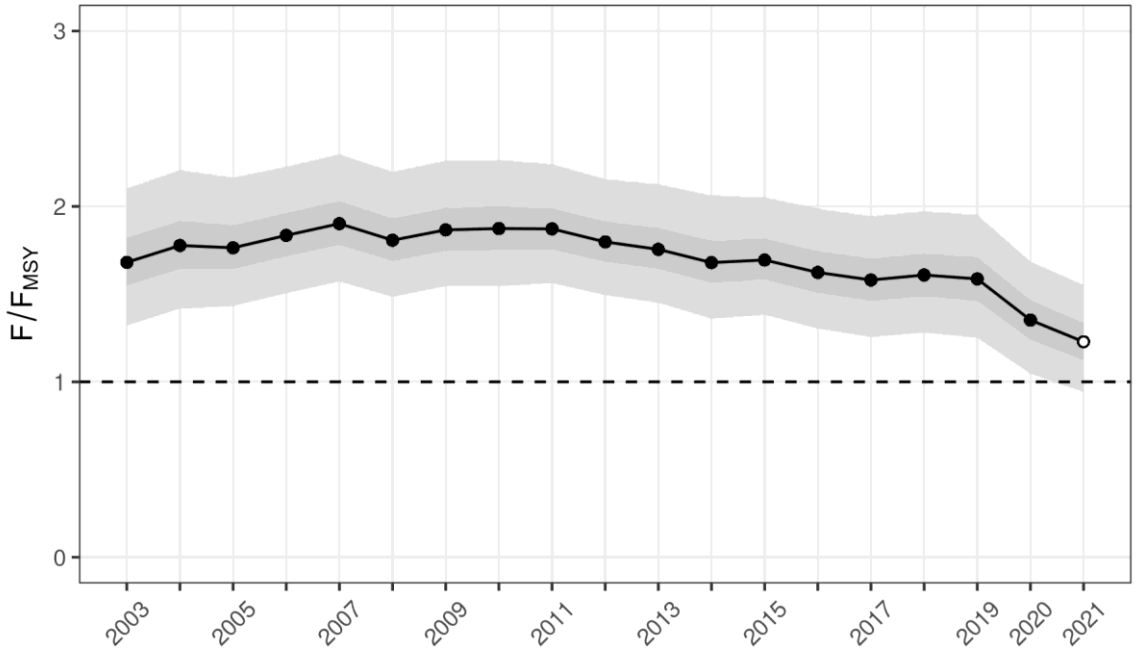

Figure 22: Trend in F/F_{MSY} (based on 63 stocks). Dark grey zone shows the 50% confidence interval; the light grey zone shows the 95% confidence interval.

Table 19: Percentiles for F/F_{MSY}

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.32	1.42	1.43	1.50	1.57	1.48	1.54	1.54	1.56	1.49
25%	1.55	1.64	1.64	1.72	1.78	1.69	1.75	1.75	1.76	1.69
50%	1.68	1.78	1.76	1.84	1.90	1.81	1.87	1.87	1.87	1.80
75%	1.82	1.92	1.89	1.96	2.03	1.93	1.99	2.00	1.99	1.91
97.5%	2.10	2.21	2.17	2.23	2.30	2.20	2.26	2.27	2.24	2.16

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	1.45	1.36	1.38	1.30	1.25	1.28	1.25	1.05	0.94	-
25%	1.64	1.57	1.58	1.51	1.46	1.49	1.46	1.24	1.12	-
50%	1.76	1.68	1.69	1.62	1.58	1.61	1.59	1.35	1.23	-
75%	1.88	1.80	1.82	1.74	1.70	1.73	1.71	1.47	1.33	-
97.5%	2.13	2.06	2.05	1.99	1.95	1.97	1.95	1.69	1.55	-

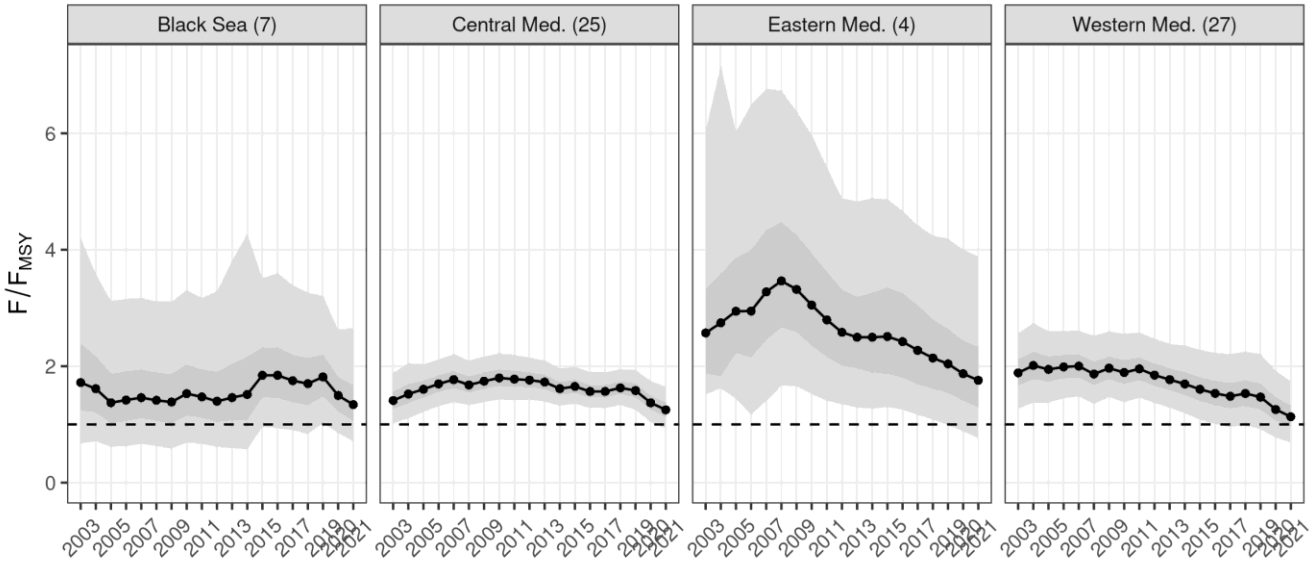

Figure 23: Trend in F/F_{MSY} by ecoregion. The number of stocks in each ecoregion are shown between parentheses.

Table 20: F/F_{MSY} by ecoregion

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Black Sea	1.72	1.61	1.37	1.42	1.46	1.41	1.39	1.53	1.47	1.40
Central Med.	1.41	1.52	1.60	1.70	1.77	1.68	1.74	1.80	1.78	1.76
Eastern Med.	2.57	2.75	2.94	2.95	3.28	3.46	3.32	3.05	2.80	2.58
Western Med.	1.89	2.01	1.94	1.99	2.00	1.86	1.97	1.89	1.95	1.85

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Black Sea	1.46	1.52	1.84	1.84	1.75	1.70	1.82	1.50	1.34	-
Central Med.	1.73	1.61	1.65	1.57	1.57	1.63	1.58	1.37	1.25	-
Eastern Med.	2.50	2.50	2.51	2.42	2.27	2.14	2.04	1.87	1.76	-
Western Med.	1.77	1.69	1.60	1.53	1.48	1.53	1.47	1.26	1.13	-

3.1.4 Trend in SSB (relative to SSB in 2003)

This indicator was computed using a state-space model as implemented in JARA (Winker et al, 2019; and see Gras et al.2023 for additional details regarding used the settings). The median exhibits a declining trend in biomass from 2003 to 2011. It is to be noted that a number of stocks do not have estimates for these years (see Figure 19 for details). From 2009 the trend in SSB does show little changes (Figure 24 and Table 21). The trends estimated by Ecoregion (Figure 25 and Table 22) showed similar trend in the Central Mediterranean, Eastern Mediterranean and Black Sea. In West Mediterranean, an increase in biomass is recorded after 2009. Due to the low number of stock assessments available in the Black Sea and the Eastern Mediterranean, large percentile ranges are being observed.

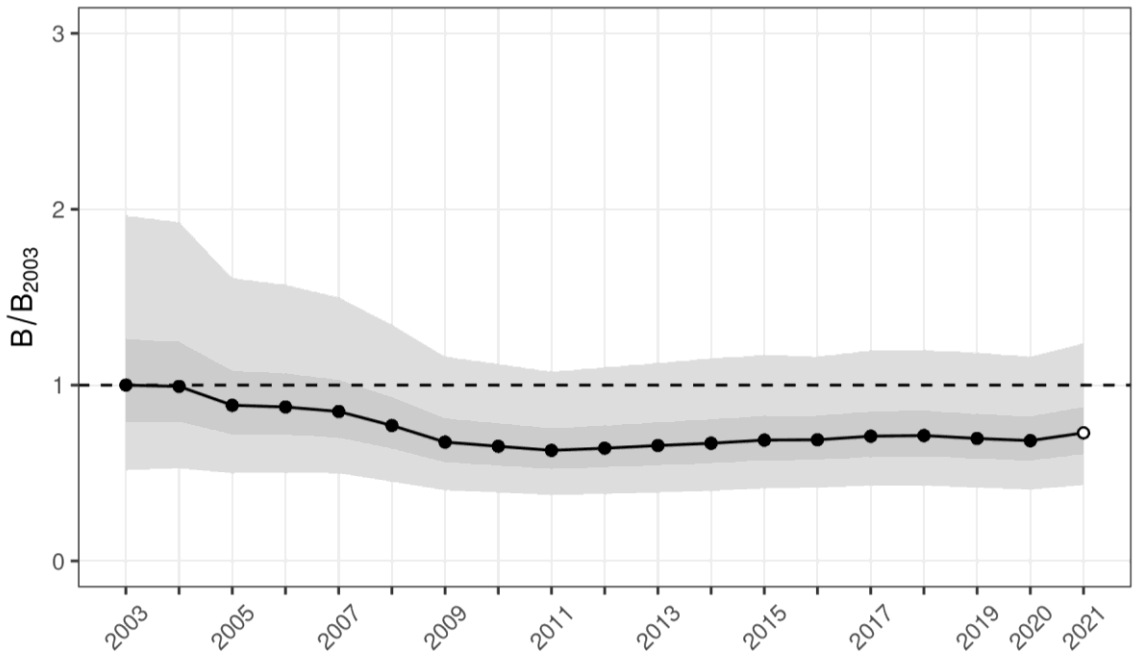

Figure 24: Trend in SSB relative to 2003 (based on 64 stocks). Dark grey zone shows the 50% confidence interval; the light grey zone shows the 95% confidence interval.

Table 21: Percentiles for SSB relative to 2003

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.51	0.52	0.49	0.50	0.49	0.45	0.39	0.38	0.37	0.38
25%	0.80	0.79	0.72	0.72	0.70	0.64	0.56	0.54	0.53	0.53
50%	1.00	1.00	0.89	0.88	0.85	0.77	0.68	0.65	0.63	0.64
75%	1.26	1.25	1.09	1.07	1.03	0.94	0.82	0.79	0.76	0.77
97.5%	2.00	1.94	1.65	1.59	1.51	1.37	1.19	1.14	1.09	1.12

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.39	0.39	0.41	0.41	0.42	0.42	0.41	0.40	0.43	-
25%	0.54	0.56	0.57	0.58	0.59	0.60	0.58	0.57	0.61	-
50%	0.66	0.67	0.69	0.69	0.71	0.71	0.70	0.69	0.74	-
75%	0.79	0.81	0.83	0.83	0.85	0.86	0.84	0.83	0.89	-
97.5%	1.15	1.18	1.20	1.20	1.23	1.23	1.21	1.19	1.29	-

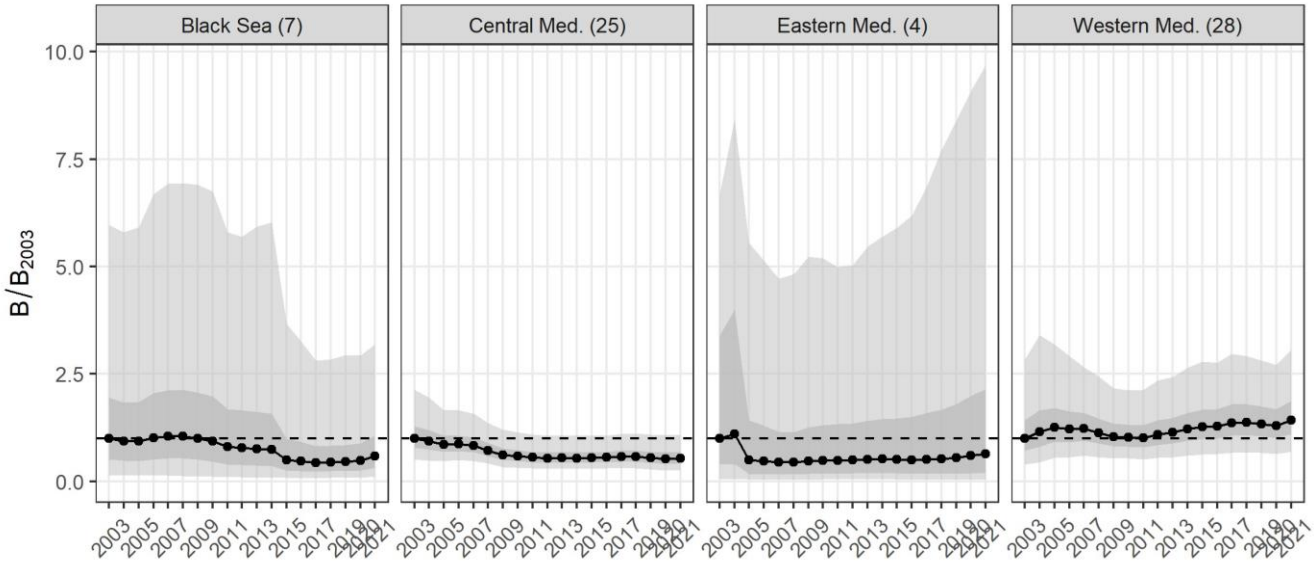

Figure 25: Trend in SSB relative to 2003 by ecoregion. The number of stocks in each ecoregion are shown in parentheses.

Table 22: SSB relative to 2003 by ecoregion

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Black Sea	1.00	0.94	0.93	1.02	1.05	1.05	1.00	0.94	0.81	0.78
Central Med.	1.00	0.94	0.85	0.87	0.83	0.72	0.62	0.59	0.56	0.54
Eastern Med.	1.00	1.10	0.50	0.47	0.45	0.45	0.47	0.48	0.49	0.50
Western Med.	1.00	1.16	1.26	1.22	1.23	1.13	1.05	1.03	1.02	1.09

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Black Sea	0.76	0.75	0.50	0.47	0.44	0.45	0.46	0.48	0.59	-
Central Med.	0.55	0.54	0.55	0.56	0.57	0.57	0.55	0.53	0.54	-
Eastern Med.	0.52	0.52	0.52	0.50	0.52	0.53	0.55	0.60	0.64	-
Western Med.	1.14	1.22	1.27	1.29	1.37	1.37	1.34	1.30	1.43	-

4 European Union Waters

STECF was requested in 2021 to provide two indicators of performance for the CFP at the European level (STECF, 2021a). The same model as in the individual areas was applied to the Northeast Atlantic and the Mediterranean and Black Seas combined to provide estimates of F/F_{MSY} and B/B_{2003} (indicators 7 and 8 of the protocol). For the purpose of deriving this index, the Northeast Atlantic and the Mediterranean and Black Seas datasets were pooled together and used as input data (Figure 26, Figure 27, Figure 28 and Figure 29). The time window was reduced by one year (2003-2021) in comparison to the Northeast Atlantic analysis as the Mediterranean and Black Seas dataset stops in 2021.

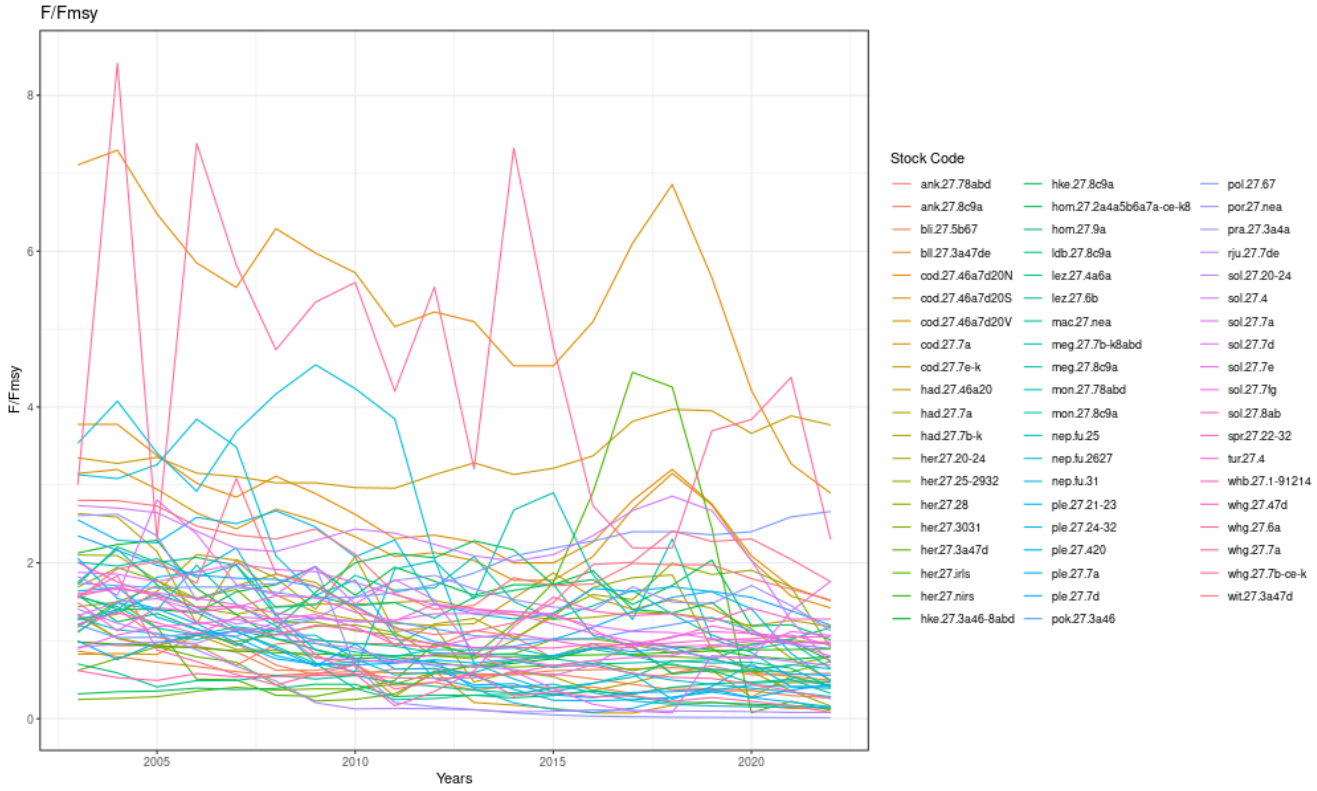

Figure 26: Individual trajectories of all stocks used to estimate the F/F_{MSY} indicator for the Northeast Atlantic

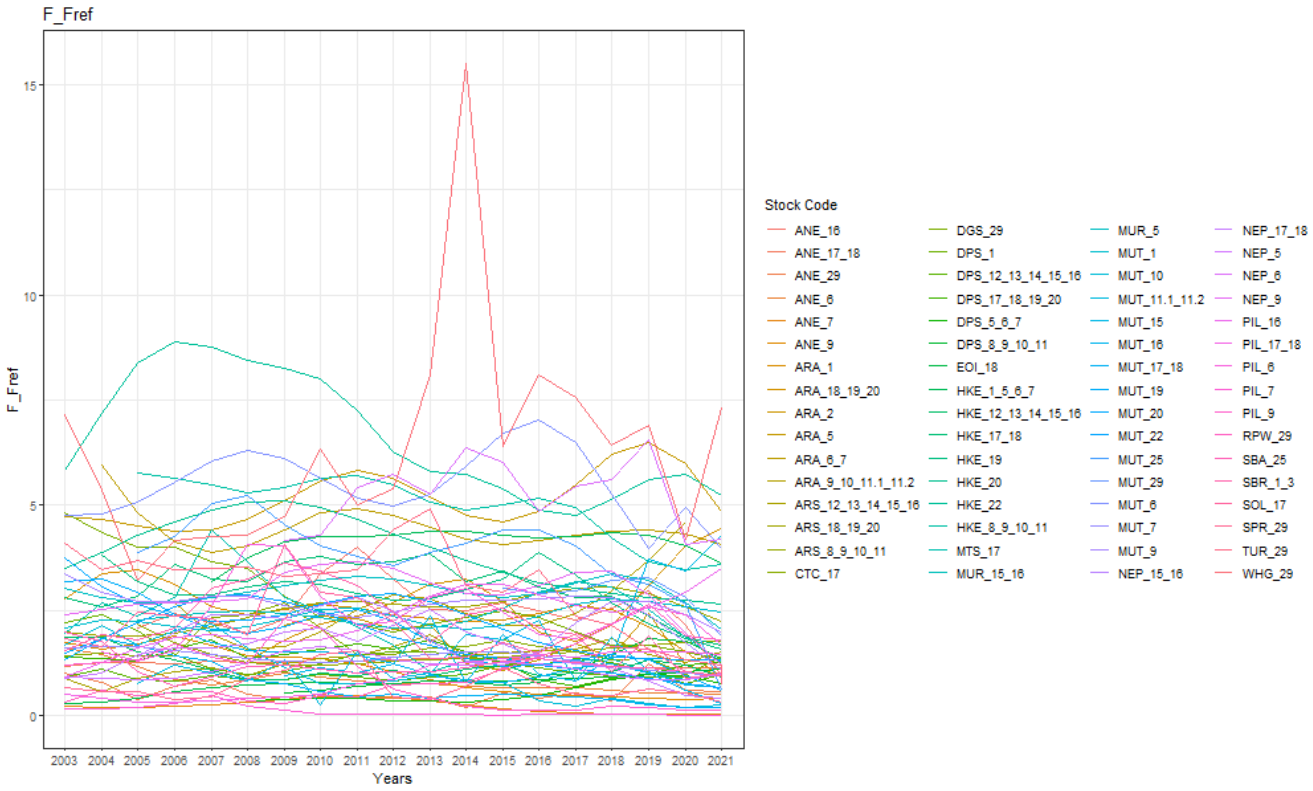

Figure 27: Individual trajectories of all stocks used to estimate the F/F_{MSY} indicator for the Mediterranean and Black Seas

4.1 Indicators of management performance

Trends in F/F_{MSY} in EU Waters (FAO 27 and 37) exhibited a decreasing trend from 2003 to 2021 (Figure 28) from 1.56 to 0.88 (Table 23). The steepness of the decrease was constant over the years 2003-2019 when it reached 1.12. In 2020 and 2021 the ratio F/F_{MSY} was estimated to be <1 and the CI overlaps with 1.

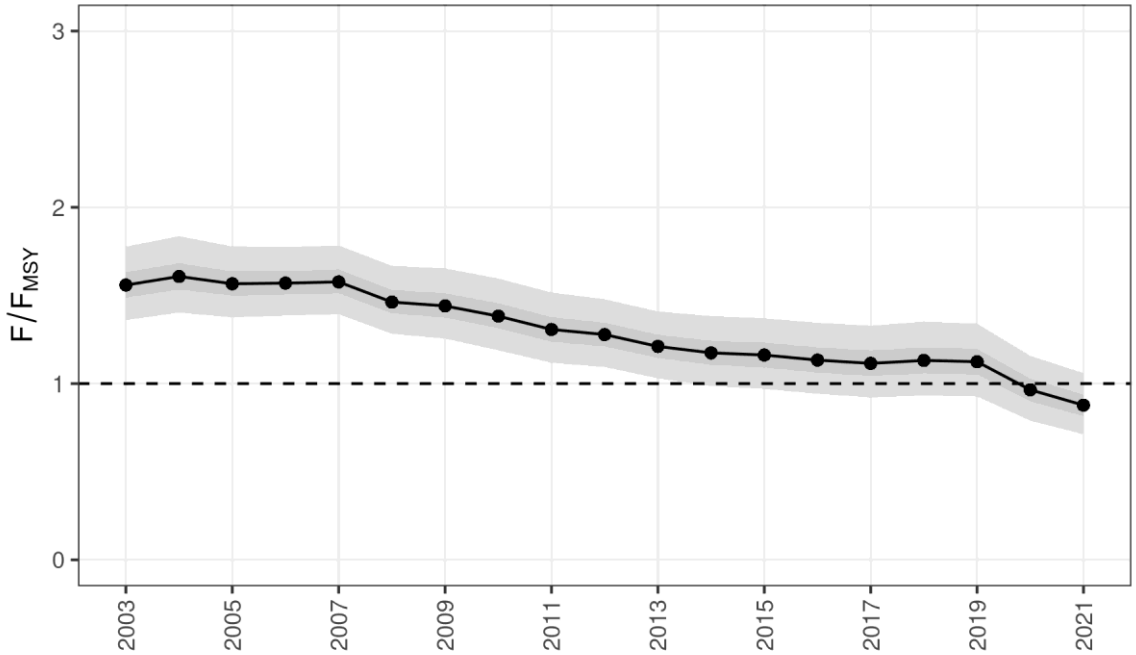

Figure 28: Trends in F/F_{MSY} (based on 122 stocks, 59 from the Northeast Atlantic and 63 from the Mediterranean and Black Seas). The dark grey zone shows the 50% confidence interval; the light grey zone shows the 95% confidence interval.

Table 23: Percentiles of F/F_{MSY} by year

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.36	1.40	1.37	1.39	1.39	1.28	1.25	1.19	1.12	1.09
25%	1.49	1.53	1.50	1.50	1.51	1.40	1.37	1.31	1.24	1.21
50%	1.56	1.61	1.57	1.57	1.58	1.46	1.44	1.38	1.31	1.28
75%	1.63	1.68	1.64	1.64	1.65	1.53	1.51	1.46	1.38	1.35
97.5%	1.78	1.84	1.78	1.77	1.78	1.67	1.65	1.60	1.52	1.48

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	1.03	0.99	0.97	0.94	0.92	0.93	0.93	0.79	0.71	-
25%	1.15	1.11	1.09	1.06	1.04	1.06	1.05	0.90	0.82	-
50%	1.21	1.17	1.16	1.13	1.11	1.13	1.12	0.96	0.88	-
75%	1.28	1.24	1.23	1.21	1.19	1.21	1.20	1.03	0.94	-
97.5%	1.41	1.38	1.37	1.35	1.33	1.35	1.34	1.16	1.06	-

Trend in B/B_{2003} decreased over the years 2003-2009 to reach 0.65 (Figure 29 and Table 24). It then followed a slight increasing trend until 2021 when it reached 0.77. It should be noted that in this year's report, the number of stocks included in the analysis has increased to 64 for the Mediterranean and Black Sea and that the trend in the Mediterranean biomass indicator has changed since a number of small stocks have been included.

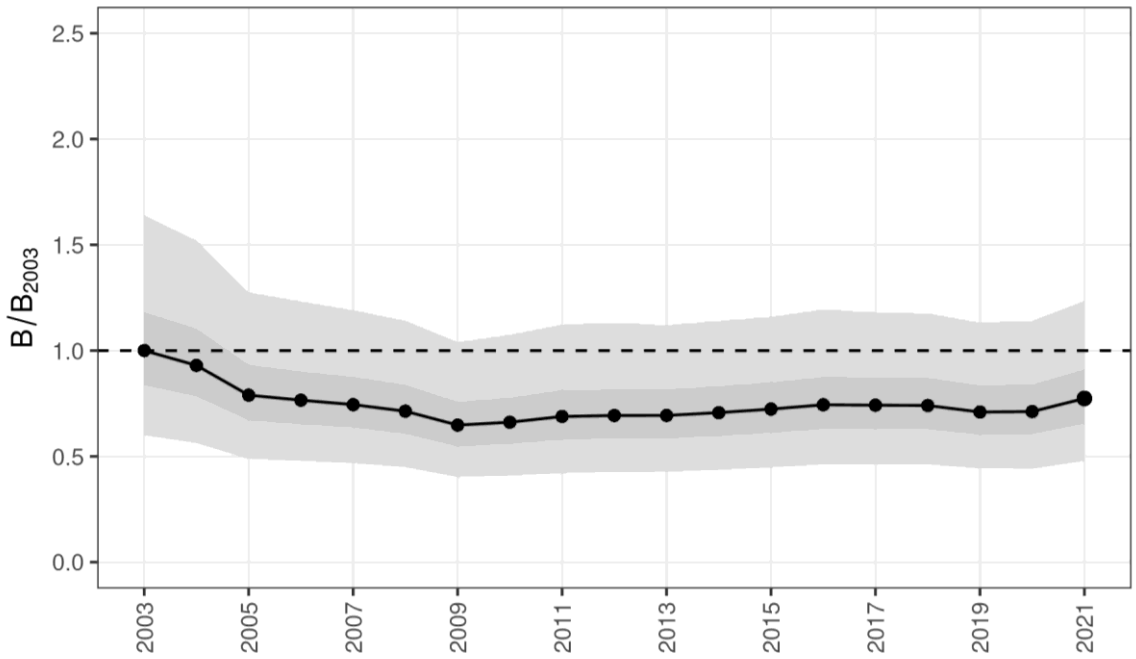

Figure 29: Trends in B/B_{2003} (based on 118 stocks, 54 from the Northeast Atlantic and 64 from the Mediterranean and Black Seas). The dark grey zone shows the 50% confidence interval; the light grey zone shows the 95% confidence interval.

Table 24: Percentiles of SSB relative to 2003

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.60	0.56	0.49	0.48	0.47	0.45	0.40	0.41	0.42	0.43
25%	0.84	0.79	0.67	0.65	0.64	0.61	0.55	0.56	0.58	0.59
50%	1.00	0.93	0.79	0.77	0.74	0.71	0.65	0.66	0.69	0.69
75%	1.18	1.10	0.93	0.90	0.87	0.84	0.76	0.78	0.81	0.82
97.5%	1.64	1.52	1.28	1.23	1.19	1.14	1.04	1.08	1.12	1.13

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.43	0.44	0.45	0.46	0.46	0.46	0.44	0.44	0.48	-
25%	0.59	0.60	0.61	0.63	0.63	0.63	0.60	0.61	0.66	-
50%	0.69	0.71	0.72	0.74	0.74	0.74	0.71	0.71	0.77	-
75%	0.81	0.83	0.85	0.87	0.87	0.87	0.83	0.84	0.91	-
97.5%	1.12	1.14	1.16	1.19	1.18	1.18	1.13	1.14	1.24	-

5 Status across all stocks

Table 25: Stock status for all stocks in the analysis. Columns refer to ecoregion, last year for which the estimate was obtained, stock code description, value for F/F_{MSY} ratio (F ind), if F is lower than F_{MSY} (F Status), if the stock is inside safe biological limits (SBL) (for both indicators F_{PA} and B_{PA}), and if the stock has F below F_{MSY} and SSB above B_{MSY} ($F \leq F_{MSY}$ and $B \geq B_{MSY}$). Stocks managed under escapement strategies do not have an estimate of F/F_{MSY}, their F status is calculated as $MSYB_{escapement}$ over the stock size. Symbol 'Y' stands for 'Yes', 'N' for No and '–' stands for unknown due to missing information.

Region	EcoRegion	Year	Stock	Description	F ind	F status	SBL	CFP
FAO27	Baltic Sea	2022	her.27.20-24	Herring (*Clupea harengus*) in subdivisions 20-24. spring spawners (Skagerrak. Kattegat. and western Baltic)	0.16	Y	N	-
FAO27	Baltic Sea	2022	her.27.25-2932	Herring (*Clupea harengus*) in subdivisions 25-29 and 32. excluding the Gulf of Riga (central Baltic Sea)	0.91	Y	-	N
FAO27	Baltic Sea	2022	her.27.28	Herring (*Clupea harengus*) in Subdivision 28.1 (Gulf of Riga)	0.95	Y	Y	-
FAO27	Baltic Sea	2022	her.27.3031	Herring (*Clupea harengus*) in subdivisions 30 and 31 (Gulf of Bothnia)	0.80	Y	N	-
FAO27	Baltic Sea	2022	ple.27.21-23	Plaice (*Pleuronectes platessa*) in subdivisions 21-23 (Kattegat. Belt Seas. and the Sound)	0.48	Y	Y	-
FAO27	Baltic Sea	2022	ple.27.24-32	Plaice (*Pleuronectes platessa*) in subdivisions 24-32 (Baltic Sea. excluding the Sound and Belt Seas)	0.15	Y	-	Y
FAO27	Baltic Sea	2022	sol.27.20-24	Sole (*Solea solea*) in subdivisions 20-24 (Skagerrak and Kattegat. western Baltic Sea)	0.68	Y	N	-
FAO27	Baltic Sea	2022	spr.27.22-32	Sprat (*Sprattus sprattus*) in subdivisions 22-32 (Baltic Sea)	1.05	N	N	-
FAO27	BoBiscay & Iberia	2022	ane.27.8	Anchovy (*Engraulis encrasicolus*) in Subarea 8 (Bay of Biscay)	-	Y	-	-
FAO27	BoBiscay & Iberia	2022	ank.27.78abd	Black-bellied anglerfish (*Lophius budegassa*) in Subarea 7 and divisions 8.a-b and 8.d (Celtic Seas. Bay of Biscay)	0.58	Y	Y	-
FAO27	BoBiscay & Iberia	2022	ank.27.8c9a	Black-bellied anglerfish (*Lophius budegassa*) in divisions 8.c and 9.a (Cantabrian Sea. Atlantic Iberian waters)	0.27	Y	-	Y
FAO27	BoBiscay & Iberia	2022	hke.27.8c9a	Hake (*Merluccius merluccius*) in divisions 8.c and 9.a. Southern stock (Cantabrian Sea and Atlantic Iberian waters)	0.74	Y	Y	-
FAO27	BoBiscay & Iberia	2022	hom.27.9a	Horse mackerel (*Trachurus trachurus*) in Division 9.a (Atlantic Iberian waters)	0.13	Y	-	Y
FAO27	BoBiscay & Iberia	2022	ldb.27.8c9a	Four-spot megrim (*Lepidorhombus boscii*) in divisions 8.c and 9.a (southern Bay of Biscay and Atlantic Iberian waters East)	0.47	Y	Y	-

Region	EcoRegion	Year	Stock	Description	F ind	F status	SBL	CFP
FAO27	BoBiscay & Iberia	2022	meg.27.7b-k8abd	Megrim (*Lepidorhombus whiffiagonis*) in divisions 7.b-k. 8.a-b. and 8.d (west and southwest of Ireland. Bay of Biscay)	0.64	Y	Y	-
FAO27	BoBiscay & Iberia	2022	meg.27.8c9a	Megrim (*Lepidorhombus whiffiagonis*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters)	0.41	Y	Y	-
FAO27	BoBiscay & Iberia	2022	mon.27.78abd	White anglerfish (*Lophius piscatorius*) in Subarea 7 and divisions 8.a-b and 8.d (Celtic Seas. Bay of Biscay)	0.64	Y	Y	-
FAO27	BoBiscay & Iberia	2022	mon.27.8c9a	White anglerfish (*Lophius piscatorius*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters)	0.28	Y	Y	Y
FAO27	BoBiscay & Iberia	2022	nep.fu.2324	Norway lobster (*Nephrops norvegicus*) in divisions 8.a and 8.b. Functio-l Units 23-24 (northern and central Bay of Biscay)	0.53	Y	-	-
FAO27	BoBiscay & Iberia	2021	nep.fu.25	Norway lobster (*Nephrops norvegicus*) in Division 8.c, Functional Unit 25 (southern Bay of Biscay and northern Galicia)	0.15	Y	-	N
FAO27	BoBiscay & Iberia	2021	nep.fu.2627	Norway lobster (*Nephrops norvegicus*) in Division 9.a, Functional Units 26-27 (Atlantic Iberian waters East, western Galicia, and northern Portugal)	0.41	Y	-	N
FAO27	BoBiscay & Iberia	2022	nep.fu.31	Norway lobster (*Nephrops norvegicus*) in Division 8.c. Functional Unit 31 (southern Bay of Biscay and Cantabrian Sea)	0.39	Y	-	N
FAO27	BoBiscay & Iberia	2022	sol.27.8ab	Sole (*Solea solea*) in divisions 8.a-b (northern and central Bay of Biscay)	0.80	Y	N	-
FAO27	Celtic Seas	2022	cod.27.7a	Cod (*Gadus morhua*) in Division 7.a (Irish Sea)	0.14	Y	N	-
FAO27	Celtic Seas	2022	cod.27.7e-k	Cod (*Gadus morhua*) in divisions 7.e-k (eastern English Channel and southern Celtic Seas)	3.77	N	N	-
FAO27	Celtic Seas	2022	had.27.7a	Haddock (*Melanogrammus aeglefinus*) in Division 7.a (Irish Sea)	0.42	Y	Y	Y
FAO27	Celtic Seas	2022	had.27.7b-k	Haddock (*Melanogrammus aeglefinus*) in divisions 7.b-k (southern Celtic Seas and English Channel)	1.18	N	Y	-
FAO27	Celtic Seas	2022	her.27.irls	Herring (*Clupea harengus*) in divisions 7.a South of 52°30'N. 7.g-h. and 7.j-k (Irish Sea. Celtic Sea. and southwest of Ireland)	0.11	Y	N	-
FAO27	Celtic Seas	2022	her.27.nirs	Herring (*Clupea harengus*) in Division 7.a North of 52°30'N (Irish Sea)	0.89	Y	Y	-

Region	EcoRegion	Year	Stock	Description	F ind	F status	SBL	CFP
FAO27	Celtic Seas	2022	lez.27.4a6a	Megrim (Lepidorhombus spp.) in divisions 4.a and 6.a (northern North Sea. West of Scotland)	0.32	Y	-	Y
FAO27	Celtic Seas	2022	lez.27.6b	Megrim (*Lepidorhombus* spp.) in Division 6.b (Rockall)	0.40	Y	-	Y
FAO27	Celtic Seas	2022	nep.fu.11	Norway lobster (*Nephrops norvegicus*) in Division 6.a. Functional Unit 11 (West of Scotland. North Minch)	0.50	Y	-	Y
FAO27	Celtic Seas	2022	nep.fu.12	Norway lobster (*Nephrops norvegicus*) in Division 6.a. Functional Unit 12 (West of Scotland. South Minch)	0.44	Y	-	Y
FAO27	Celtic Seas	2022	nep.fu.13	Norway lobster (*Nephrops norvegicus*) in Division 6.a. Functional Unit 13 (West of Scotland. the Firth of Clyde and Sound of Jura)	0.79	Y	-	Y
FAO27	Celtic Seas	2022	nep.fu.14	Norway lobster (*Nephrops norvegicus*) in Division 7.a. Functional Unit 14 (Irish Sea. East)	0.25	Y	-	Y
FAO27	Celtic Seas	2022	nep.fu.15	Norway lobster (*Nephrops norvegicus*) in Division 7.a. Functional Unit 15 (Irish Sea. West)	0.65	Y	-	Y
FAO27	Celtic Seas	2022	nep.fu.16	Norway lobster (*Nephrops norvegicus*) in divisions 7.b-c and 7.j-k. Functional Unit 16 (west and southwest of Ireland. Porcupine Bank)	1.16	N	-	-
FAO27	Celtic Seas	2022	nep.fu.17	Norway lobster (*Nephrops norvegicus*) in Division 7.b. Functio-l Unit 17 (west of Ireland. Aran grounds)	1.13	N	-	-
FAO27	Celtic Seas	2022	nep.fu.19	Norway lobster (*Nephrops norvegicus*) in divisions 7.a. 7.g. and 7.j. Functional Unit 19 (Irish Sea. Celtic Sea. eastern part of southwest of Ireland)	0.61	Y	-	N
FAO27	Celtic Seas	2022	nep.fu.2021	Norway lobster (*Nephrops norvegicus*) in divisions 7.g and 7.h. Functional Units 20 and 21 (Celtic Sea)	0.45	Y	-	Y
FAO27	Celtic Seas	2022	nep.fu.22	Norway lobster (*Nephrops norvegicus*) in divisions 7.f and 7.g. Functional Unit 22 (Celtic Sea. Bristol Channel)	0.50	Y	-	N
FAO27	Celtic Seas	2022	ple.27.7a	Plaice (*Pleuronectes platessa*) in Division 7.a (Irish Sea)	0.44	Y	Y	N
FAO27	Celtic Seas	2022	pol.27.67	Pollack (*Pollachius pollachius*) in subareas 6-7 (Celtic Seas and the English Channel)	2.66	N	-	N
FAO27	Celtic Seas	2021	rju.27.7de	Undulate ray (*Raja undulata*) in divisions 7.d and 7.e (English Channel)	0.08	Y	-	Y
FAO27	Celtic Seas	2022	sol.27.7a	Sole (*Solea solea*) in Division 7.a (Irish Sea)	1.77	N	N	-

Region	EcoRegion	Year	Stock	Description	F ind	F status	SBL	CFP
FAO27	Celtic Seas	2022	sol.27.7e	Sole (*Solea solea*) in Division 7.e (western English Channel)	1.07	N	Y	N
FAO27	Celtic Seas	2022	sol.27.7fg	Sole (*Solea solea*) in divisions 7.f and 7.g (Bristol Channel. Celtic Sea)	0.97	Y	Y	-
FAO27	Celtic Seas	2022	whg.27.6a	Whiting (*Merlangius merlangus*) in Division 6.a (West of Scotland)	0.08	Y	Y	-
FAO27	Celtic Seas	2022	whg.27.7a	Whiting (*Merlangius merlangus*) in Division 7.a (Irish Sea)	2.30	N	N	-
FAO27	Celtic Seas	2022	whg.27.7b-ce-k	Whiting (*Merlangius merlangus*) in divisions 7.b-c and 7.e-k (southern Celtic Seas and western English Channel)	1.76	N	N	-
FAO27	Greater North Sea	2022	bll.27.3a47de	Brill (*Scophthalmus rhombus*) in Subarea 4 and divisions 3.a and 7.d-e (North Sea. Skagerrak and Kattegat. English Channel)	0.49	Y	-	N
FAO27	Greater North Sea	2022	cod.27.46a7d20N	Cod in Subarea 4. divisions 6.a and 7.d. and Subdivision 20 (North Sea. West of Scotland. eastern English Channel and Skagerrak)	1.51	N	Y	-
FAO27	Greater North Sea	2022	cod.27.46a7d20S	Cod in Subarea 4. divisions 6.a and 7.d. and Subdivision 20 (North Sea. West of Scotland. eastern English Channel and Skagerrak)	2.89	N	N	-
FAO27	Greater North Sea	2022	cod.27.46a7d20V	Cod in Subarea 4. divisions 6.a and 7.d. and Subdivision 20 (North Sea. West of Scotland. eastern English Channel and Skagerrak)	1.42	N	N	-
FAO27	Greater North Sea	2022	had.27.46a20	Haddock (*Melanogrammus aeglefinus*) in Subarea 4. Division 6.a. and Subdivision 20 (North Sea. West of Scotland. Skagerrak)	0.50	Y	Y	-
FAO27	Greater North Sea	2022	her.27.3a47d	Herring (*Clupea harengus*) in Subarea 4 and divisions 3.a and 7.d. autumn spawners (North Sea. Skagerrak and Kattegat. eastern English Channel)	0.73	Y	Y	Y
FAO27	Greater North Sea	2022	nep.fu.3-4	Norway lobster (*Nephrops norvegicus*) in Division 3.a. Functional units 3 and 4 (Skagerrak and Kattegat)	0.59	Y	-	-
FAO27	Greater North Sea	2022	nep.fu.6	Norway lobster (*Nephrops norvegicus*) in Division 4.b. Functional Unit 6 (central North Sea. Farn Deeps)	1.58	N	-	N
FAO27	Greater North Sea	2022	nep.fu.7	Norway lobster (*Nephrops norvegicus*) in Division 4.a. Functional Unit 7 (northern North Sea. Fladen Ground)	0.51	Y	-	Y

Region	EcoRegion	Year	Stock	Description	F ind	F status	SBL	CFP
FAO27	Greater North Sea	2022	nep.fu.8	Norway lobster (*Nephrops norvegicus*) in Division 4.b. Functional Unit 8 (central North Sea. Firth of Forth)	0.77	Y	-	Y
FAO27	Greater North Sea	2022	nep.fu.9	Norway lobster (*Nephrops norvegicus*) in Division 4.a. Functional Unit 9 (central North Sea. Moray Firth)	0.85	Y	-	Y
FAO27	Greater North Sea	2022	nop.27.3a4	Norway pout (*Trisopterus esmarkii*) in Subarea 4 and Division 3.a (North Sea. Skagerrak and Kattegat)	-	N	-	-
FAO27	Greater North Sea	2022	ple.27.420	Plaice (*Pleuronectes platessa*) in Subarea 4 (North Sea) and Subdivision 20 (Skagerrak)	0.56	Y	Y	-
FAO27	Greater North Sea	2022	ple.27.7d	Plaice (*Pleuronectes platessa*) in Division 7.d (eastern English Channel)	1.20	N	N	-
FAO27	Greater North Sea	2022	pok.27.3a46	Saithe (*Pollachius virens*) in subareas 4. 6 and Division 3.a (North Sea. Rockall and West of Scotland. Skagerrak and Kattegat)	0.90	Y	Y	-
FAO27	Greater North Sea	2022	pra.27.3a4a	Northern shrimp (*Pandalus borealis*) in divisions 3.a and 4.a East (Skagerrak and Kattegat and northern North Sea in the Norwegian Deep)	1.13	N	-	N
FAO27	Greater North Sea	2022	san.sa.1r	Sandeel (*Ammodytes* spp.) in divisions 4.b-c and Subdivision 20, Sandeel Area 2r (central and southern North Sea)	-	N	-	-
FAO27	Greater North Sea	2022	san.sa.2r	Sandeel (*Ammodytes* spp.) in divisions 4.bâ€“c and Subdivision 20, Sandeel Area 2r (central and southern North Sea)	-	N	-	-
FAO27	Greater North Sea	2022	san.sa.3r	Sandeel (*Ammodytes* spp.) in divisions 4.a-b and Subdivision 20, Sandeel Area 3r (northern and central North Sea, Skagerrak)	-	Y	-	-
FAO27	Greater North Sea	2022	san.sa.4	Sandeel (*Ammodytes* spp.) in divisions 4.a-b, Sandeel Area 4 (northern and central North Sea)	-	N	-	-
FAO27	Greater North Sea	2022	sol.27.4	Sole (*Solea solea*) in Subarea 4 (North Sea)	0.72	Y	N	-
FAO27	Greater North Sea	2022	sol.27.7d	Sole (*Solea solea*) in Division 7.d (eastern English Channel)	0.99	Y	N	-
FAO27	Greater North Sea	2022	spr.27.3a4	Sprat (*Sprattus sprattus*) in Division 3.a and Subarea 4 (Skagerrak. Kattegat and North Sea)	-	N	-	-
FAO27	Greater North Sea	2022	tur.27.4	Turbot (*Scophthalmus maximus*) in Subarea 4 (North Sea)	0.94	Y	Y	Y
FAO27	Greater North Sea	2022	whg.27.47d	Whiting (*Merlangius merlangus*) in Subarea 4 and Division 7.d (North Sea and eastern English Channel)	0.26	Y	Y	-

Region	EcoRegion	Year	Stock	Description	F ind	F status	SBL	CFP
FAO27	Greater North Sea	2022	wit.27.3a47d	Witch (*Glyptocephalus cynoglossus*) in Subarea 4 and divisions 3.a and 7.d (North Sea. Skagerrak and Kattegat. eastern English Channel)	1.52	N	N	-
FAO27	Widely	2021	bli.27.5b67	Blue ling (*Molva dypterygia*) in subareas 6-7 and Division 5.b (Celtic Seas and Faroes grounds)	0.46	Y	Y	-
FAO27	Widely	2021	dgs.27.nea	Spurdog (*Squalus acanthias*) in Subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)	0.07	Y	Y	-
FAO27	Widely	2022	hke.27.3a46-8abd	Hake (*Merluccius merluccius*) in subareas 4. 6. and 7. and divisions 3.a. 8.a-b. and 8.d. Northern stock (Greater North Sea. Celtic Seas. and the northern Bay of Biscay)	0.80	Y	Y	-
FAO27	Widely	2022	hom.27.2a4a5b6a7a-ce-k8	Horse mackerel (*Trachurus trachurus*) in Subarea 8 and divisions 2.a. 4.a. 5.b. 6.a. 7.a-c.e-k (the Northeast Atlantic)	1.01	N	N	N
FAO27	Widely	2022	mac.27.nea	Mackerel (*Scomber scombrus*) in subareas 1-8 and 14 and Division 9.a (the Northeast Atlantic and adjacent waters)	1.17	N	Y	-
FAO27	Widely	2021	por.27.nea	Porbeagle (Lam- -sus) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)	0.01	Y	-	N
FAO27	Widely	2022	whb.27.1-91214	Blue whiting (*Micromesistius poutassou*) in subareas 1-9. 12. and 14 (Northeast Atlantic and adjacent waters)	1.28	N	N	-
FAO37	Black Sea	2021	ANE_29	European anchovy in GSA(s) 29	0.57	Y	-	-
FAO37	Black Sea	2022	DGS_29	Piked dogfish in GSA(s) 29	1.33	N	-	-
FAO37	Black Sea	2022	MUT_29	Red mullet in GSA(s) 29	1.09	N	-	-
FAO37	Black Sea	2022	RPW_29	Papa whelk in GSA(s) 29	1.47	N	-	-
FAO37	Black Sea	2022	SPR_29	European sprat in GSA(s) 29	0.10	Y	-	-
FAO37	Black Sea	2021	TUR_29	Turbot in GSA(s) 29	1.20	N	-	-
FAO37	Black Sea	2021	TUR_29	Turbot in GSA(s) 29	0.73	Y	-	-
FAO37	Black Sea	2022	WHG_29	Whiting in GSA(s) 29	8.53	N	-	-
FAO37	Central Med.	2021	ANE_16	European anchovy in GSA(s) 16	0.94	Y	-	-
FAO37	Central Med.	2022	ANE_17_18	European anchovy in GSA(s) 17, 18	1.24	N	-	-
FAO37	Central Med.	2022	ARA_18_19_20	Blue and red shrimp in GSA(s) 18, 19, 20	5.28	N	-	-
FAO37	Central Med.	2021	ARS_12_13_14_15_16	Giant Red Shrimp in GSA(s) 12, 13, 14, 15, 16	1.52	N	-	-
FAO37	Central Med.	2022	ARS_18_19_20	Giant red shrimp in GSA(s) 18, 19, 20	1.30	N	-	-

Region	EcoRegion	Year	Stock	Description	F ind	F status	SBL	CFP
FAO37	Central Med.	2021	CTC_17	Common cuttlefish in GSA(s) 17	1.37	N	-	-
FAO37	Central Med.	2022	DPS_12_13_14_15_16	Deep-water rose shrimp in GSA(s) 12, 13, 14, 15, 16	0.99	Y	-	-
FAO37	Central Med.	2021	DPS_17_18_19_20	Deep-water rose shrimp in GSA(s) 17, 18, 19, 20	1.26	N	-	-
FAO37	Central Med.	2022	EOI_18	Horned octopus in GSA(s) 18	0.94	Y	-	-
FAO37	Central Med.	2021	HKE_12_13_14_15_16	European hake in GSA(s) 12, 13, 14, 15, 16	0.93	Y	-	-
FAO37	Central Med.	2022	HKE_17_18	European hake in GSA(s) 17, 18	1.98	N	-	-
FAO37	Central Med.	2022	HKE_19	European hake in GSA(s) 19	1.57	N	-	-
FAO37	Central Med.	2022	HKE_20	European hake in GSA(s) 20	2.65	N	-	-
FAO37	Central Med.	2022	MTS_17	Spottail mantis squillid in GSA(s) 17	0.91	Y	-	-
FAO37	Central Med.	2021	MUR_15_16	Surmullet in GSA(s) 15, 16	1.25	N	-	-
FAO37	Central Med.	2021	MUT_15	Red mullet in GSA(s) 15	4.30	N	-	-
FAO37	Central Med.	2021	MUT_16	Red mullet in GSA(s) 16	0.29	Y	-	-
FAO37	Central Med.	2021	MUT_17_18	Red mullet in GSA(s) 17, 18	0.20	Y	-	-
FAO37	Central Med.	2022	MUT_19	Red mullet in GSA(s) 19	0.35	Y	-	-
FAO37	Central Med.	2021	MUT_20	Red mullet in GSA(s) 20	1.33	N	-	-
FAO37	Central Med.	2022	NEP_15_16	Norway lobster in GSA(s) 15, 16	1.50	N	-	-
FAO37	Central Med.	2022	NEP_17_18	Norway lobster in GSA(s) 17, 18	0.30	Y	-	-
FAO37	Central Med.	2021	PIL_16	European pilchard(=Sardine) in GSA(s) 16	3.50	N	-	-
FAO37	Central Med.	2022	PIL_17_18	European pilchard(=Sardine) in GSA(s) 17, 18	1.45	N	-	-
FAO37	Central Med.	2022	SOL_17	Common sole in GSA(s) 17	0.68	Y	-	-
FAO37	Eastern Med.	2022	HKE_22	European hake in GSA(s) 22	4.30	N	-	-
FAO37	Eastern Med.	2022	MUT_22	Red mullet in GSA(s) 22	0.52	Y	-	-
FAO37	Eastern Med.	2022	MUT_25	Red mullet in GSA(s) 25	0.34	Y	-	-
FAO37	Eastern Med.	2020	SBA_25	Axillary seabream in GSA(s) 25	1.05	N	-	-
FAO37	Western Med.	2021	ANE_6	European anchovy in GSA(s) 6	0.52	Y	-	-
FAO37	Western Med.	2021	ANE_7	European anchovy in GSA(s) 7	0.02	Y	-	-
FAO37	Western Med.	2021	ANE_9	European anchovy in GSA(s) 9	0.40	Y	-	-
FAO37	Western Med.	2021	ARA_1	Blue and red shrimp in GSA(s) 1	0.93	Y	-	-
FAO37	Western Med.	2021	ARA_2	Blue and red shrimp in GSA(s) 2	0.95	Y	-	-

Region	EcoRegion	Year	Stock	Description	F ind	F status	SBL	CFP
FAO37	Western Med.	2022	ARA_5	Blue and red shrimp in GSA(s) 5	3.68	N	-	-
FAO37	Western Med.	2022	ARA_6_7	Blue and red shrimp in GSA(s) 6, 7	3.81	N	-	-
FAO37	Western Med.	2020	ARA_9_10_11.1_11.2	Blue and red shrimp in GSA(s) 9, 10 11.1, 11.2	4.60	N	-	-
FAO37	Western Med.	2022	ARS_8_9_10_11	Giant red shrimp in GSA(s) 8, 9, 10, 11	1.63	N	-	-
FAO37	Western Med.	2022	DPS_1	Deep-water rose shrimp in GSA(s) 1	0.96	Y	-	-
FAO37	Western Med.	2022	DPS_5_6_7	Deep-water rose shrimp in GSA(s) 5, 6, 7	0.55	Y	-	-
FAO37	Western Med.	2022	DPS_8_9_10_11	Deep-water rose shrimp in GSA(s) 8, 9, 10, 11	1.29	N	-	-
FAO37	Western Med.	2022	HKE_1_5_6_7	European hake in GSA(s) 1, 5, 6, 7	3.21	N	-	-
FAO37	Western Med.	2022	HKE_8_9_10_11	European hake in GSA(s) 8, 9, 10, 11	2.00	N	-	-
FAO37	Western Med.	2021	MUR_5	Surmullet in GSA(s) 5	2.06	N	-	-
FAO37	Western Med.	2022	MUT_1	Red mullet in GSA(s) 1	2.36	N	-	-
FAO37	Western Med.	2021	MUT_10	Red mullet in GSA(s) 10	0.24	Y	-	-
FAO37	Western Med.	2021	MUT_11.1_11.2	Red mullet in GSA(s) 11.1, 11.2	0.66	Y	-	-
FAO37	Western Med.	2022	MUT_6	Red mullet in GSA(s) 6	3.41	N	-	-
FAO37	Western Med.	2022	MUT_7	Red mullet in GSA(s) 7	0.91	Y	-	-
FAO37	Western Med.	2022	MUT_9	Red mullet in GSA(s) 9	0.82	Y	-	-
FAO37	Western Med.	2021	NEP_5	Norway lobster in GSA(s) 5	0.97	Y	-	-
FAO37	Western Med.	2022	NEP_6	Norway lobster in GSA(s) 6	4.63	N	-	-
FAO37	Western Med.	2022	NEP_9	Norway lobster in GSA(s) 9	1.13	N	-	-
FAO37	Western Med.	2022	PIL_6	European pilchard(=Sardine) in GSA(s) 6	0.99	Y	-	-
FAO37	Western Med.	2022	PIL_7	European pilchard(=Sardine) in GSA(s) 7	0.00	Y	-	-
FAO37	Western Med.	2021	PIL_9	European pilchard(=Sardine) in GSA(s) 9	0.13	Y	-	-
FAO37	Western Med.	2021	SBR_1_3	Blackspot(=red) seabream in GSA(s) 1, 3	1.00	N	-	-

6 Historical Trends

As the number of stocks under consideration changes every year due to the availability of stock assessments, historical retrospectives of both modelled indicators (F/F_{MSY} and B/B_{2003}) for both sea basins were presented (Figure 30-Figure 33). The indicators were grouped by FAO region. The input data were the F and B modelled indicators computed each year for the purpose of monitoring the CFP performance since 2017. It is important to note that the figures present a historical retrospective (as opposed to a numerical retrospective), i.e. the trend observed in every modelling exercise since 2017 and not running the same model by peeling off one year of data at the end of the time series. Only the median was used to compare inter-annual behaviour. It should be noted that trajectories previous to 2024 were estimated using the GLMM approach as it was the standard up to this year.

In the Northeast Atlantic, the trajectories of both F/F_{MSY} and B/B_{2003} were generally consistent over the years they were computed.

The fishing pressure exhibited a decreasing trend over the period 2003-2022 (Figure 30). The results obtained by the CFP monitoring for the F/F_{MSY} indicators computed from 2017 to 2021 showed a regular upward revision of the time series. That pattern seems to have changed over the last three years (CFP monitoring 2022-2024) with a downward revision of the estimates. In last year's report a sensitivity analysis highlighted that removing the stocks assessed with a Bayesian Biomass Dynamic Model (BDM) was bringing the estimate back up (STECF, 2023b, Annex 5).

The biomass indicator exhibited an increasing trend over the period 2003-2021. A downward revision pattern of the indicator seems to be displayed in Figure 31 although it appears less obvious than in the fishing pressure indicator. This downward revision of the trend does not seem to be present anymore but more years of analysis are required to confirm if this pattern has disappeared.

In the Mediterranean and Black Seas, the fishing pressure indicator F/F_{MSY} (Figure 32) does not show a pattern as clear as in the Northeast Atlantic equivalent. However, over the last 5 years (CFP monitorings 2020 to 2023), a downward revision of the time series was observed. It should be noted that the number of stocks included in the analysis over the last two years has significantly increased compared to the previous analysis (34 in 2022, 57 in 2023 and 63 in 2024). Regarding the downward revision in 2024, one has to keep in mind that the GLMM framework was replaced by a state-space model.

The retrospective of the biomass indicator (B/B_{2003}) does not show any obvious patterns since 2017 (Figure 33). However, the indicator shows an important instability from year to year. As for the fishing pressure indicator, it should be noted that the number of stocks considered in this report (64) has significantly increased compared to last year's report (58) and 2022 (34).

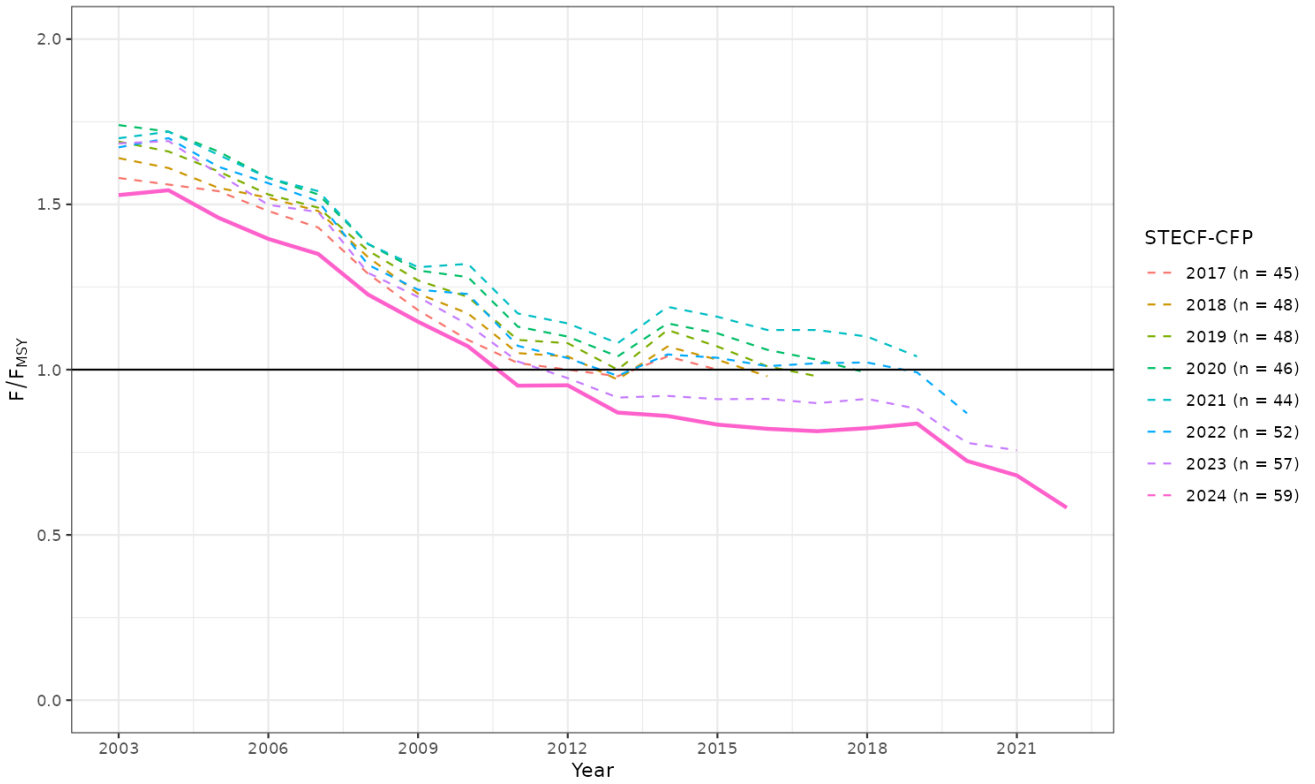

Figure 30: Historical retrospective reported in STECF CFP monitoring reports since 2017 for F/F_{MSY} in the Northeast Atlantic Area (dashed lines = GLMM and solid line = JARA)

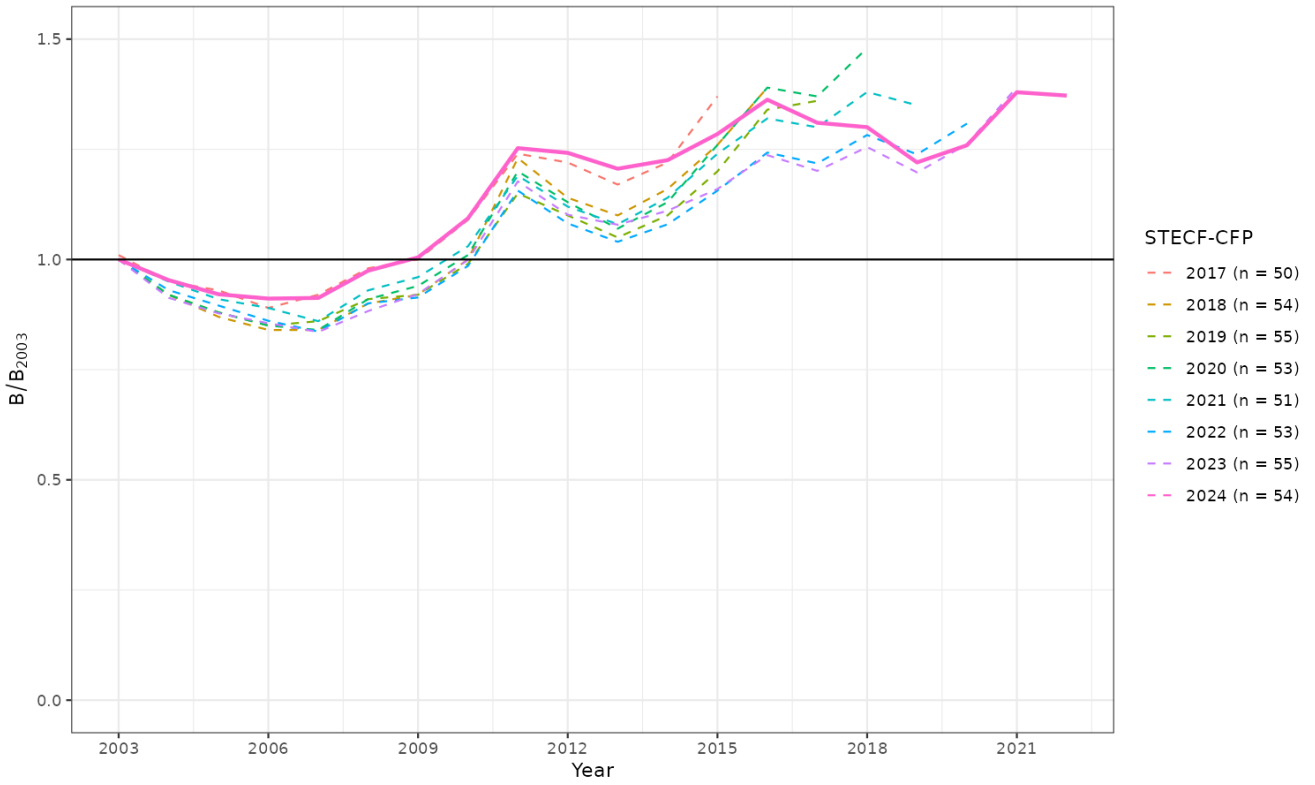

Figure 31: Historical retrospective reported in STECF CFP monitoring reports since 2017 for B/B_{2003} in the Northeast Atlantic Area (dashed lines = GLMM and solid line = JARA)

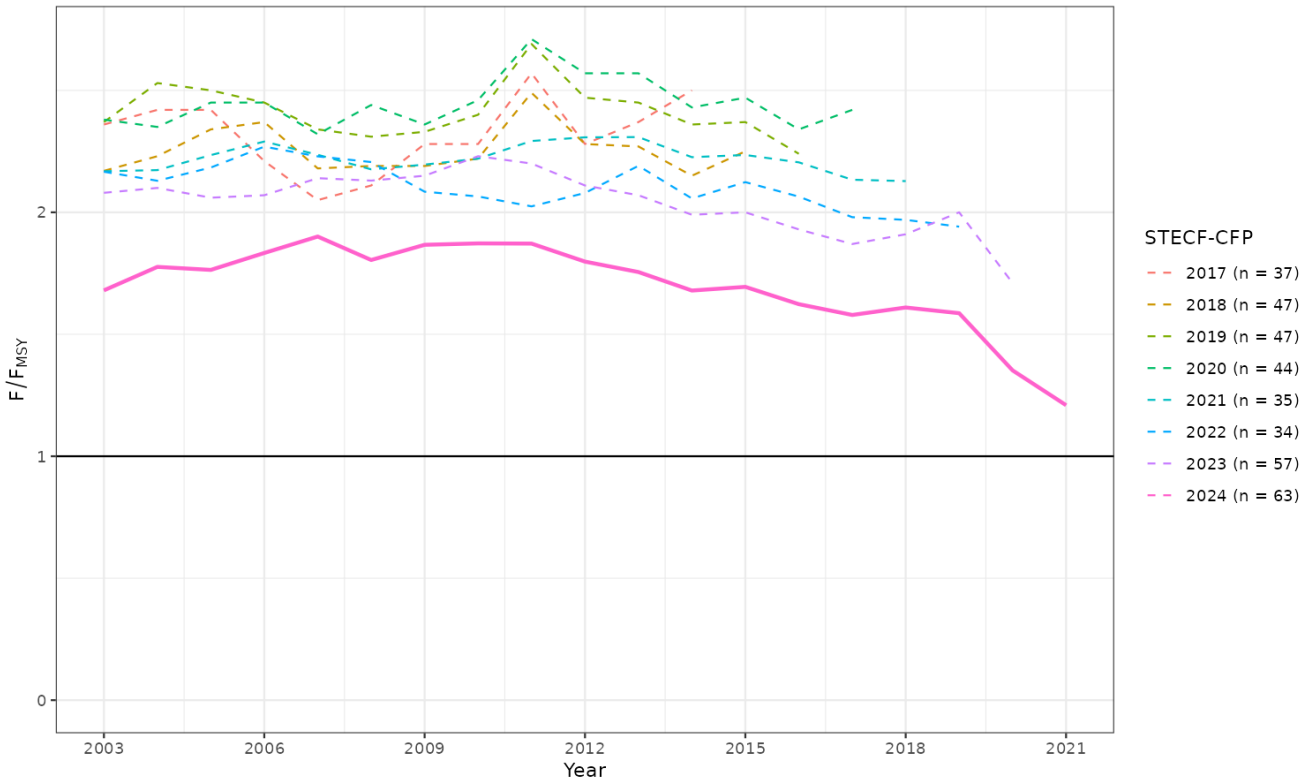

Figure 32: Historical retrospective reported in STECF CFP monitoring reports since 2017 for F/F_{MSY} in the Mediterranean and Black Seas Area (dashed lines = GLMM and solid line = JARA)

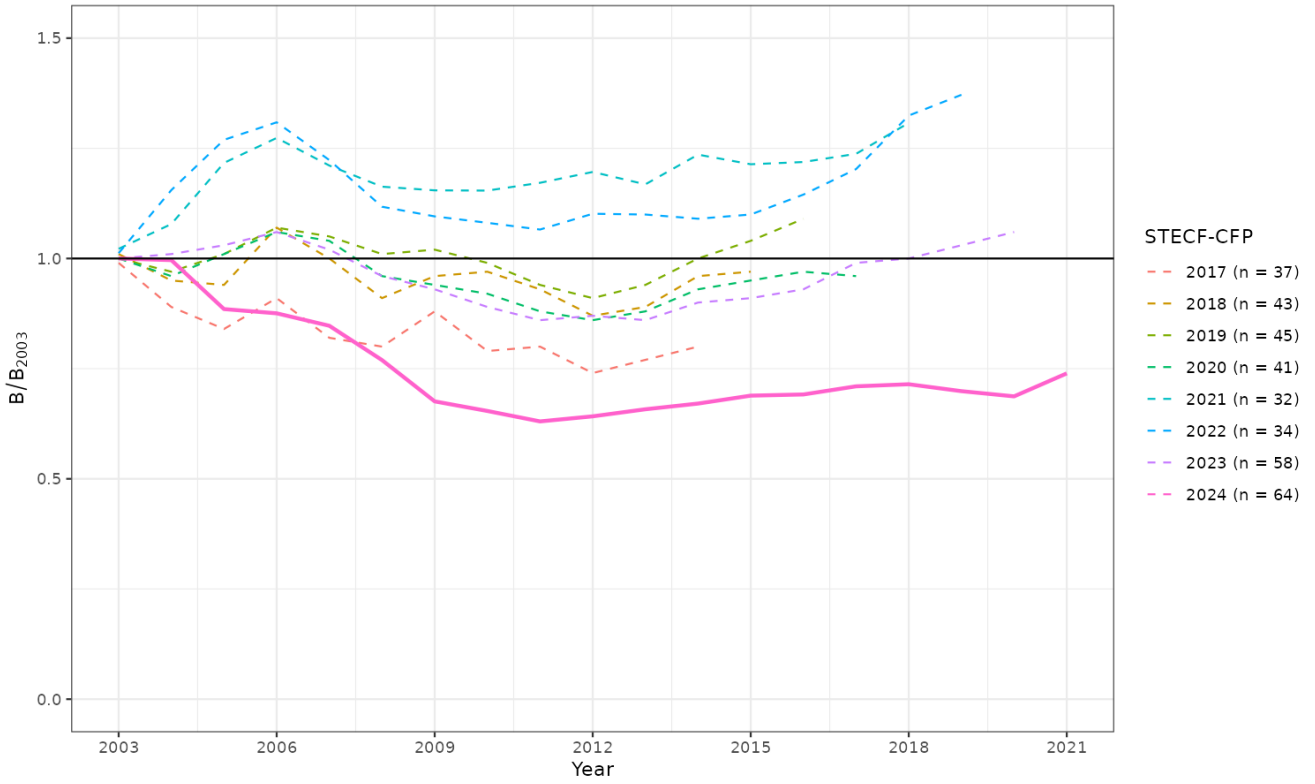

Figure 33: Historical retrospective reported in STECF CFP monitoring reports since 2017 for B/B_{2003} in the Mediterranean and Black Seas Area (dashed lines = GLMM and solid line = JARA)

7 References

Gibin M., 2017 - Integrating Fishing Management Zones, FAO and ICES statistical areas by data fusion, JRC Technical Report, JRC105881.

Gras, M., Vasilakopoulos, P., Pierucci, A., Kupschus, S., Mantopoulou Palouka, D., Winker, H. and Konrad, C., Protocol for the Monitoring of the Common Fisheries Policy, Publications Office of the European Union, Luxembourg, 2023, JRC136235.

ICES, 2021b. Cod (*Gadus morhua*) in subdivisions 24–32, eastern Baltic stock (eastern Baltic Sea) In Report of the ICES Advisory Committee, 2021. ICES Advice 2021, cod.27.24 -32. https://doi.org/10.17895/ices.advice.7745

Jardim, E., Mosqueira, I, Vasilakopoulos, P, Mannini, A, Pinto, C., Konrad, C., 2019. Protocol for the monitoring of the Common Fisheries Policy Version 4.0. JRC Technical Report.

Scott, F., Gibin, M. and Jardim, E., 2017a - Generating the CFP indicators sampling frame for FAO area 27 (Northeast Atlantic). JRC Technical Report, JRC106114, doi:10.2760/689063.

Scott, F., Gibin, M., Vasilakopoulos, P. and Jardim, E. 2017b. Matching the sampling frame for FAO area 27 (Northeast Atlantic) with ICES assessments. JRC Technical Report, JRC106115, doi:10.2760/818883.74

STECF, 2018 – 59th Plenary Meeting Report (PLEN-18-03). Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-98374-0, doi:10.2760/335280, JRC114701.

STECF (2021a). Scientific, Technical and Economic Committee for Fisheries (STECF) – Monitoring the performance of the Common Fisheries Policy (STECF-Adhoc-21-01). EUR 28359 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-36155-8, doi:10.2760/26195, JRC124906

STECF (2022a). Scientific, Technical and Economic Committee for Fisheries (STECF) – Monitoring of the performance of the Common Fisheries Policy (STECF-Adhoc-22-01). EUR 28359 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-51702-3, doi:10.2760/566544, JRC129080

STECF (2022b). Scientific, Technical and Economic Committee for Fisheries (STECF) – Stock Assessments: demersal stocks in the western Mediterranean Sea. (STECF-22-09), Simmonds, J., Mannini, A. and Kupschus, S. editor(s), EUR 28359 EN, Publications Office of the European Union, Luxembourg, 2023, ISBN 978-92-76-60485-3, doi:10.2760/00380, JRC132120.

STECF (2022c). Scientific, Technical and Economic Committee for Fisheries (STECF) – Stock Assessments: demersal stocks in Adriatic, Ionian and Aegean Seas and straits of Sicily (STECF-22-16). Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/25344, JRC132157.

STECF (2022d). Scientific, Technical and Economic Committee for Fisheries (STECF) – 71st Plenary report (STECF-PLEN-22-03). Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/016673, JRC132078.

STECF (2023a) – 74thPLENARY REPORT (STECF-PLEN-23-03), Rihan, D. and Doerner, H. editor(s), Publications Office of the European Union, Luxembourg, 2023, JRC136255.

STECF(2023b), Monitoring of the performance of the Common Fisheries Policy (STECF-adhoc-23-01), Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/361698, JRC133325.

Winker, H., Pacoureau, N., Sherley, R.B. JARA: 'Just Another Red-List Assessment'. BioRxiv, 2019, p. 672899.

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- EWG-24-Adhoc-01 – Annex 2: Numerical retrospective of model-based indicators
- EWG-24-Adhoc-01 – Annex 3: Sensitivity analysis of model-based indicator F/F_{MSY} to the inclusion of surplus production models
- EWG-24-Adhoc-01 – Annex 4: Outputs of JARA fits to the Median
- EWG-24-Adhoc-01 – Annex 5: Model-based indicators input data and outputs
- EWG-24-Adhoc-01 – Annex 6: Histogram of input values to model-based indicators for 2022 and 2021 data for the Mediterranean and Black Seas.

Electronic annexes are published on the meeting's web site on:

- EWG-24-Adhoc-01 – eAnnex 1: CFP monitoring protocols as agreed by STECF PLEN 23-03 (STECF, 2023b)
- EWG-24-Adhoc-01 – eAnnex 2: URL links to electronic annexes referring to the reports and stock advice sheets underpinning the analysis
- EWG-24-Adhoc-01 – eAnnex 3: R code for processing all the data and produce indicators for the Northeast Atlantic
- EWG-24-Adhoc-01 – eAnnex 4: R code for processing all the data and produce indicators for the Mediterranean and Black Seas.
- EWG-24-Adhoc-01 – eAnnex 5: R code for computing all the European waters' indicators

12 Annex 1 – Design-based indicators by ecoregion for the Mediterranean and Black Seas

Since 2023 (STECF, 2023b), BMSY reference points were made available for Mediterranean and Black Seas stocks. It is now possible to produce two design based indicators in relation to the MSY approach.

12.1 Number of stocks by year where fish mortality is above/below F_{MSY}

One is presenting the number of stocks for which F is compared to F_{MSY} (Figure 34). The values used to present the figures are also tabulated (Table 26 and Table 27). This indicator shows that the number of stocks for which $F \leq F_{MSY}$ ranges from 10 to 16 in the period 2003-2019. From 2020 to 2022 that number increased to 29.

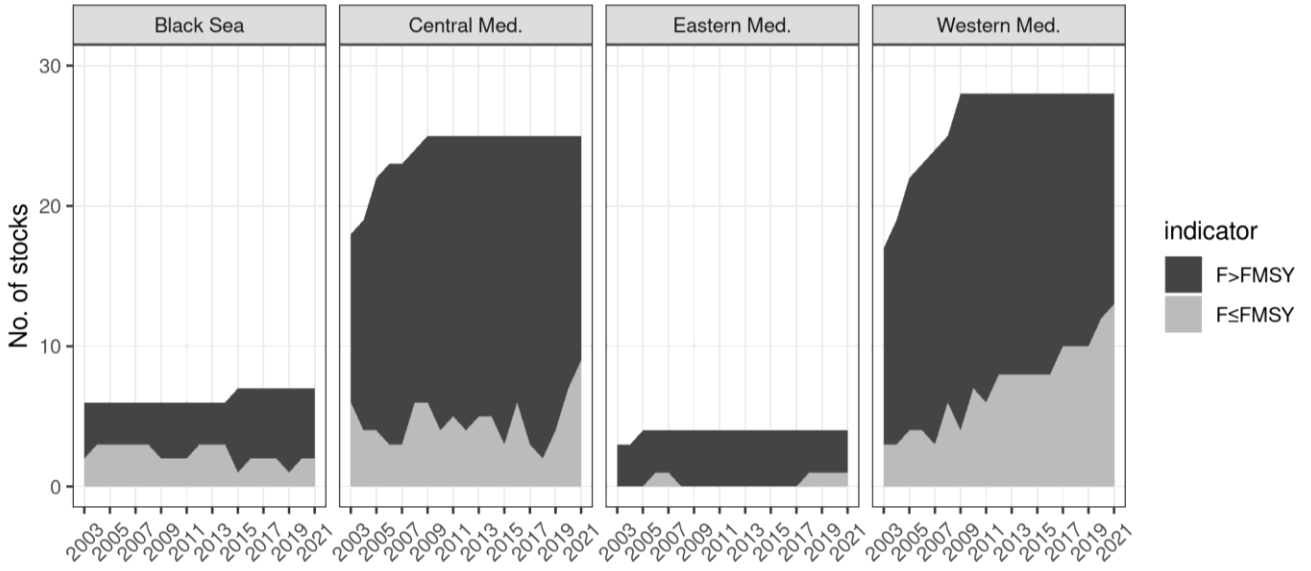

Figure 34: Number of stocks by ecoregion for which fishing mortality (F) was above/below F_{MSY} (MEDI1-2b)

Table 26: Number of stocks by ecoregion for which fishing mortality (F) exceeded F_{MSY} (MEDI1)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Black Sea	4	3	3	3	3	3	4	4	4	3
Central Med.	12	15	18	20	20	18	19	21	20	21
Eastern Med.	3	3	4	3	3	4	4	4	4	4
Western Med.	14	16	18	19	21	19	24	21	22	20

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Black Sea	3	3	6	5	5	5	6	5	5	-
Central Med.	20	20	22	19	22	23	21	18	16	-
Eastern Med.	4	4	4	4	4	3	3	3	2	-
Western Med.	20	20	20	20	18	18	18	16	15	-

Table 27: Number of stocks by ecoregion for which fishing mortality (F) did not exceed F_{MSY} (MEDI2)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Black Sea	2	3	3	3	3	3	2	2	2	3
Central Med.	6	4	4	3	3	6	6	4	5	4
Eastern Med.	0	0	0	1	1	0	0	0	0	0
Western Med.	3	3	4	4	3	6	4	7	6	8

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Black Sea	3	3	1	2	2	2	1	2	2	-
Central Med.	5	5	3	6	3	2	4	7	9	-
Eastern Med.	0	0	0	0	0	1	1	1	2	-
Western Med.	8	8	8	8	10	10	10	12	13	-

12.2 Number of stocks with F>F_{MSY} or SSB<B_{MSY} and number of stocks with F≤F_{MSY} and SSB≥ B_{MSY}

Figure 35: Number of stocks with F>F_{MSY} or B<B_{MSY} and number of stocks with F≤F_{MSY} and B≥B_{MSY} in the Mediterranean and Black Seas (MEDI5-6)

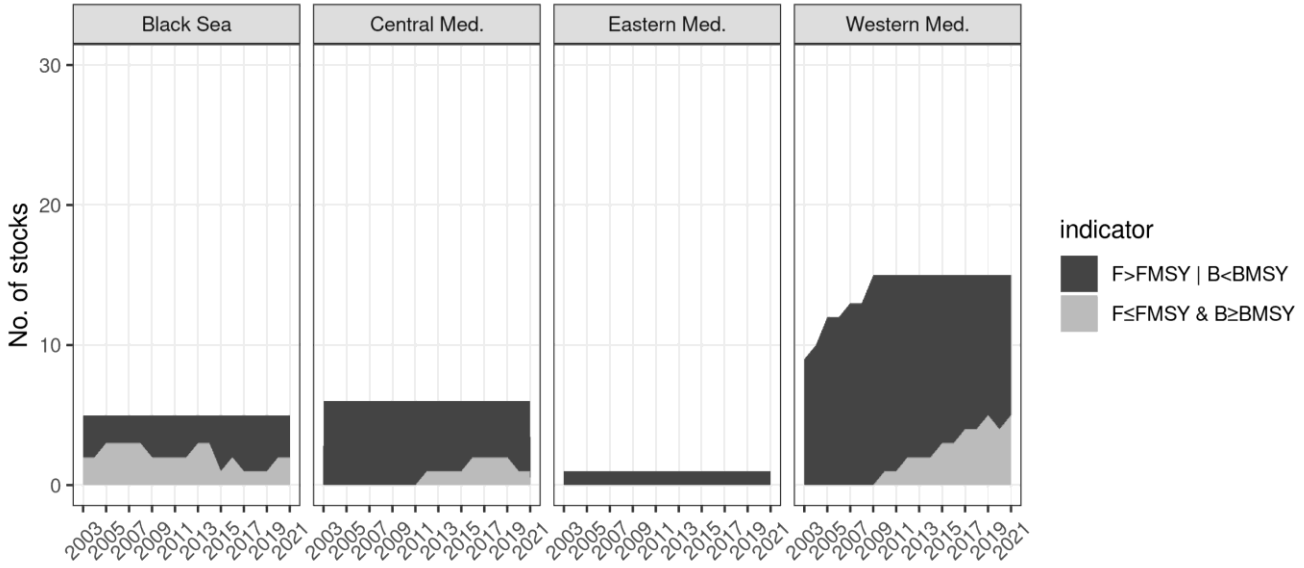

Figure 36: Number of stocks by ecoregion with F>F_{MSY} or B<B_{MSY} and number of stocks with F≤F_{MSY} and B≥B_{MSY} in the Mediterranean and Black Seas (MEDI5-6)

Table 28: Number of stocks with $F>F_{MSY}$ or $B<B_{MSY}$ for the Mediterranean and Black Sea ecoregion (MEDI5)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Black Sea	3	3	2	2	2	2	3	3	3	3
Central Med.	6	6	6	6	6	6	6	6	6	5
Eastern Med.	1	1	1	1	1	1	1	1	1	1
Western Med.	9	10	12	12	13	13	15	14	14	13

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Black Sea	2	2	4	3	4	4	4	3	3	-
Central Med.	5	5	5	4	4	4	4	5	5	-
Eastern Med.	1	1	1	1	1	1	1	1	1	-
Western Med.	13	13	12	12	11	11	10	11	10	-

Table 29: Number of stocks with $F\leq F_{MSY}$ or $B\geq B_{MSY}$ for the Mediterranean and Black Sea ecoregion (MEDI6)

EcoRegion	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All	2	2	3	3	3	3	2	3	3	5
Black Sea	2	2	3	3	3	3	2	2	2	2
Central Med.	0	0	0	0	0	0	0	0	0	1
Eastern Med.	0	0	0	0	0	0	0	0	0	0
Western Med.	0	0	0	0	0	0	0	1	1	2

EcoRegion	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
All	6	6	5	7	7	7	8	7	8	8
Black Sea	3	3	1	2	1	1	1	2	2	2
Central Med.	1	1	1	2	2	2	2	1	1	1
Eastern Med.	0	0	0	0	0	0	0	0	0	
Western Med.	2	2	3	3	4	4	5	4	5	5

13 Annex 2: Numerical retrospective of model-based indicators

13.1 Northeast Atlantic

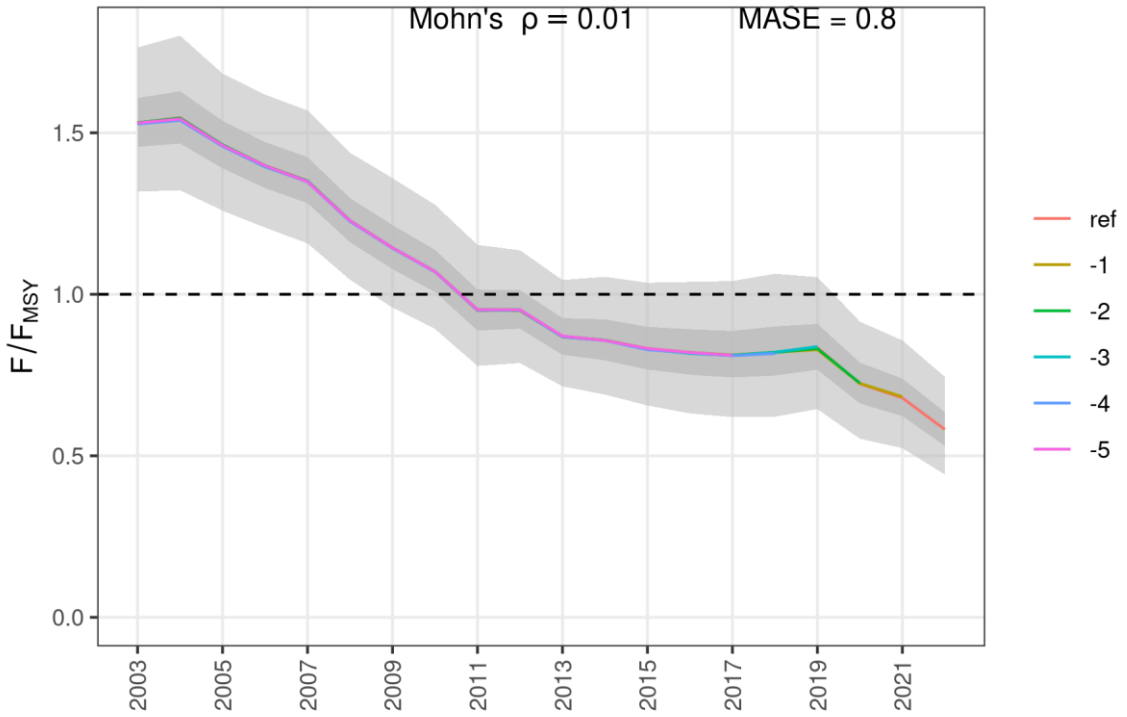

Figure 37: Numerical retrospective for the F/F_{MSY} model-based indicators in the NEA

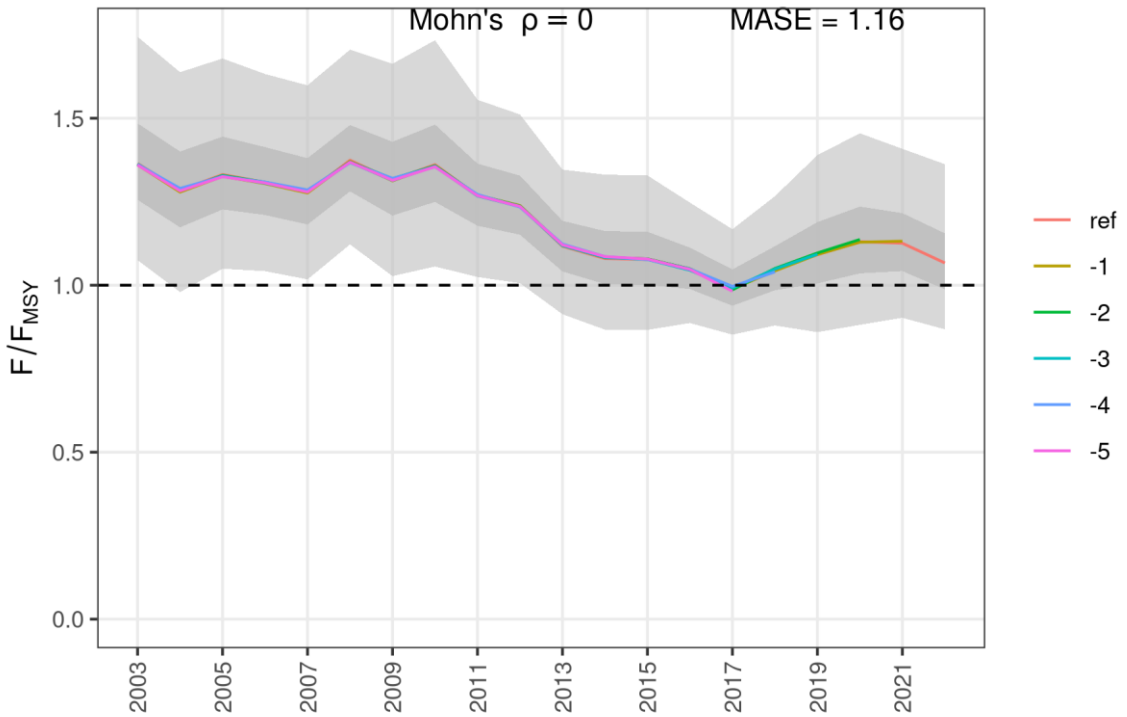

Figure 38: Numerical retrospective for the F/F_{MSY} model-based indicators for outside EU-Waters stocks in the NEA

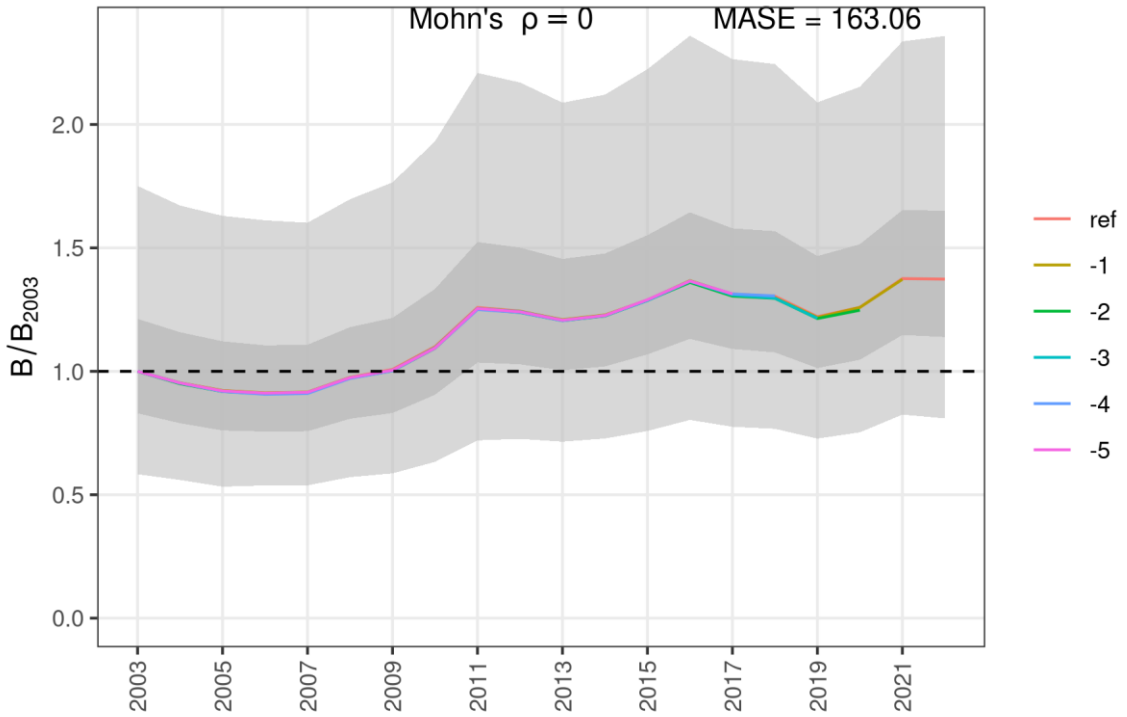

Figure 39: Numerical retrospective for the B/B_{2003} model-based indicators in the NEA

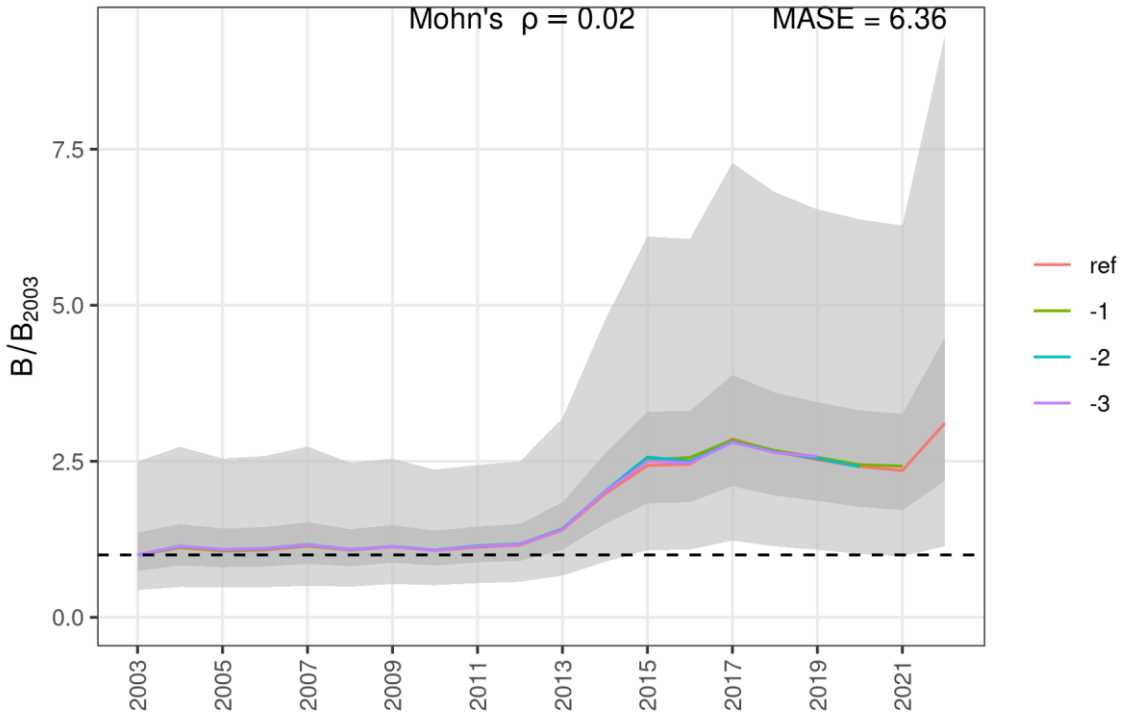

Figure 40: Numerical retrospective for the B/B_{2003} model-based indicators for category 3 stocks in the NEA

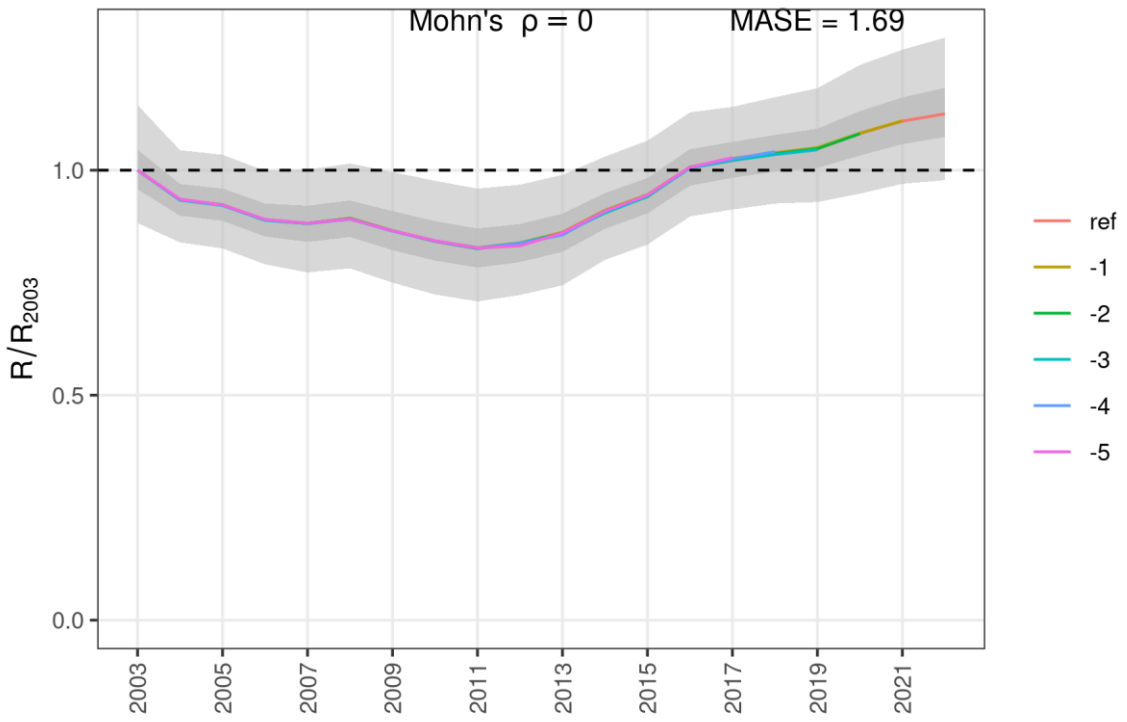

Figure 41: Numerical retrospective for the R/R_{2003} model-based indicators in the NEA

13.2 Mediterranean and Black Sea

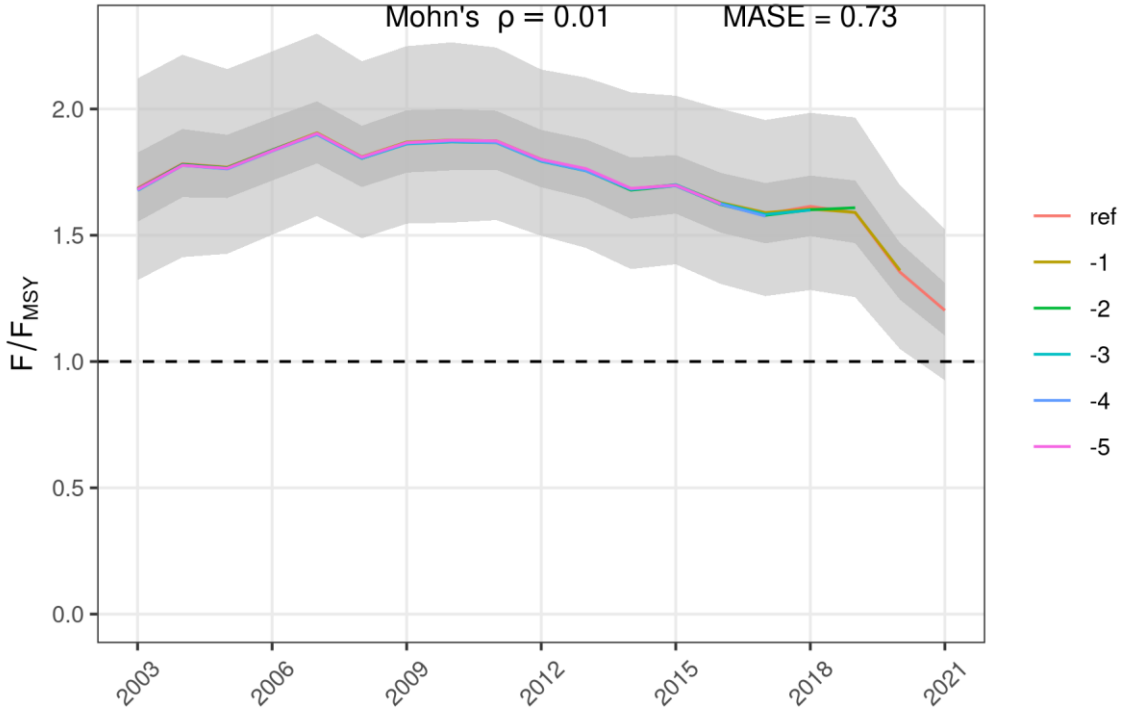

Figure 42: Numerical retrospective for the F/F_{MSY} model-based indicators in the Mediterranean and Black Sea

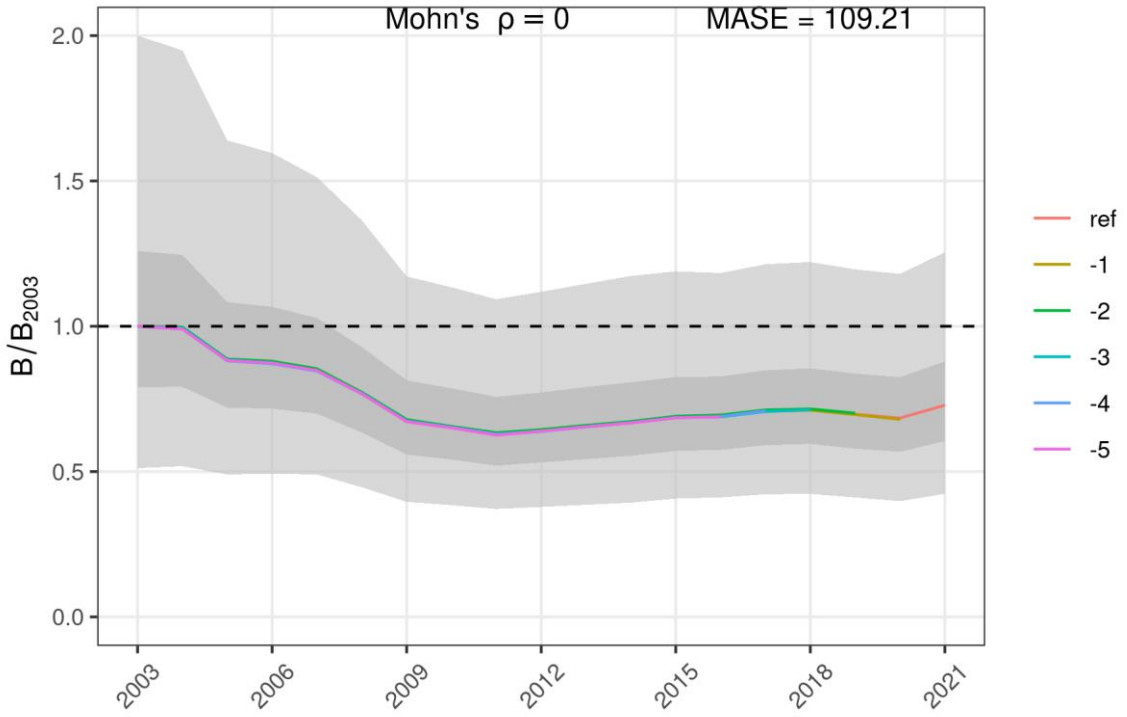

Figure 43: Numerical retrospective for the B/B_{2003} model-based indicators in the Mediterranean and Black Sea

14 Annex 3 Sensitivity analysis, model-based indicator F/F_{MSY} excluding all the surplus production models

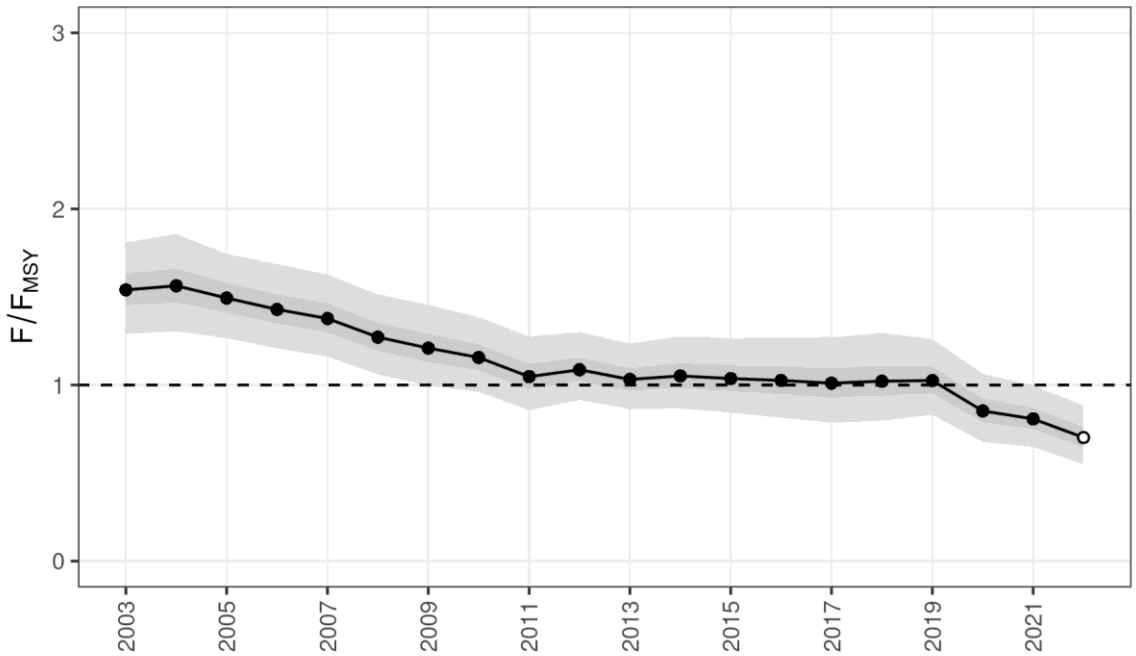

Figure 44: Trend in F/F_{MSY} based on 46 stocks instead of 59 stocks excluding all the assessments run with a surplus production model for the NEA

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.29	1.30	1.27	1.21	1.16	1.06	1.00	0.96	0.86	0.91
25%	1.45	1.47	1.41	1.35	1.30	1.19	1.13	1.08	0.98	1.02
50%	1.54	1.56	1.49	1.43	1.38	1.27	1.21	1.16	1.05	1.09
75%	1.63	1.66	1.58	1.51	1.46	1.35	1.29	1.23	1.12	1.16
97.5%	1.81	1.86	1.75	1.69	1.63	1.52	1.46	1.39	1.28	1.30

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.86	0.87	0.84	0.81	0.79	0.80	0.83	0.68	0.65	0.55
25%	0.97	0.98	0.97	0.95	0.93	0.94	0.95	0.79	0.75	0.65
50%	1.03	1.05	1.04	1.03	1.01	1.02	1.03	0.85	0.81	0.70
75%	1.10	1.13	1.11	1.11	1.10	1.11	1.10	0.92	0.87	0.76
97.5%	1.24	1.28	1.27	1.27	1.27	1.30	1.26	1.07	1.00	0.89

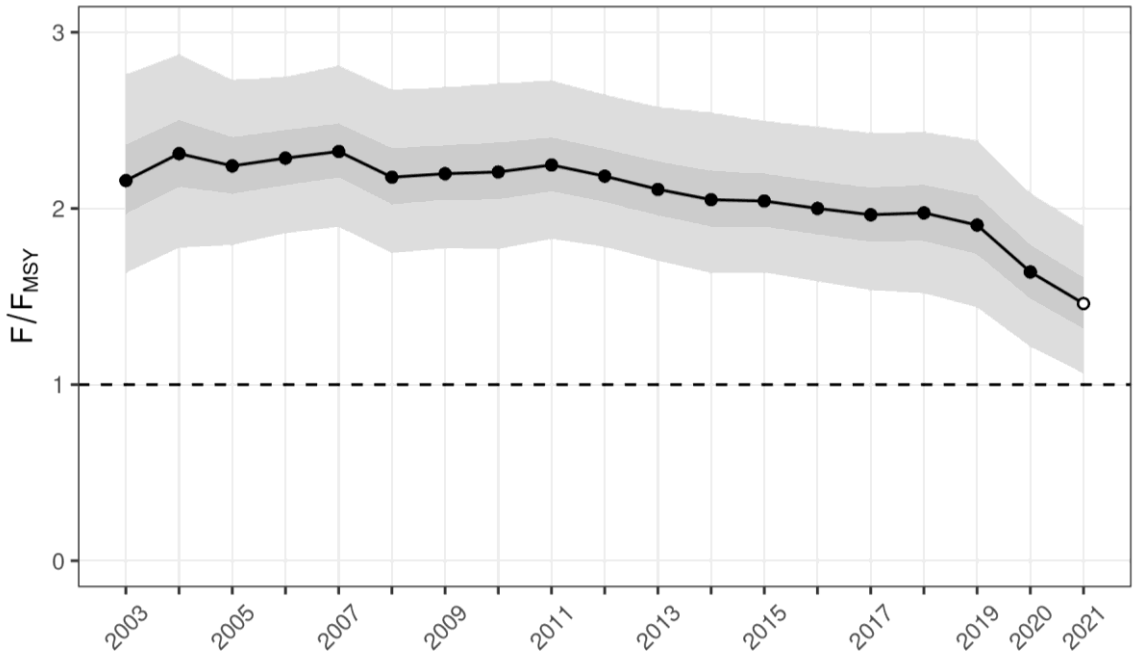

Figure 45: Trend in F/F_{MSY} based on 48 stocks instead of 63 stocks excluding all the assessments run with a surplus production model for the Mediterranean and Black Sea

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.63	1.78	1.79	1.86	1.89	1.75	1.77	1.77	1.83	1.78
25%	1.97	2.12	2.08	2.13	2.18	2.02	2.05	2.05	2.10	2.04
50%	2.16	2.31	2.24	2.29	2.32	2.18	2.20	2.21	2.25	2.18
75%	2.36	2.50	2.40	2.44	2.48	2.34	2.36	2.37	2.40	2.34
97.5%	2.76	2.88	2.73	2.75	2.81	2.68	2.69	2.71	2.73	2.65

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	1.70	1.63	1.64	1.58	1.53	1.52	1.44	1.21	1.06	-
25%	1.96	1.90	1.90	1.85	1.81	1.82	1.74	1.49	1.32	-
50%	2.11	2.05	2.04	2.00	1.96	1.97	1.91	1.64	1.46	-
75%	2.27	2.21	2.20	2.15	2.12	2.13	2.07	1.79	1.61	-
97.5%	2.58	2.55	2.50	2.47	2.43	2.44	2.39	2.09	1.90	-

15 Annex 4 JARA fitted to the median

15.1 Northeast Atlantic

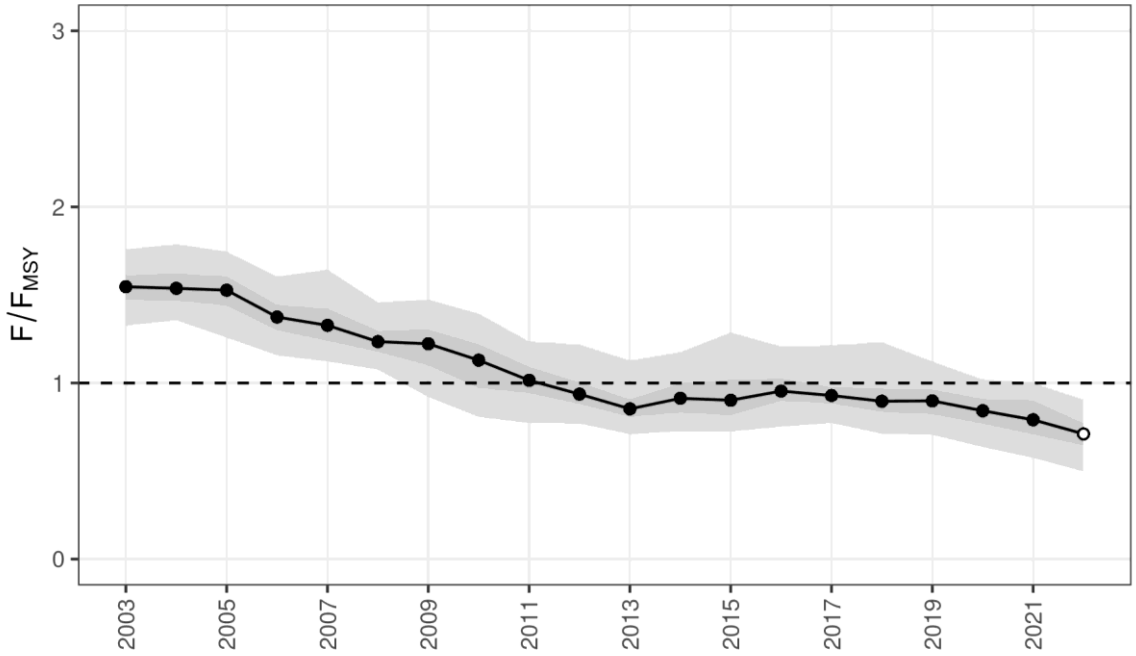

Figure 46: Trend in F/F_{MSY} (based on 59 stocks). This model is median-based and not geomean-based as in the core of the report.

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.33	1.36	1.26	1.16	1.12	1.07	0.92	0.81	0.77	0.77
25%	1.47	1.47	1.44	1.30	1.24	1.18	1.10	0.97	0.94	0.88
50%	1.55	1.54	1.53	1.37	1.33	1.23	1.22	1.13	1.01	0.94
75%	1.61	1.62	1.61	1.44	1.42	1.30	1.30	1.22	1.09	1.00
97.5%	1.76	1.79	1.75	1.61	1.65	1.46	1.48	1.40	1.24	1.22

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.71	0.73	0.72	0.75	0.77	0.71	0.70	0.64	0.57	0.50
25%	0.81	0.83	0.82	0.90	0.88	0.84	0.82	0.77	0.71	0.65
50%	0.85	0.91	0.90	0.95	0.93	0.90	0.90	0.84	0.79	0.71
75%	0.91	1.00	1.02	1.03	0.98	0.97	0.96	0.91	0.90	0.77
97.5%	1.13	1.18	1.29	1.21	1.21	1.23	1.12	1.02	1.00	0.91

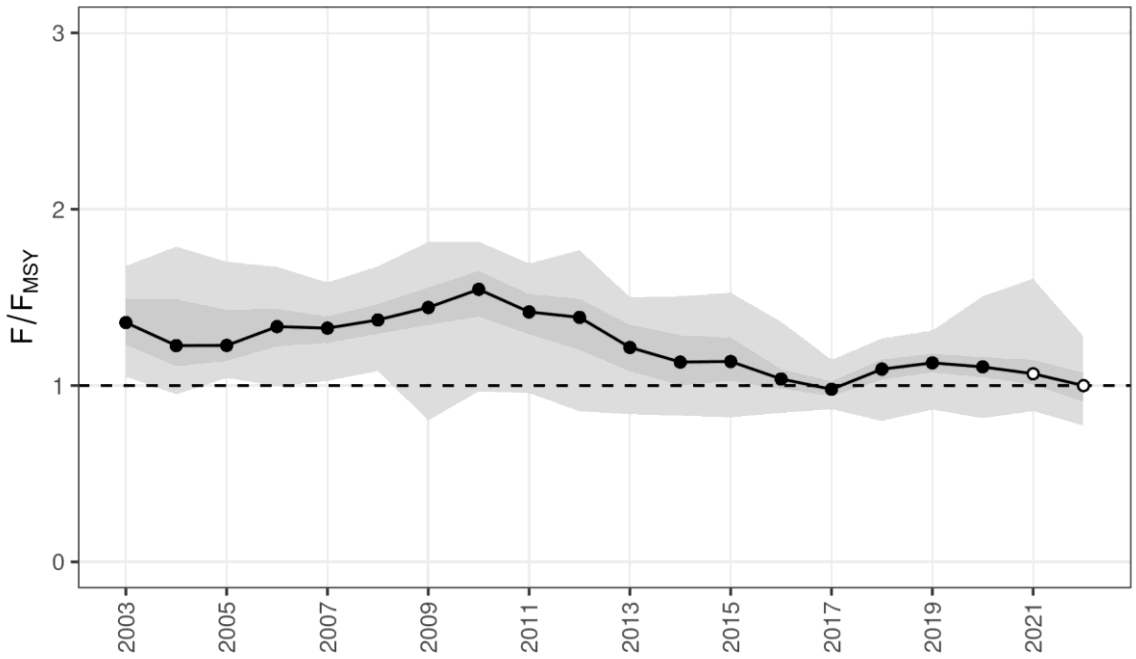

Figure 47: Trend in F/F_{MSY} for stocks outside EU waters (based on 18 stocks). This model is median-based and not geomean-based as in the core of the report.

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.05	0.95	1.04	1.00	1.02	1.08	0.80	0.97	0.96	0.85
25%	1.23	1.11	1.14	1.22	1.24	1.29	1.34	1.39	1.29	1.20
50%	1.36	1.23	1.23	1.33	1.33	1.37	1.44	1.55	1.42	1.39
75%	1.49	1.49	1.43	1.43	1.39	1.46	1.56	1.65	1.52	1.49
97.5%	1.68	1.79	1.70	1.68	1.59	1.68	1.82	1.82	1.69	1.77

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.84	0.83	0.82	0.84	0.86	0.80	0.86	0.81	0.85	0.77
25%	1.08	1.00	1.03	0.98	0.94	1.03	1.07	1.05	1.01	0.91
50%	1.22	1.13	1.14	1.04	0.98	1.09	1.13	1.11	1.07	1.00
75%	1.34	1.29	1.27	1.09	1.02	1.15	1.18	1.16	1.15	1.07
97.5%	1.50	1.51	1.53	1.36	1.15	1.27	1.31	1.51	1.61	1.28

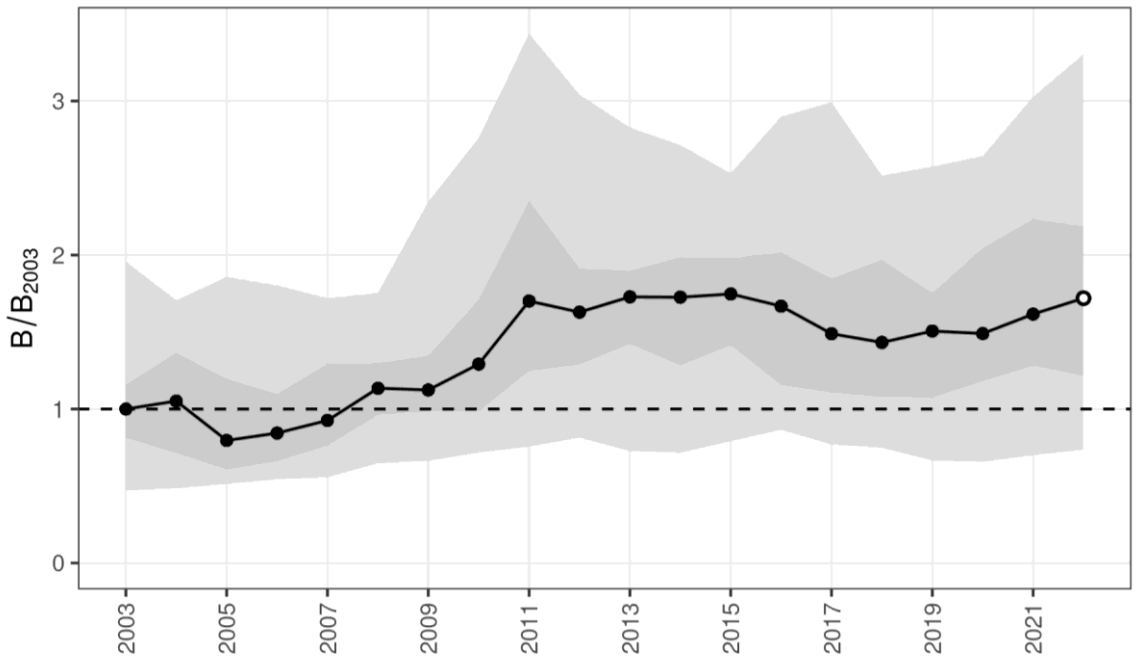

Figure 48: Trend in B/B_{2003} (based on 54 stocks). This model is median-based and not geomean-based as in the core of the report.

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.47	0.48	0.51	0.54	0.55	0.65	0.66	0.72	0.75	0.81
25%	0.82	0.72	0.61	0.66	0.76	0.96	0.99	0.99	1.25	1.29
50%	1.00	1.05	0.80	0.84	0.93	1.13	1.12	1.29	1.70	1.63
75%	1.15	1.36	1.19	1.09	1.29	1.30	1.34	1.71	2.35	1.91
97.5%	1.96	1.71	1.86	1.80	1.72	1.75	2.35	2.76	3.44	3.04

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.73	0.71	0.79	0.86	0.77	0.75	0.66	0.66	0.70	0.73
25%	1.43	1.29	1.42	1.16	1.11	1.08	1.08	1.18	1.28	1.22
50%	1.73	1.73	1.75	1.67	1.49	1.43	1.51	1.49	1.62	1.72
75%	1.89	1.98	1.98	2.01	1.84	1.97	1.75	2.04	2.23	2.18
97.5%	2.83	2.71	2.53	2.90	2.99	2.52	2.57	2.64	3.03	3.31

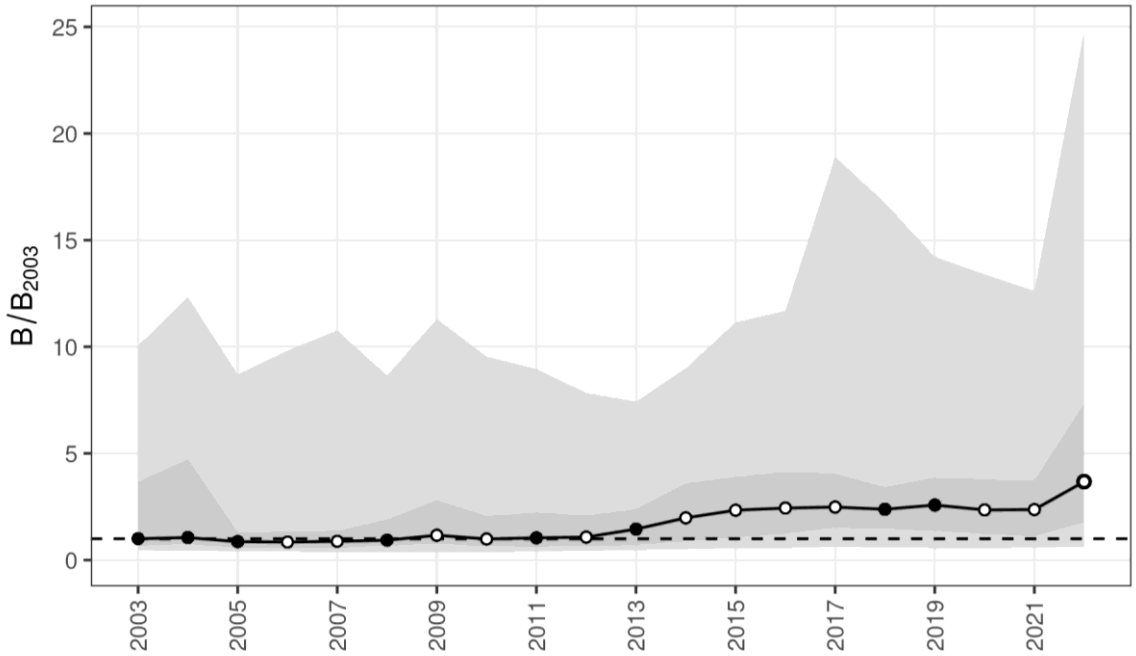

Figure 49: Trend in B/B_{2003} for category 3 stocks (based on 66 stocks). This model is median-based and not geomean-based as in the core of the report.

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.45	0.42	0.40	0.38	0.36	0.35	0.36	0.36	0.39	0.43
25%	0.70	0.76	0.60	0.56	0.60	0.69	0.79	0.66	0.64	0.67
50%	1.00	1.05	0.86	0.84	0.88	0.93	1.16	0.99	1.04	1.08
75%	3.65	4.71	1.28	1.33	1.35	1.88	2.79	2.04	2.21	2.07
97.5%	10.06	12.34	8.71	9.82	10.77	8.65	11.30	9.54	8.96	7.84

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.46	0.50	0.55	0.55	0.60	0.57	0.56	0.54	0.58	0.61
25%	0.73	0.91	1.07	1.25	1.54	1.48	1.39	1.24	1.14	1.79
50%	1.45	1.98	2.34	2.44	2.48	2.38	2.58	2.35	2.37	3.68
75%	2.37	3.58	3.88	4.11	4.03	3.40	3.84	3.77	3.70	7.32
97.5%	7.43	8.99	11.15	11.69	18.91	16.75	14.22	13.40	12.62	24.78

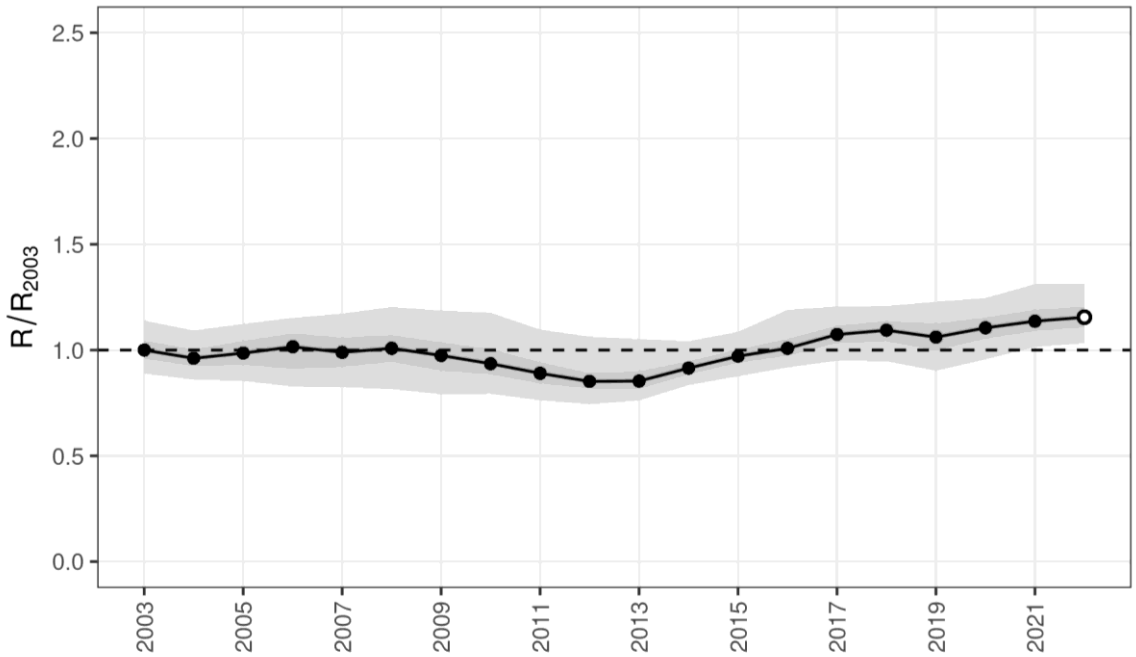

Figure 50: Trend in decadal recruitment scaled to 2003 (based on 56 stocks). This model is median-based and not geomean-based as in the core of the report.

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.89	0.86	0.85	0.83	0.82	0.82	0.79	0.79	0.76	0.74
25%	0.96	0.93	0.93	0.91	0.92	0.95	0.90	0.89	0.84	0.82
50%	1.00	0.96	0.99	1.02	0.99	1.01	0.97	0.94	0.89	0.85
75%	1.04	1.00	1.04	1.08	1.06	1.07	1.03	1.00	0.94	0.89
97.5%	1.14	1.09	1.12	1.15	1.17	1.20	1.19	1.18	1.10	1.06

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.76	0.83	0.88	0.92	0.95	0.95	0.90	0.96	1.01	1.03
25%	0.82	0.89	0.94	0.97	1.03	1.04	1.00	1.05	1.09	1.11
50%	0.85	0.91	0.97	1.01	1.07	1.09	1.06	1.11	1.14	1.16
75%	0.90	0.95	1.00	1.05	1.11	1.14	1.12	1.15	1.19	1.20
97.5%	1.05	1.04	1.09	1.19	1.21	1.21	1.23	1.25	1.31	1.31

15.2 Mediterranean and Black Sea

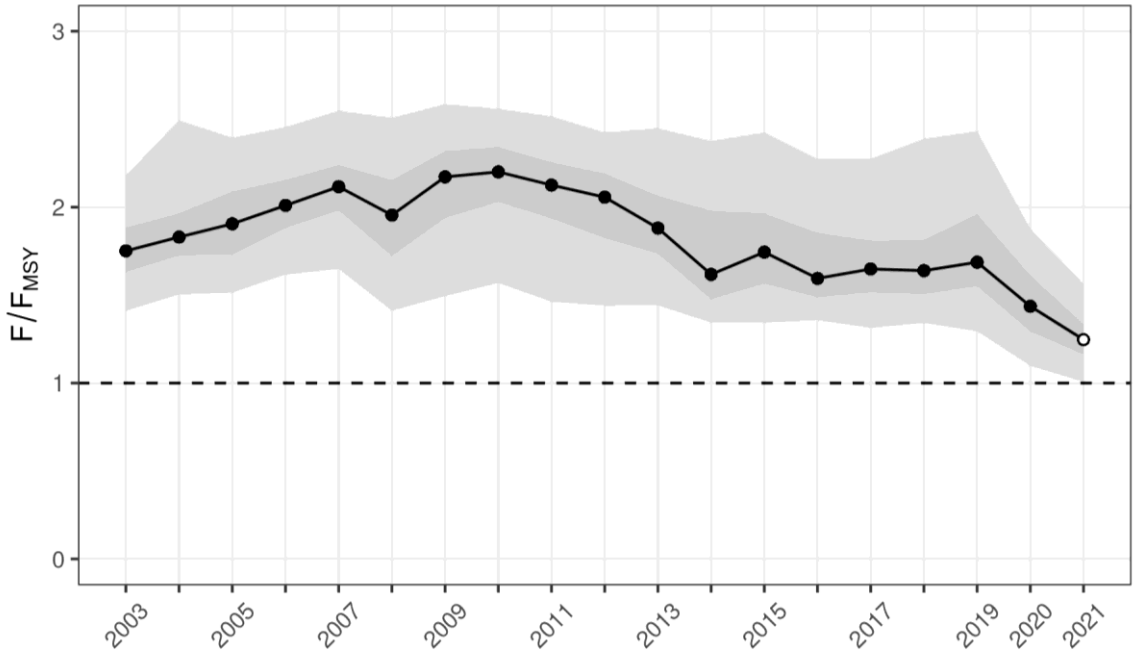

Figure 51 Trend in F/F_{MSY} (based on 63 stocks). This model is median-based and not geomean-based as in the core of the report.

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	1.41	1.50	1.51	1.61	1.65	1.41	1.49	1.57	1.46	1.44
25%	1.63	1.73	1.73	1.88	1.98	1.72	1.94	2.03	1.94	1.82
50%	1.75	1.83	1.91	2.01	2.12	1.95	2.17	2.20	2.13	2.06
75%	1.88	1.96	2.09	2.15	2.24	2.15	2.32	2.34	2.25	2.19
97.5%	2.18	2.50	2.40	2.46	2.55	2.51	2.59	2.56	2.52	2.43

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	1.44	1.34	1.34	1.36	1.31	1.34	1.29	1.10	1.01	-
25%	1.74	1.48	1.57	1.49	1.52	1.51	1.55	1.29	1.16	-
50%	1.88	1.62	1.74	1.59	1.65	1.64	1.69	1.44	1.25	-
75%	2.06	1.98	1.96	1.85	1.81	1.81	1.96	1.61	1.33	-
97.5%	2.45	2.38	2.43	2.28	2.28	2.39	2.43	1.88	1.57	-

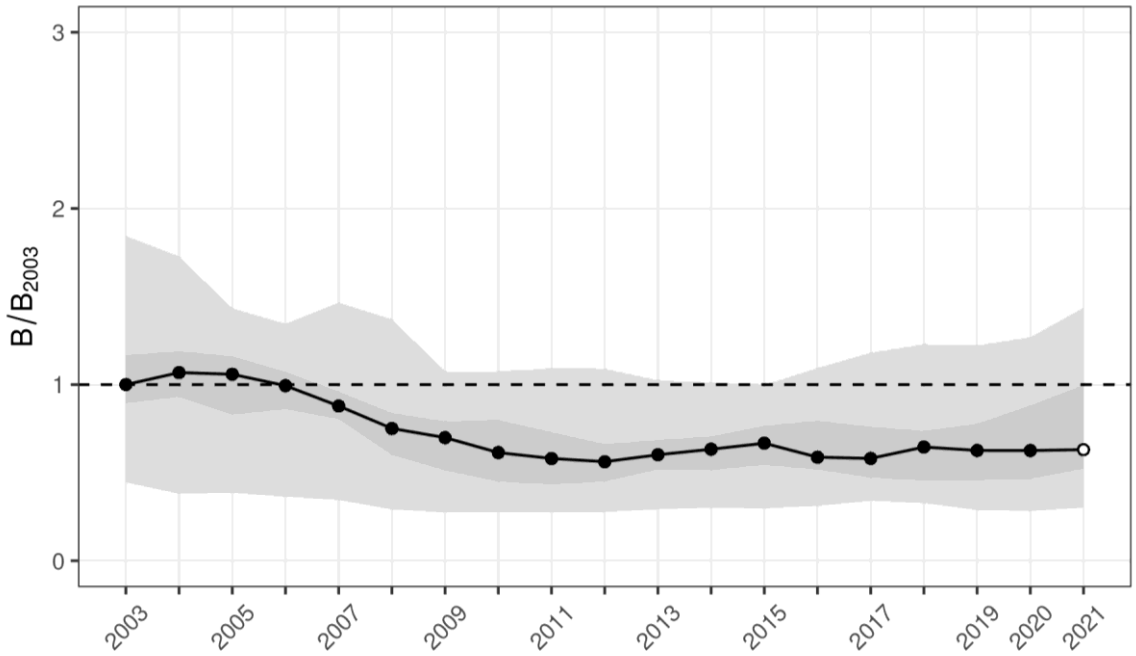

Figure 52: Trend in B/B_{2003} (based on 54 stocks). This model is median-based and not geomean-based as in the core of the report.

Percentiles	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2.5%	0.44	0.38	0.38	0.36	0.34	0.29	0.27	0.27	0.28	0.28
25%	0.89	0.93	0.83	0.86	0.80	0.60	0.51	0.45	0.43	0.45
50%	1.00	1.07	1.06	0.99	0.88	0.75	0.70	0.61	0.58	0.56
75%	1.17	1.19	1.16	1.07	0.96	0.84	0.79	0.80	0.73	0.66
97.5%	1.85	1.73	1.44	1.35	1.47	1.37	1.08	1.08	1.09	1.09

Percentiles	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2.5%	0.29	0.30	0.30	0.31	0.34	0.33	0.29	0.28	0.30	0.29
25%	0.52	0.51	0.54	0.52	0.47	0.45	0.46	0.46	0.52	0.52
50%	0.60	0.63	0.67	0.59	0.58	0.65	0.63	0.63	0.63	0.60
75%	0.69	0.71	0.77	0.79	0.76	0.74	0.78	0.88	1.00	0.69
97.5%	1.03	1.01	1.00	1.10	1.18	1.23	1.22	1.27	1.44	1.03

16 Annex 5: Model-based indicators input data and outputs

In this annex, input data (presented as boxplots) and output from the model (solid line) are presented together. Regarding the model-based biomass indicator, standardised input data are not directly comparable with the model output since the model takes absolute biomass as input.

16.1 Northeast Atlantic

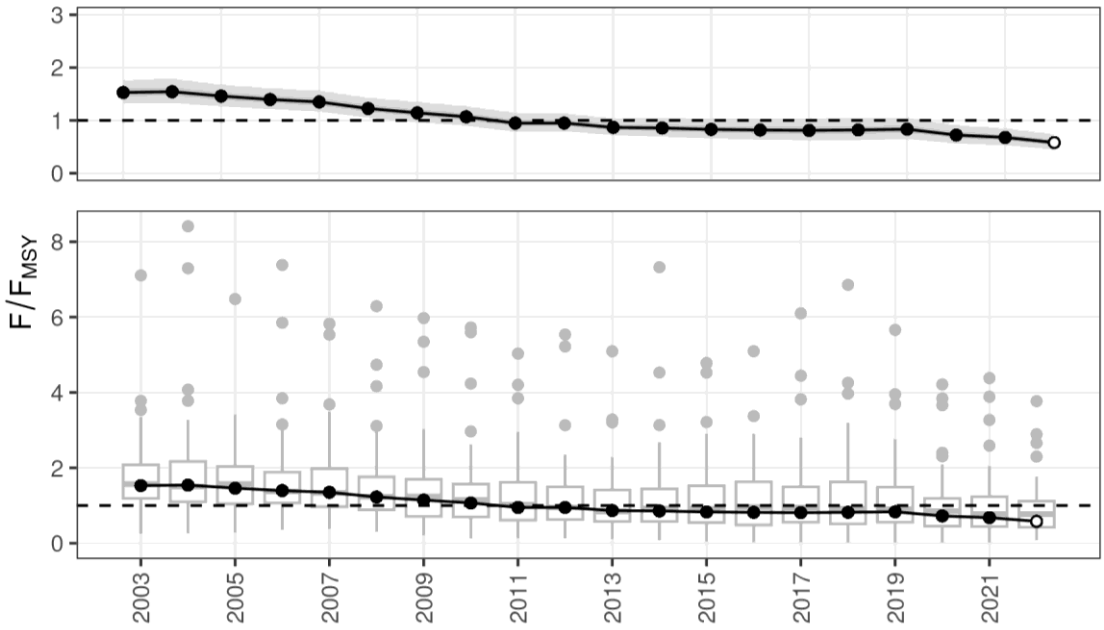

Figure 53: Trend in F/F_{MSY} (based on 59 stocks)

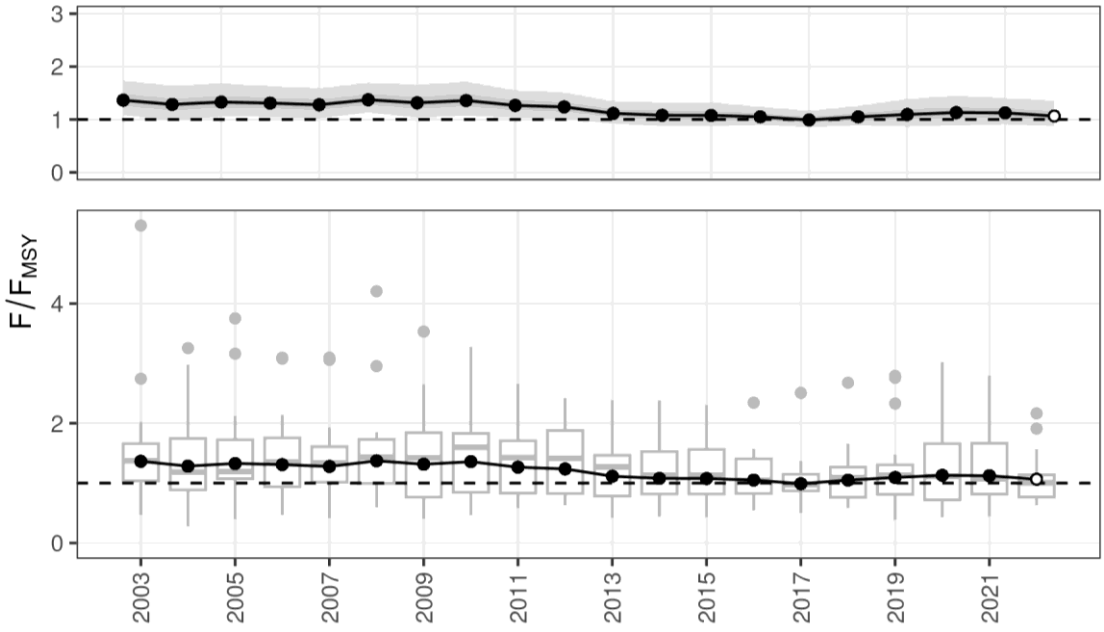

Figure 54: Trend in F/F_{MSY} for outside EU waters stocks (based on 18 stocks)

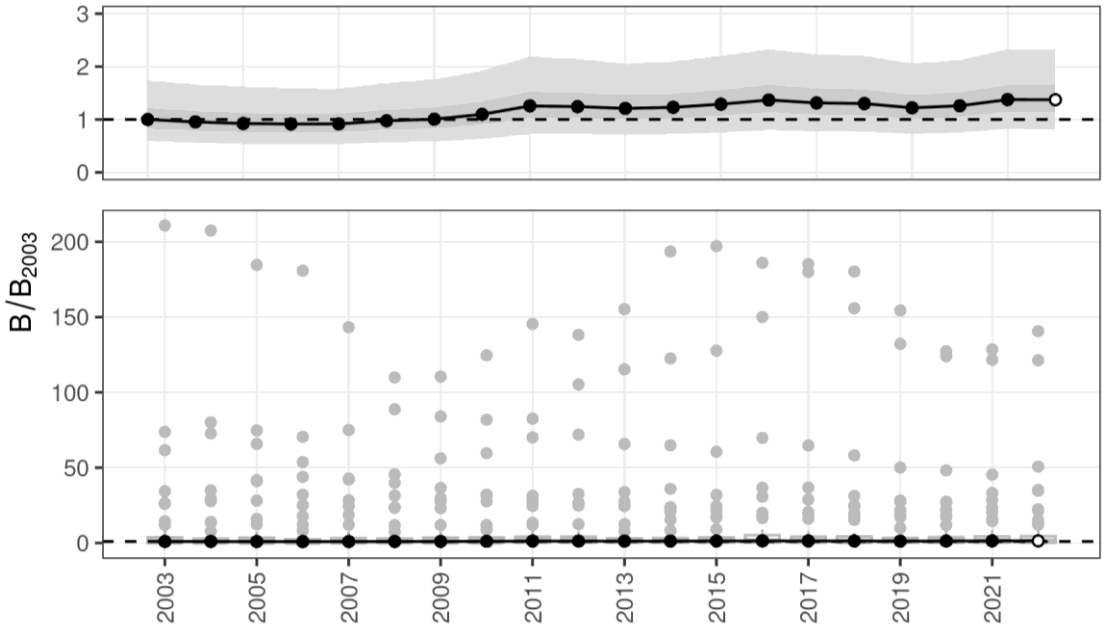

Figure 55: Trend in B/B_{2003} (based on 54 stocks)

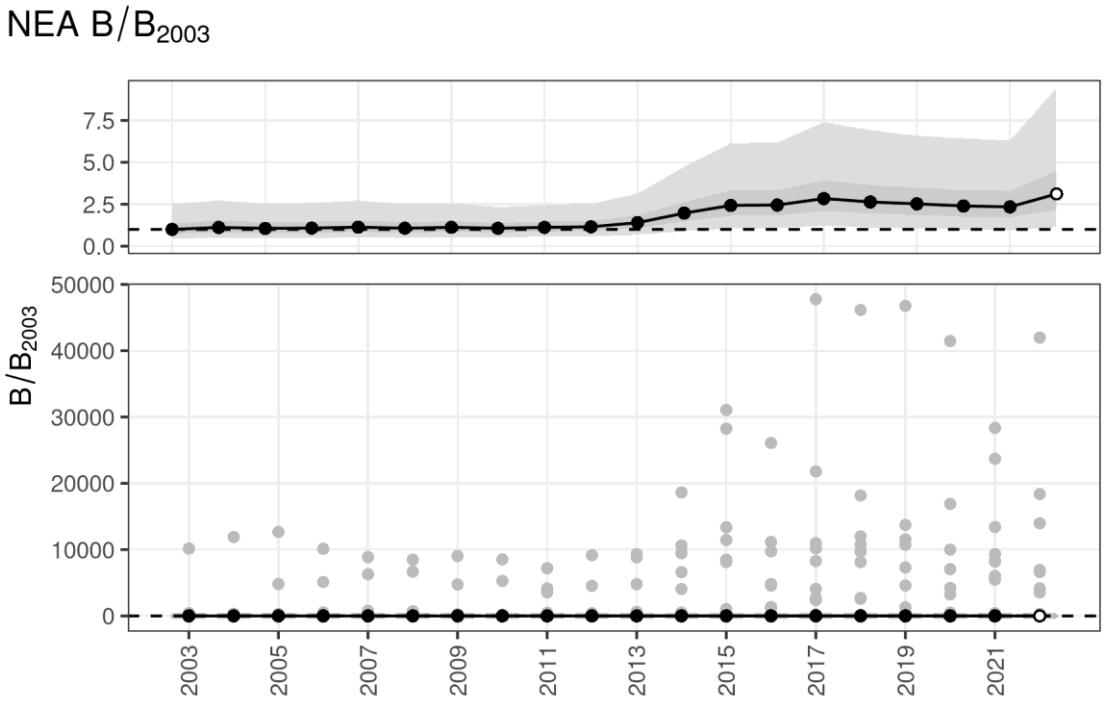

Figure 56: Trend in B/B_{2003} for category 3 stocks (based on 66 stocks)

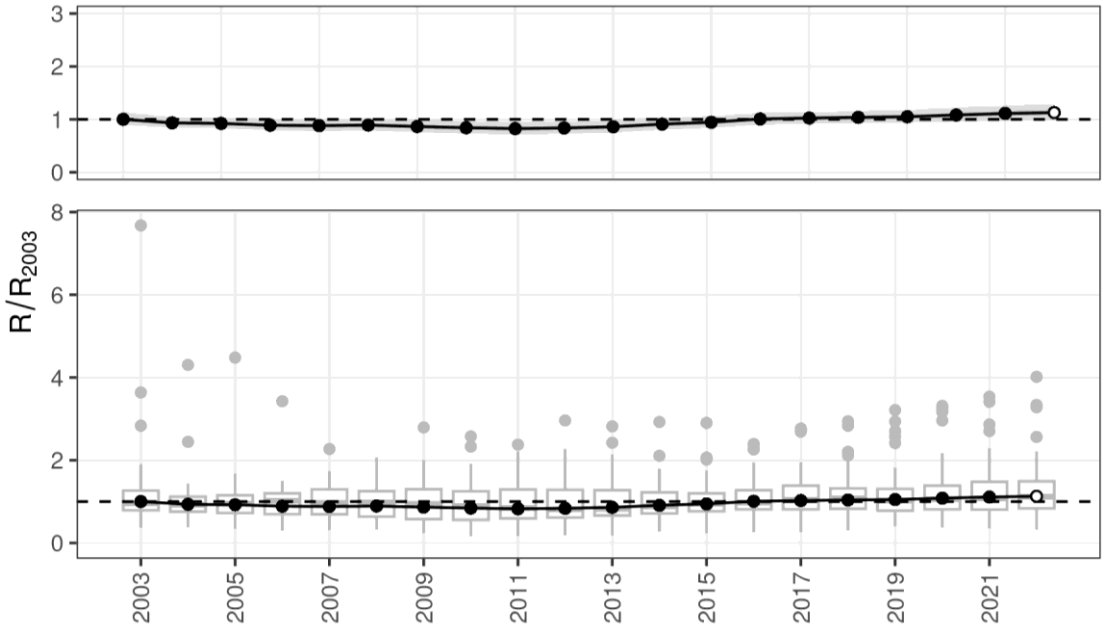

Figure 57: Trend in R/R_{2003} (based on 54 stocks)

16.2 Mediterranean and Black Seas

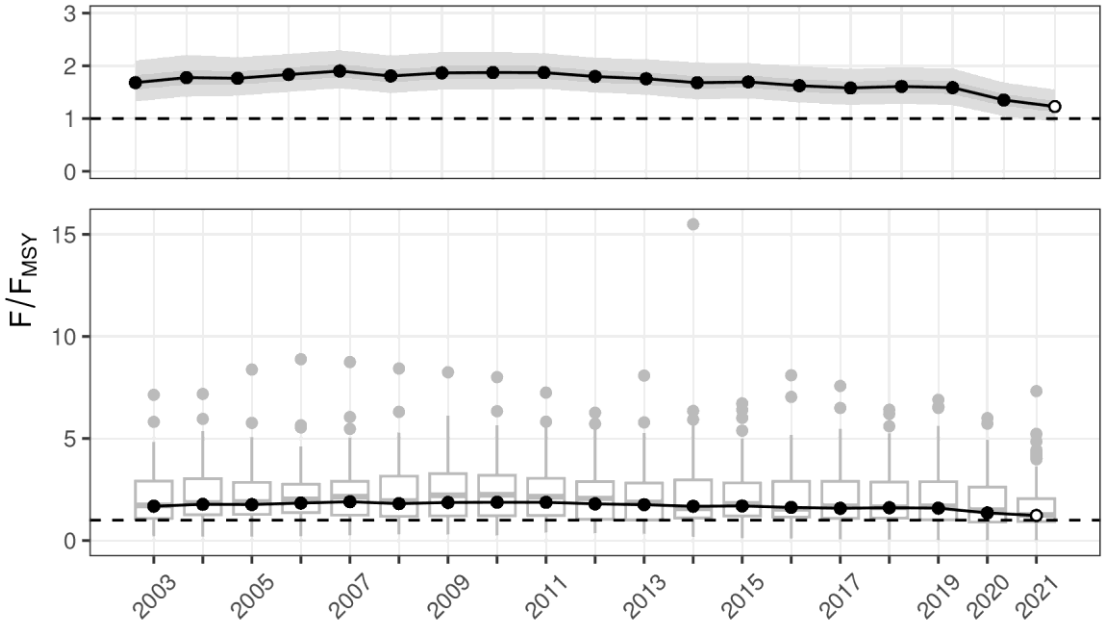

Figure 58: Trend in F/F_{MSY} (based on 63 stocks)

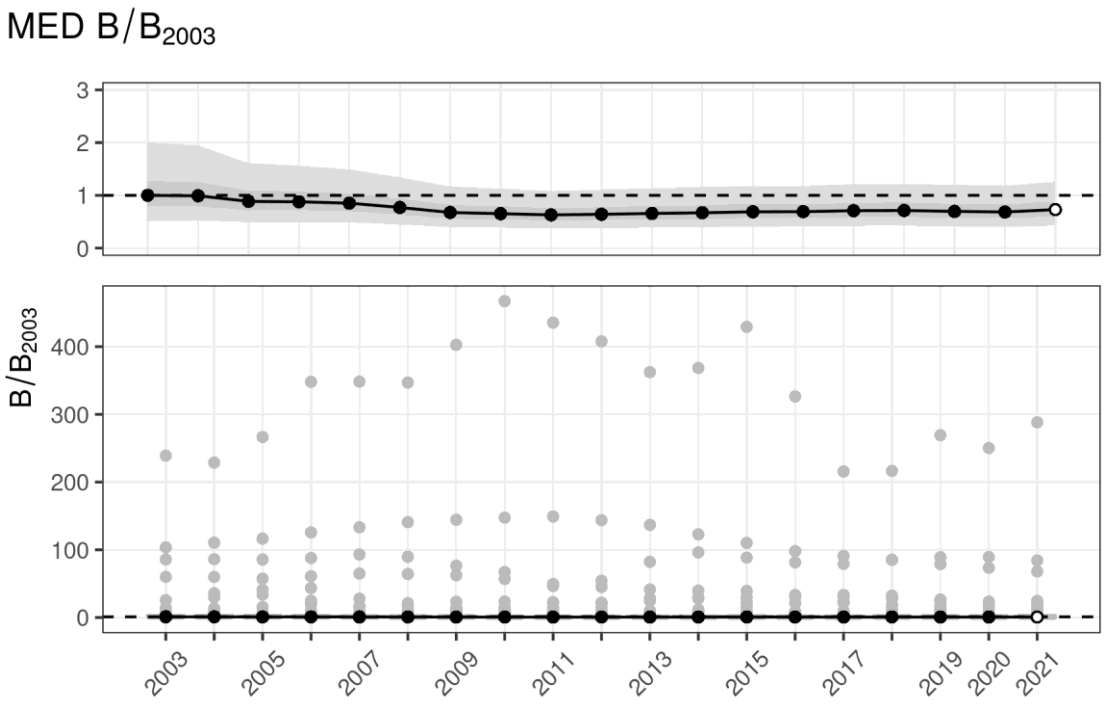

Figure 59: Trend in B/B_{2003} (based on 64 stocks)

17 Histogram of the input values of F/F_{MSY} and stocks specific values of B/B_{2003} for 2022 and 2021 data for the Northeast Atlantic and the Mediterranean and Black Seas respectively

17.1 Northeast Atlantic

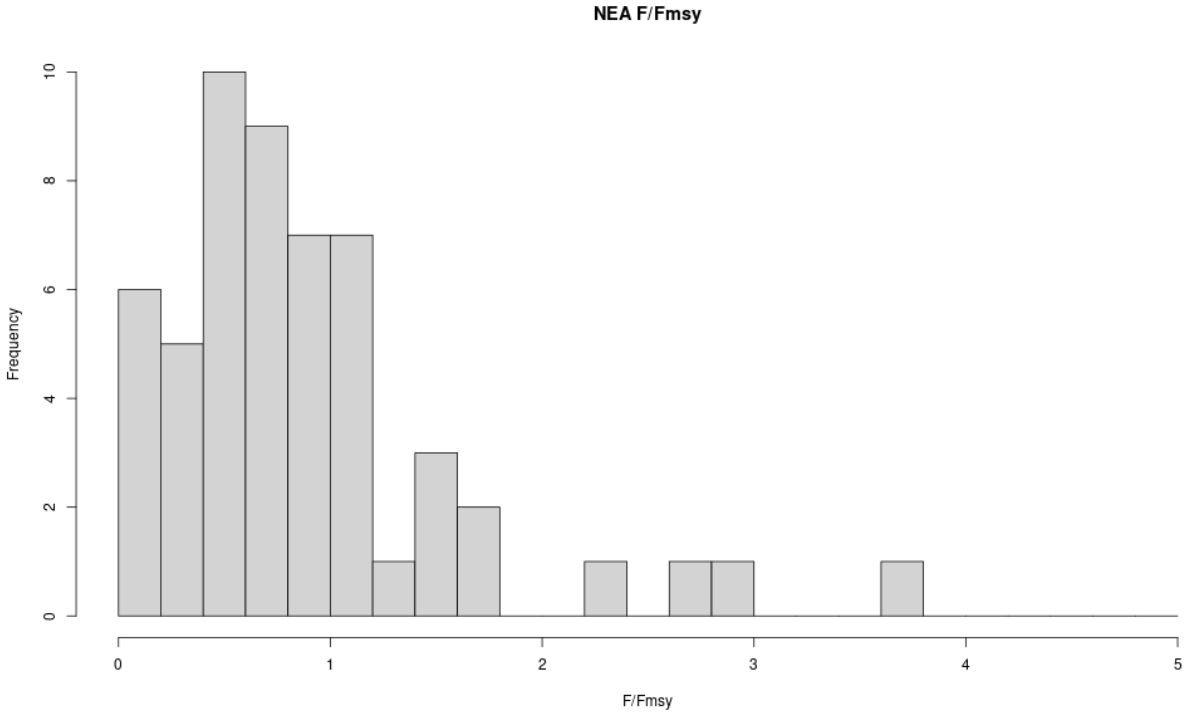

Figure 60: Histrogram of F/F_{MSY} values for 2022

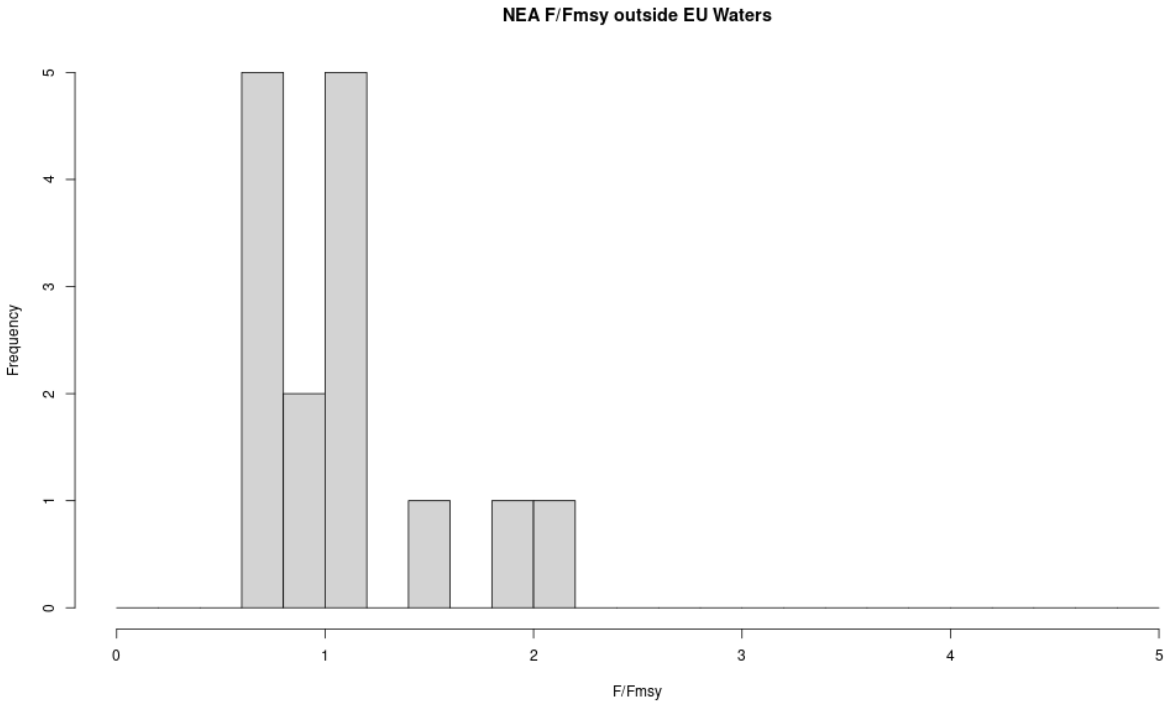

Figure 61: Histrogram of F/F_{MSY} values for 2022 for outside EU waters stocks

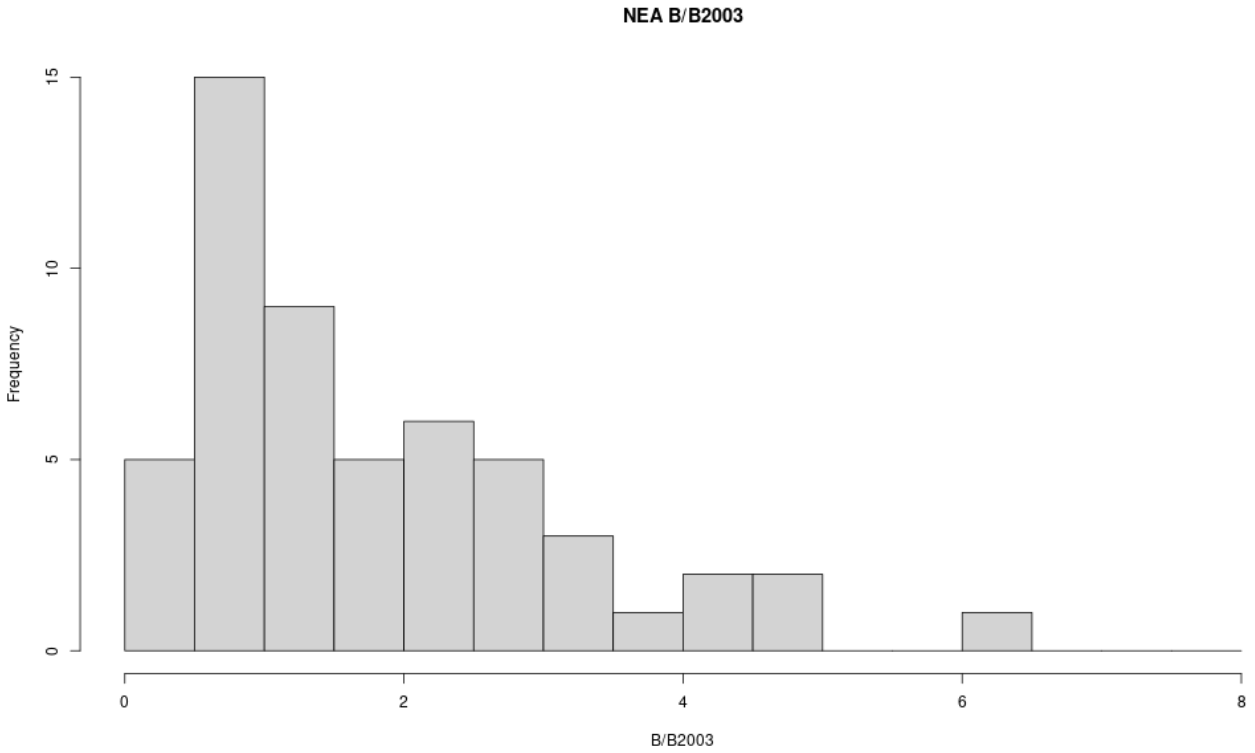

Figure 62: Histrogram of B/B_{2003} values for 2022.

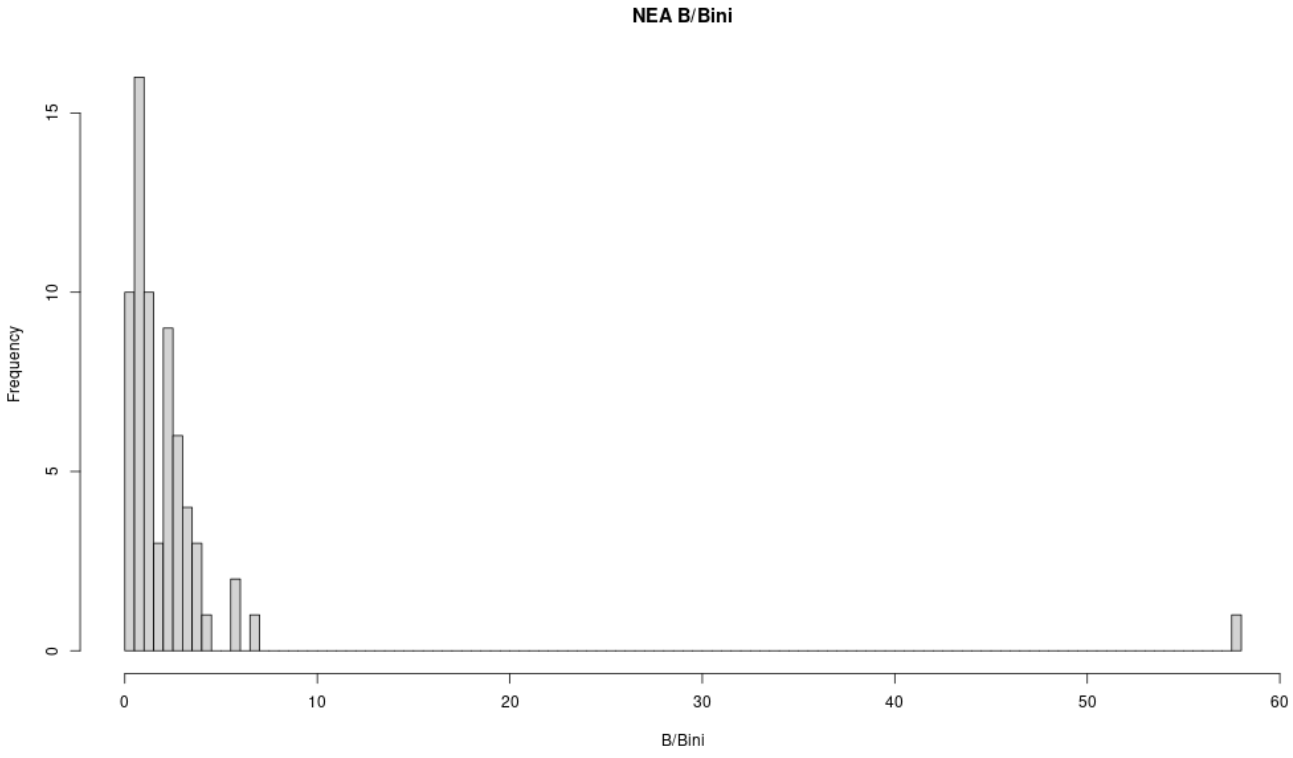

Figure 63: Histrogram of B/Binitial values for 2022. In the case of the category 3 stocks some time series do not start in 2003. Therefore the time series was standardised by the first available value.

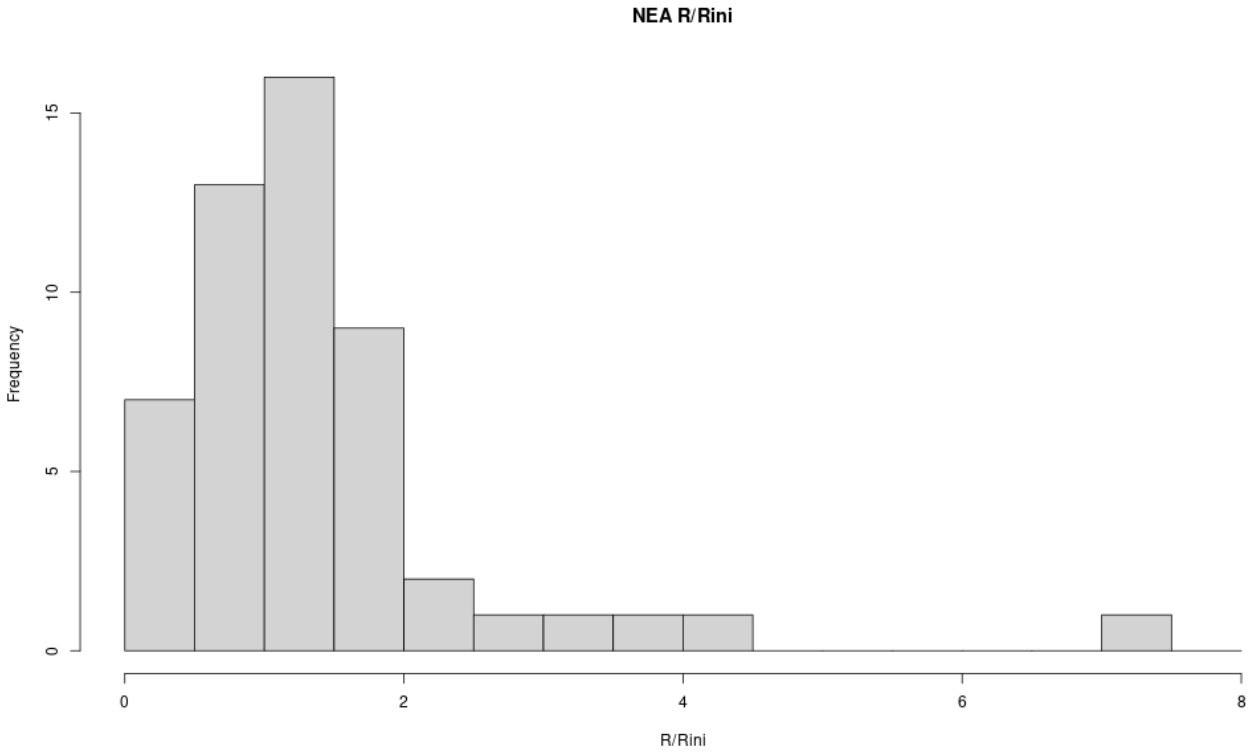

Figure 64: Histrogram of R/Rinitial values for 2022. In the case of the decadal recruitment some time series do not start in 2003. Therefore the time series was standardised by the first available value.

17.2 Mediterranean and Black Seas

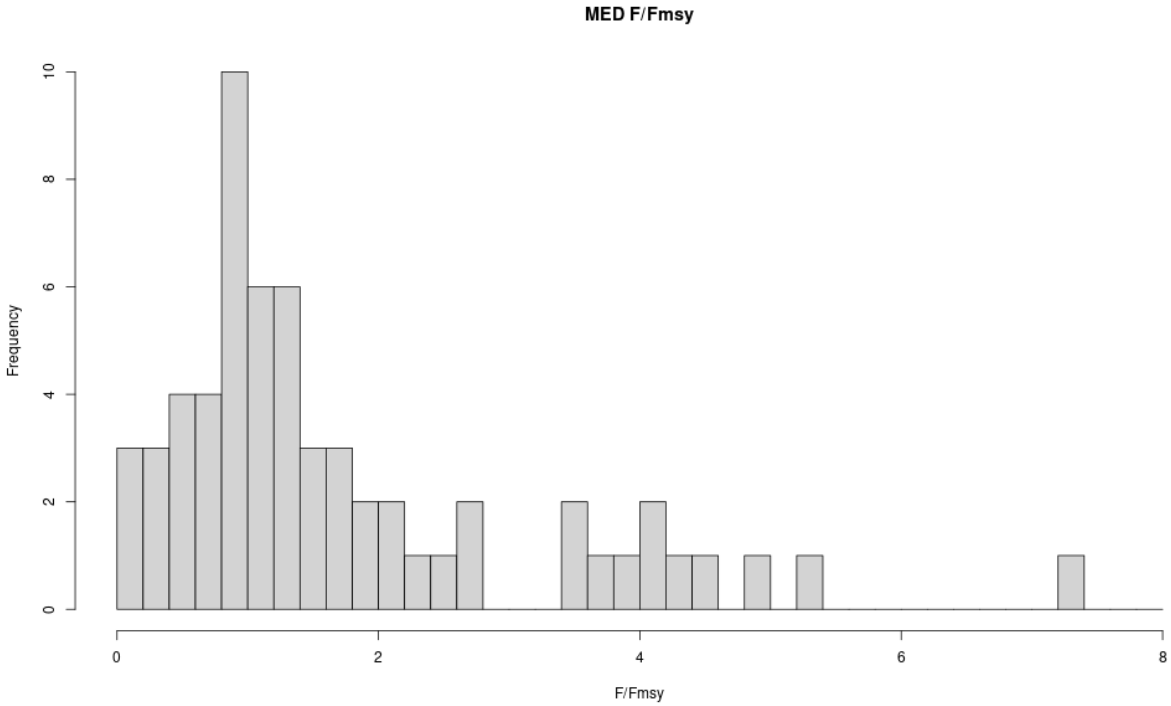

Figure 65: Histrogram of F/F_{MSY} values for 2021

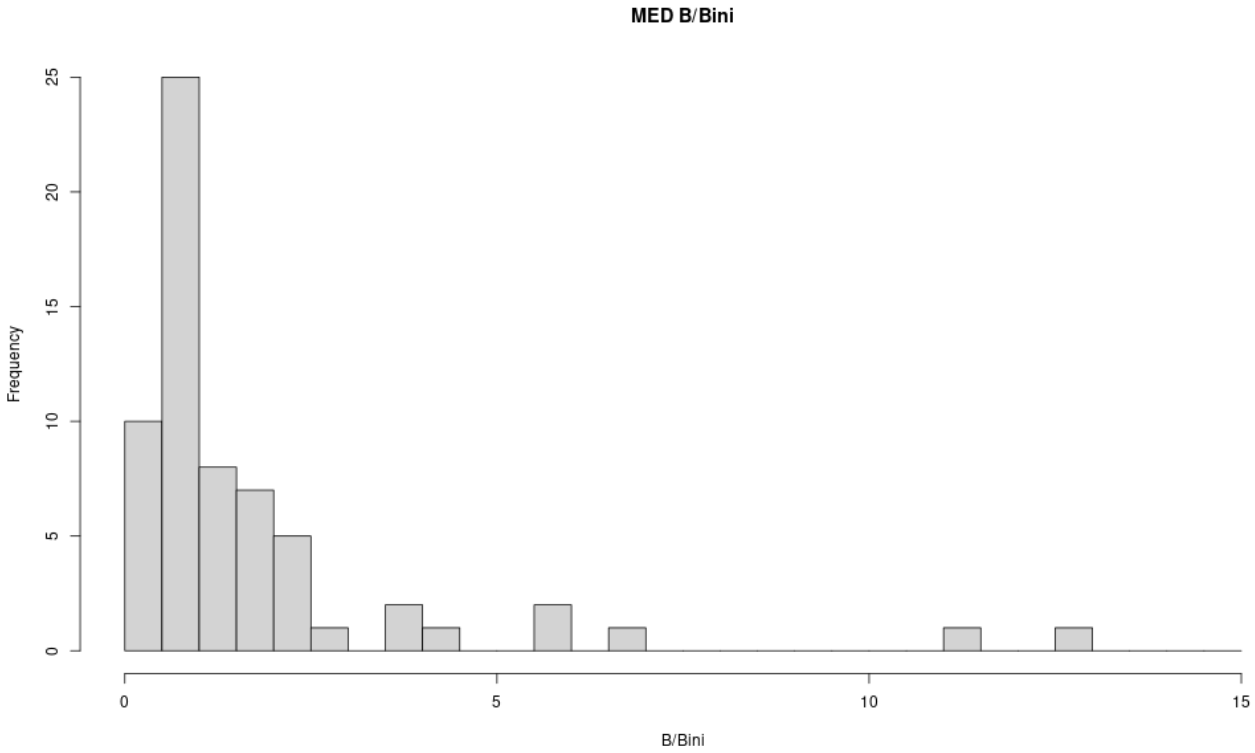

Figure 66: Histrogram of B/Binitial values for 2021. In the case of the Mediterrean and Black Sea stocks some time series do not start in 2003. Therefore the time series was standardised by the first available value.

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