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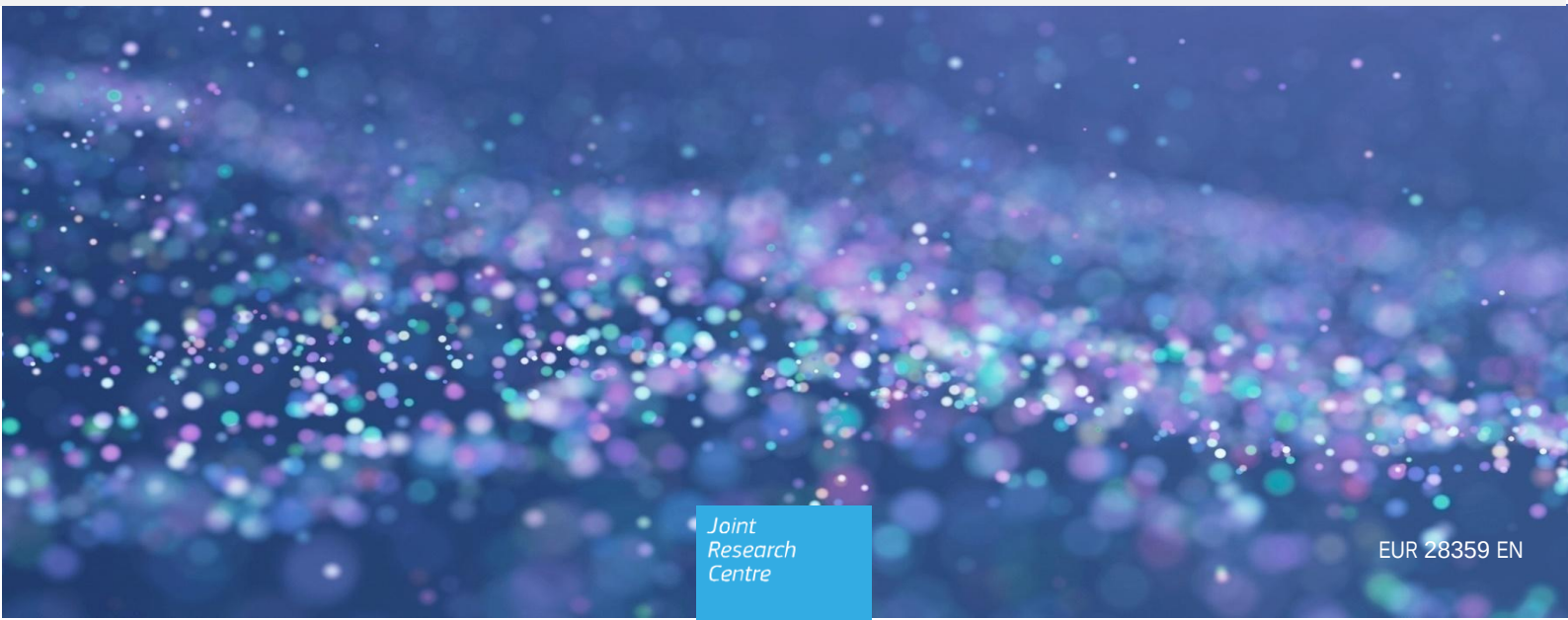
Scientific Technical and Economic Committee for Fisheries (STECF) – Fishery sustainability indicators (STECF 23-18)

Edited by Fabio Grati & Jean-Noël Druon

2024



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CONTENTS

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 is from the EWG 23-18 on "Fishery sustainability indicators", which met in Ispra, Italy (hybrid) from 11th to 15th December 2023.

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EWG-23-18 report:

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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF) - Fishery sustainability indicators (STECF-23-18)

Background provided by the Commission

Under the Farm to Fork Strategy for a fair, healthy and environmentally friendly food system[1], DG MARE has been developing with the support of the STECF fisheries-specific sustainability criteria and indicators that can feed into the labelling of food products.

In May 2021, the STECF released a report on "Criteria and indicators to incorporate sustainability aspects for seafood products in the marketing standards under the Common Market Organisation"[2] (EWG 20-05). This report proposes transparent methods of measuring and communicating along the supply chain some sustainability aspects of fisheries and aquaculture products (FAPs), based on scientifically sound, simple and verifiable criteria and indicators. Among the eight criteria suggested for fishery products by the STECF report, three have been identified by DG MARE as key sustainability hotspots: (i) fishing pressure [renamed stock status] (i.e. sustainability of the targeted stock), (ii) impact on the seabed and (iii) impact on sensitive species.

A follow-up report on the "Validation of selected sustainability indicators and underlying methodologies"[3] was published in December 2022 (EWG 22-12). The report endorsed the indicators on the sustainability of the targeted stock and impact on the seabed and proposed scientifically robust methods to determine a product grading (score) of these indicators on a 5-scale (e.g. A to E), which could in the future be incorporated in a general or fishery-specific sustainability label. The methods are suitable to grade both EU products and imported products on the two sustainability criteria mentioned before. The Commission is currently planning to operationalise these two methods through a publicly available IT tool.

While this is already finalised for the impact on the seabed, more work is required for the indicator on stock sustainability. This concerns, in particular, stock assessment data from ICES, GFCM and various other RFMOs, incl. for migratory species. For that purpose, an initial data gathering exercise was carried out by an ad hoc team of experts. The experts have also developed a preliminary 'pilot tool', which can be used to determine the grade (score) of a given product based on the species and catch area.

EWG 22-12 also explored the possibility of a third graded indicator on the impact of the fishing activity on sensitive species. The development of such an indicator would be significantly more complex than the other two already finalised indicators and the STECF could not conclude whether actual development and operationalisation of this indicator is actually feasible at all. An ad hoc team of experts has been established to explore possible approaches to that end.

[1] Communication from the Commission to the EP and Council - Farm to Fork Strategy

[2] EWG 20-05

[3] EWG 22-12

Request to the STECF

STECF is requested to evaluate the findings of the STECF Expert Working Group meeting and make any appropriate comments and recommendations. In particular STECF is asked to comment on the following:

- The EWG's findings and conclusions following its testing of a pilot tool that operationalises an indicator (previously developed in EWG 22-12) to score a given fisheries product in relation to the sustainability of the targeted stock / species.
- The methodology proposed by the EWG for an **indicator on the impact on sensitive species** and its scoring and, in particular, the conclusions of the EWG in terms of the feasibility and operationality of that indicator.

STECF comments

EWG 23-18 on "Fishery sustainability indicators", met in Ispra, Italy (hybrid) from 11th to 15th December 2023. EWG 23-18 was a follow up to EWG 20-05 which investigated the first *criteria and indicators that could contribute to incorporating sustainability aspects in the* EU marketing standards for fisheries products *under the CMO*. Additionally, EWG 22-12 and EWG 22-13 validated the selection of some sustainability indicators and underlying methodologies for their estimation. These EWGs explored and proposed transparent methods of measuring and communicating some sustainability aspects of fisheries products along the supply chain, based on scientifically sound, simple and verifiable criteria and indicators. In particular, the investigation of the criteria on the impact on the seabed was considered as completed by the EWG 22-12.

EWG 23-18 focused on fishery seafood products, with the objectives to assess and validate the findings of two *ad hoc* contracts which defined specific indicators and grading for two criteria, respectively (i) impact on the targeted stock (fishing pressure) and (ii) impact on sensitive species.

STECF observes that the EWG adequately addressed the TORs.

STECF notes that the methodologies suggested by the two *ad hoc* contracts was appropriate and served as proper input to the work of EWG 23-18. EWG 23-18 identified some challenges in implementing the IT tool[4] developed by the *ad hoc* team to operationalise the indicator on fishing pressure, primarily arising from difficulties in combining various data sources due to disparities in data availability and the level of variable (dis)aggregation.

STECF notes that EWG 23-18 made suggestions to develop solutions to these issues, and made several recommendations aimed at enhancing the IT tool's functionalities and data integration capabilities. STECF supports that these suggestions and recommendations need to be considered for the next steps in implementing the scoring process.

STECF notes that EWG 23-18 recommended an annual update of data from three identified sources (Balance Capacity STECF working group database, ICES Stock Assessment, Stock SMART NOAA). The suggested timeframe for these updates is December each year. Considering that part of this updating process is automatized through web services, and automatic detection of information in existing data sources such as ICES, IUCN. STECF agrees this process is realistic and appropriate.

[4] The IT tool calculates the stock sustainability grading of fisheries products marketed in the EU.

Hence, regarding the indicators for fishing pressure, the IT tool developed to produce a sustainability score is functioning and will now be further operationalised on a separate platform and rolled out for external users.

STECF notes that a remaining issue is the organisation and management of this process in the longer term, especially in the light of new sources of data (national stock assessments for example) that may become available. STECF notes that, with potentially more stock assessments becoming available, the sustainability scoring system may become a more accurate system, as intended and with more fishery products moving from system 1 to system 2 scoring[5]. Any (new) data becoming available should be assessed by the appropriate RFMO, with STECF requested to endorse these data.

Regarding the indicator for sensitive species, STECF notes that EWG 23-18 proposes an alternative wording for this indicator: "potential risk of negative interactions between a fishery targeting a certain species with a certain gear type and a group of sensitive species". EWG 23-18 developed a detailed classification (32 fishing gears, instead of the original suggested 12 gears) to adequately represent the diversity of bycatch risks.

The selection of the number of fishing gears has been based on the scope and objective of each specific indicator. For example, the primary need of the indicator on sensitive species is to distinguish demersal from pelagic fishing gears, as the risk of interaction with sensitive species is highly affected by the fishing gear behaviour. The mandatory information the producers must provide relates to broader fishing gear categories (i.e., seven categories). Table 1 shows the list of gear categories from the CMO mandatory information (7 gears, first column) is compared with the proposed gear division by the EWG 23-18 to be used for the scoring the indicator on sensitive species (32 gears, second column).

STECF notes that, based on the new method for defining the sensitive species indicator, this is a realistic definition and methodology that can be further developed. However, STECF notes that there are challenges in accessing and processing diverse sources of information, including grey literature and data in various languages. For example, data consistency poses challenges as scientific literature may exhibit a bias towards reporting high bycatch risks. This does limit a comprehensive assessment of this scoring system at this stage.

In addition, as indicated by the EWG, adding additional species to the indicator, (e.g., elasmobranchs), would make it more complex to operationalise compared to restricting mammals, seabirds and turtles covered currently. Several elasmobranch species are also commercial species. In addition, different species have different degrees of protection in different areas, including under national rules that cannot be reviewed with certainty and updated periodically.

STECF notes that the proposed scoring system for the sensitive species indicator in principle is feasible, but acknowledges that some issues remain, such as dealing with different sources of data, inclusion of other species such as elasmobranchs in the indicator and data consistency. STECF proposes for 2025 an additional *ad hoc* contract and an EWG. The *ad hoc* contract to be based on the work done by EWG 23-18 and provide a second iteration of the scoring system. The EWG would assess the work of the *ad hoc* contract and, in addition, consider further development of the indicator and the wider integration of the fisheries sustainability indicators into a single sustainability score.

[5] The scoring of system 1 is based on general available information, the scoring of system 2 is based on the provision of additional information allowing for a more precise sustainability assessment.

Table 1 List of gear categories from the CMO mandatory information (7 gears) and the proposed gear categories by the EWG 23-18 to be used for the scoring the indicator on sensitive species (32 gears).

Mandatory CMO information on the category of fishing gear from Annex III - Regulation (EU) No 1379/2013	**List of gears suggested by EWG 23-18 for scoring the bycatch risk of sensitive species mostly based on Annex XI - Regulation (EU) No 404/2011**
Seines	Beach seines, Danish seines, Scottish seines, Pair seines Seine nets, Midwater trawls
Trawls	Beam trawls, Bottom otter trawls, Bottom pair trawls, Midwater otter trawls, Pelagic pair trawls Otter twin trawls
Gillnets and similar nets	Set (anchored) gillnets, Driftnets Encircling gillnets, Trammel nets, Combined trammel and gillnets
Surrounding nets and lift nets	Purse seines, Lampara nets, Boat operated lift nets, Shore-operated stationary lift nets
Hooks and lines	Hand lines and pole lines (hand operated), Hand lines and pole lines (mechanised), Set longlines, Longlines (drifting), Troll lines
Dredges	Boat dredges, Hand dredges used on board a vessel, Mechanised dredges including suction dredges
Pots and traps	Pots (traps)
Not included	Hand implements: wrenching gear, Clamps, Tongs, Rakes, Spears, Dredges, Seine nets, Midwater trawls

With the three sustainability indicators being made operational (i.e., stock status and the impact on the seabed which are operational and the indicator for sensitive species in development), the question now arises how to integrate these three indicators into a single Fishery and Aquaculture Products (FAPs) score. Reiterating STECF's PLEN 23-01 observations, STECF notes that the way to compute a single sustainability score, combining the three into a single score, is still to be agreed upon. The challenge will be to interpret the actual score for a single seafood product, e.g. (i) if it scores green for one criterion, orange for a second and red of a third then what should the final score be? And (ii) if the scores were red for the first criterion, green for the second and orange for the third, would that result in a different final score (i.e. are the separate criterion weighted)?

STECF observes that the alignment of different scores is not only relevant between different fish products from capture fisheries but a sustainability score of a wild caught fish should in principle also be comparable to a sustainability score of fish products from aquaculture.

On these wider considerations beyond the scope of EWG 23-18, STECF is aware that different initiatives already exist or are in experimentation in the market in which multiple criteria are reflected on the product, including a final overall sustainability score. For example, STECF is aware of current developments under the Product Environmental Footprint (PEF) initiative based on life cycle assessment (LCA). STECF notes thus that there are several ways by which scoring sustainability could be achieved, and operationalising this will, in the current system, require some additional dedicated work to reach a robust consensus.

STECF understands that these longer-term initiatives and views, also from the European Commission, aim to have a scoring system that will allow direct comparison with other products in the wider market of animal proteins.

STECF Conclusions

STECF concludes that the EWG has adequately tested the pilot tool that operationalises the indicators as developed by EWG 22-12 to score a given fisheries product in relation to the sustainability of the targeted stock/species. The pilot tool can be considered operational.

STECF concludes that the methodology proposed by the EWG for an indicator on the impact on sensitive species and its scoring has proven to be feasible. However, including additional sensitive species into this indicator, such as threatened elasmobranchs, may add a substantial degree of complexity and delay the implementation of the proposed scoring.

STECF concludes that an *ad hoc* and an EWG to progress development of operationalising the sensitivity indicator are required. The EWG is requested to evaluate the update of the system and check on the robustness of the system in terms of delivering a sustainability score relating to the sensitive species indicator.

STECF reiterates the conclusion of PLEN 23-01 that this EWG should also discuss the next steps in the process of operationalising and expanding the set of indicators, considering the options proposed by EWG 20-05 and other wider societal developments of sustainability indicators on consumer products. This includes the wider integration of the fisheries sustainability indicators into a single sustainability score.

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REPORT TO THE STECF

EXPERT WORKING GROUP ON Fishery sustainability indicators (EWG-23-18)

Hybrid meeting, 11-15 December 2023

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 - TERMS OF REFERENCE FOR EWG-23-18

Task 1: Assess and validate the data gathered and the pilot tool developed by the ad hoc expert team

Objective: The outcome of this task should support DG MARE in the development of an IT tool for the stock sustainability grading of fisheries products marketed in the EU that could be made publicly available in the future. A preliminary pilot tool will be available for the EWG to test the implementation of the approach proposed in EWG 22-12. Notably, the envisaged final tool will use a different IT system and will be hosted on a Commission platform, so the pilot tool should not be seen as a beta version of the final tool that will be made available for external users.

In its assessment, the EWG should pay attention to the following aspects:

- Data coverage: Is the overall coverage sufficient for the development of a final tool? Are there significant gaps, for example assessment data still missing for commercially significant species on the EU market, where that data should in principle be available?
- Implementation of the method / decision tree developed in EWG 22-12: Are the grading results generated by the pilot tool in line with the proposed approach? Are there bugs or striking grading results that should be further examined?

For the elements above, the EWG could define a set of 50-100 [tbd] priority stocks / species, that are the most commercially relevant on the EU market (covering both landings and imports).

- Recommendations for periodic data updates (frequency / point in time)
- Recommendations for the development of the final IT tool and its testing

Task 2: Assess the approach proposed for a grading of the impact on sensitive species

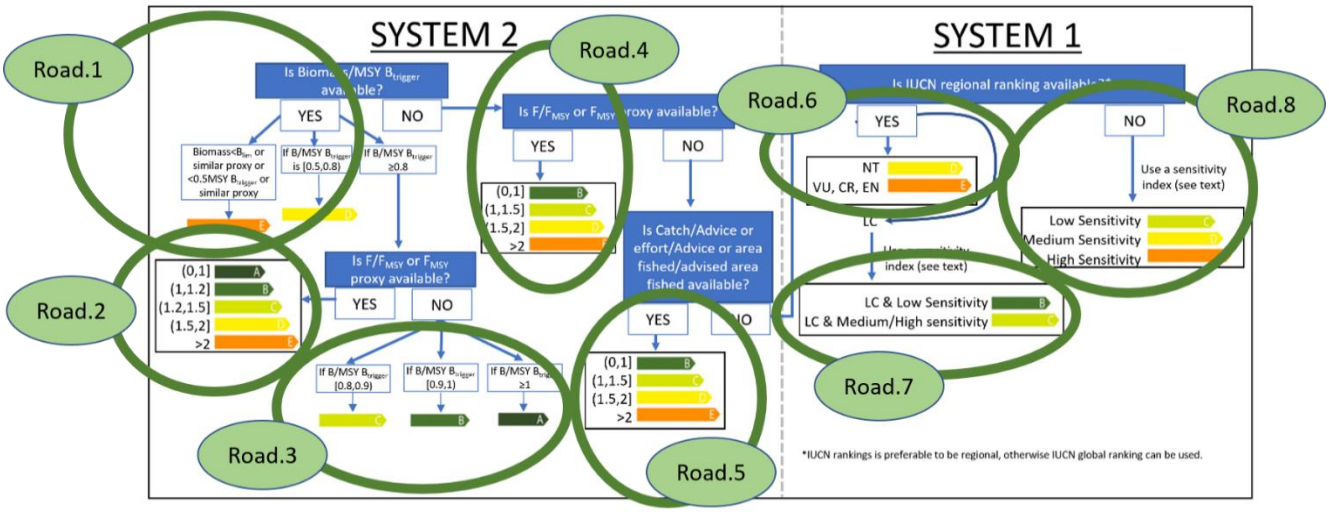
Objective: The outcome of this task should enable DG MARE to take a decision whether the approach suggested by the ad hoc expert team should be further pursued and, if so, what the next steps should be.

In its assessment, the EWG should pay attention to the following aspects:

- Scope of the proposed approach: Is the scope of considered sensitive species sufficient for a meaningful and robust indicator?
- Data availability: Can the proposed approach be scaled up to cover all global fisheries that are commercially significant for the EU market? Are there severe data gaps that would make the methodology, when applied beyond EU waters, difficult or insufficiently robust?
- Data consistency: Does the proposed approach allow for a consistent grading method across regions and species, similarly as the indicators on stock sustainability or seabed impact?
- Operationality: To which degree is the approach feasible on the basis of easily available input data, i.e. species, gear category and catch area? If not at the present stage, what could be the next developments regarding the most complete grading system (e.g., including a limited number of extremely sensitive species, number that may increase in the future) and the least complete grading system (e.g., overall bycatch by pseudo-metier eventually including interaction with sensitive species) to allow operationality also beyond EU waters?

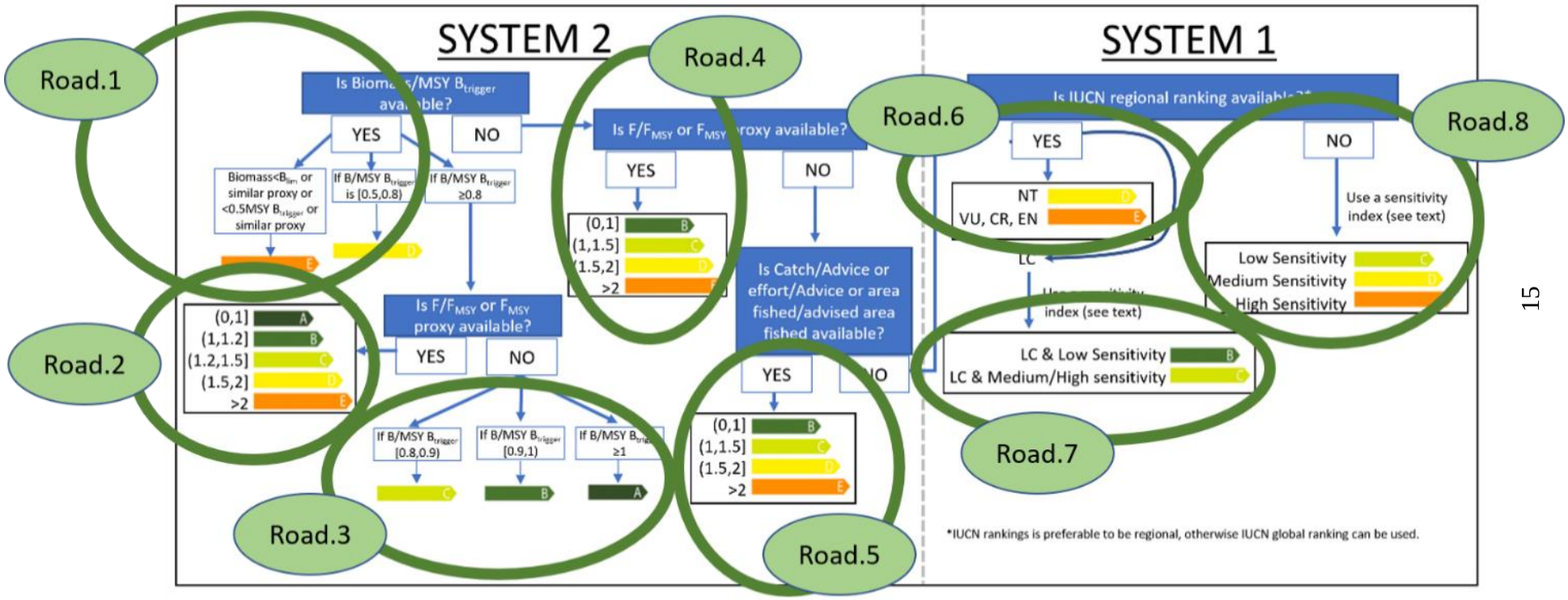
2 TASK 1 (INDICATOR ON THE STATUS OF THE STOCK)

For a better understanding of a larger audience, **the 'indicator on fishing pressure' was renamed the 'indicator on the status of the stock'.**



Decision tree from EWG 22-12 for the indicator on the status of the stock used by the IT tool to evaluate sustainability levels according to fishing pressure (LC: Least Concerned; NT: Near Threatened; VU: Vulnerable; EN: Endangered; CR: Critically Endangered).

See larger figure on the next page.


SYSTEM 2
SYSTEM 1
Road.1
Road.2
Road.3
Road.4
Road.5
Road.6
Road.7
Road.8
YES
NO
Biomass<Blim or similar proxy or <0.5MSY Btrigger or similar proxy
If B/MSY Btrigger is [0.5,0.8)
If B/MSY Btrigger ≥0.8
Is F/FMSY or FMSY proxy available?
(0,1]
(1,1.2]
(1.2,1.5]
(1.5,2]
>2
If B/MSY Btrigger [0.8,0.9)
If B/MSY Btrigger [0.9,1)
If B/MSY Btrigger ≥1
Is Catch/Advice or effort/Advice or area fished/advised area fished available?
(0,1]
(1,1.5]
(1.5,2]
>2
Is IUCN regional ranking available?*
NT
VU, CR, EN
LC
Use a sensitivity index (see text)
Low Sensitivity
Medium Sensitivity
High Sensitivity
LC & Low Sensitivity
LC & Medium/High sensitivity
*IUCN rankings is preferable to be regional, otherwise IUCN global ranking can be used.

2.1 Data coverage

In accordance with the Terms of Reference, the EWG 23-18 conducted various tests on the pilot IT tool developed under the ad hoc contract 2350/2023 (hereafter referred to as the IT tool). The IT tool was developed with the aim of operationalising the decision tree developed during EWG 22-12. In order to investigate the data coverage, the EWG considered the following data sources for the evaluation of the IT tool:

1) The EU fleet landings database from the **2021 Annual Economic Report (AER)**, comprising 11,727 combinations of 2,267 taxa and 161 areas/subareas often at stock unit level.
2) The **Resource Assessment and Management (RAM) Legacy** Stock Assessment Database (hereafter RAM-database) (https://www.ramlegacy.org), which is a compilation of stock assessment results for commercially exploited marine populations worldwide. This collaborative database, recently updated, includes graphical and analytic tools, as well as new data sets covering assessments from, e.g., North-West Africa, the Mediterranean Sea, off Chile area, and data sets on Pacific salmon. This database served as a supplementary method to identify potential missing stock assessments in the IT tool.
3) The **EUMOFA** database was used to select the 20 most important imported species by weight in the EU. A total of 91 combinations of species/group of species and areas (FAO areas and subareas) have been tested with the IT tool.
4) The **ICCAT** database allowed testing the IT tool for 12 different stock units of six large pelagic species (bluefin tuna BFT, Albacore tuna ALB, Bigeye tuna BET, Yellowfin tuna YFT, Skipjack tuna SKJ, and Swordfish SWO). The ICCAT stock units were considered (see ICCAT maps, https://www.iccat.int/Data/ICCAT_maps.pdf).

2.1.1 EU landings from the Annual Economic Report (AER) 2021

The EWG 23-18 compiled a list of taxa and area combinations derived from the information provided by each EU Member State in the 2021 AER. Therefore, in this case we are only focusing on EU fleets landings. A total of 11,727 combinations of taxa-areas, corresponding to 2,267 taxa and 161 areas/subareas, were tested using the IT tool.

As a first step, the EWG focused on the combinations that resulted in *NA* in the IT tool (6,413 in total). In order to investigate the reason for that result, a random subset of these combinations (501) were further examined. The results of this assessment are detailed in Annex 1. In the instances where the EWG 23-18 identified errors, a detailed analysis within the decision tree was conducted, and inconsistencies in the IT tool were rectified. At the end of this exercise, the number of *NA* decreased to 5,868.

The primary cause of a *NA* result was the lack of data, including stock assessment, IUCN status, and/or sensitivity index. Conversely, for a number of species, the IT tool did not yet use information on IUCN status and/or the sensitivity index, which was available on external websites such as the IUCN Red List of Threatened Species, sealifebase.org, and fishbase.org. This was particularly notable for the **sensitivity index**, where data **reported by Cheung et al. (2005) on fish** (available on fishbase.org) **and other marine organisms** (e.g., invertebrates, marine mammals, available on sealifebase.org) were not originally included in the table associated with the IT tool. Since Table 5 of the EWG 22-12 report did not include these sensitivity data, **EWG 23-18 included the Cheung et al. (2005) sensitivity index to further decrease the number of *NAs*** (see separate next section 2.1.2 as this additional improvement accepted by the group was performed after the meeting). This is especially relevant for situations where other sensitivity indices are not available. Conversely, sensitivity data from Cheung et al. (2007) are well reported in the IT tool (mostly related to fish species).

Furthermore, in a few cases, the IT tool failed to recognize information on IUCN status and/or sensitivity index present in linked databases. While some of these gaps were addressed during the EWG, a more comprehensive review would be recommended. Additionally, some species identified

in the AER report were freshwater species that do not spend any stage of their lifespan in the marine environment; thus, they should not be included in the IT tool. Following the completion of this exercise, 146 out of the 501 combinations initially marked as *NA* were corrected, receiving scores of B (98), C (45), D (1), and E (2) (Figure 1).

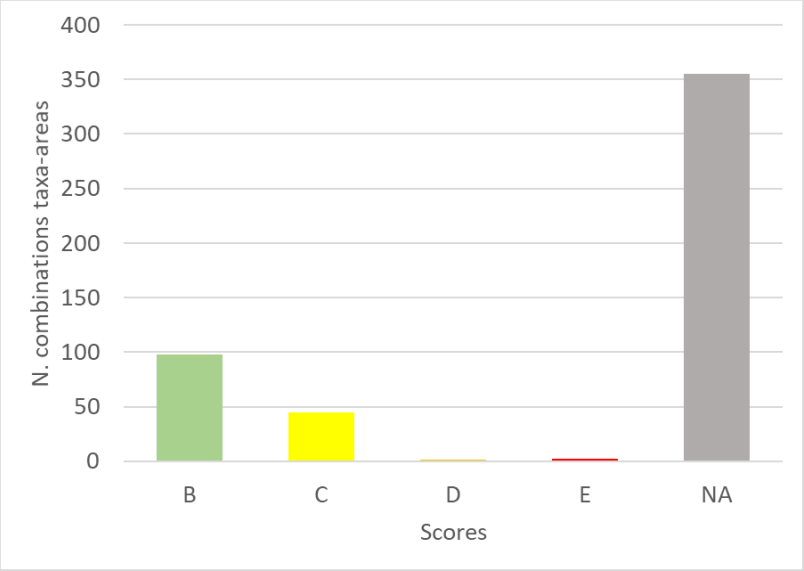


Figure 1 Preliminary distribution of the recalculated AER stock status indicator scores for the randomly chosen **501 combinations of taxa-area combinations that were originally marked as *NA* prior to EWG 23-18,** and for which **146 were scored from B to E** from the identification of the IUCN status and sensitivity data.

Integrating the assessments conducted during the EWG 23-18 and after the above correction, the IT tool results revealed 253 combinations scoring A (2.2%), 1,054 scoring B (9.0%), 2,555 scoring C (21.8%), 1,081 scoring D (9.2%), and 916 scoring E (7.8%) (Figure 2).

Nevertheless, half of the 11,727 combinations were still labelled as *NA* (5,868, 50%) by the IT tool (see Annex 1). The primary reasons for the persistence of *NA* values included:

1) a significant proportion of taxa are documented in the AER data at the genus level (*Trachurus* spp.) or family level (Caproidae), however, since this is not a deficiency of the IT tool itself, these instances are not genuine *NAs* but rather constraints imposed by the AER data;

2) several stocks are coastal and evaluated at the national level, making them ineligible for inclusion in the current System 2 of the IT tool;

3) in some cases, there are inconsistencies in the scientific names for identical species between the AER data and the IT tool. Hence, it's imperative for the source of scientific names to be uniform.

The EWG 23-18 thus importantly recognizes that the limitation of input data at the genus or family level primarily stems from AER data rather than the IT tool itself. Ideally, input parameters from producers should be provided at the species level, including both the commercial designation and the valid scientific name of the species.

However, considering the aforementioned criteria, the quantity of *NAs* in the IT tool might decrease from 5,868 to 3,799. Figure 3 illustrates how the IT tool evaluates the 11,727 combinations derived from the AER report, encompassing the *NAs* scored due to limitations in the AER data, thus not indicative of shortcomings within the IT tool itself.

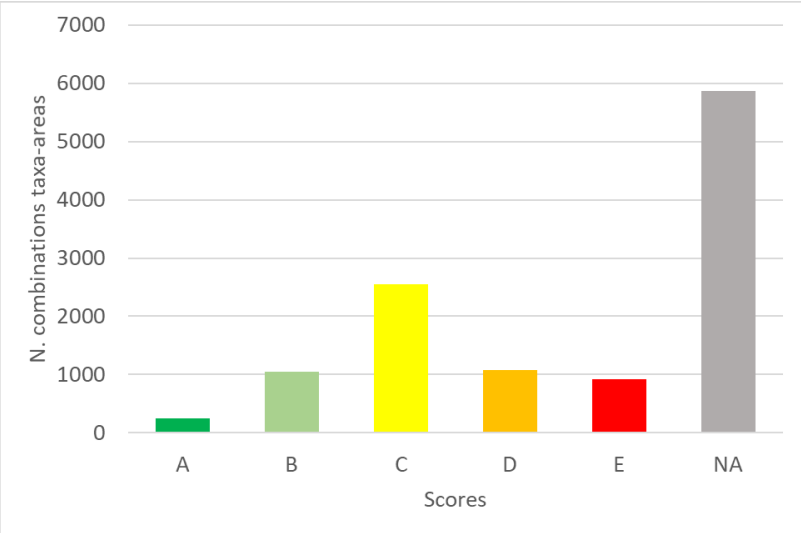


Figure 2 Preliminary distribution of scores for the indicator on stock status calculated for the **11,727 taxa-area combinations** gathered from the AER (**including the above correction in Figure 1**).

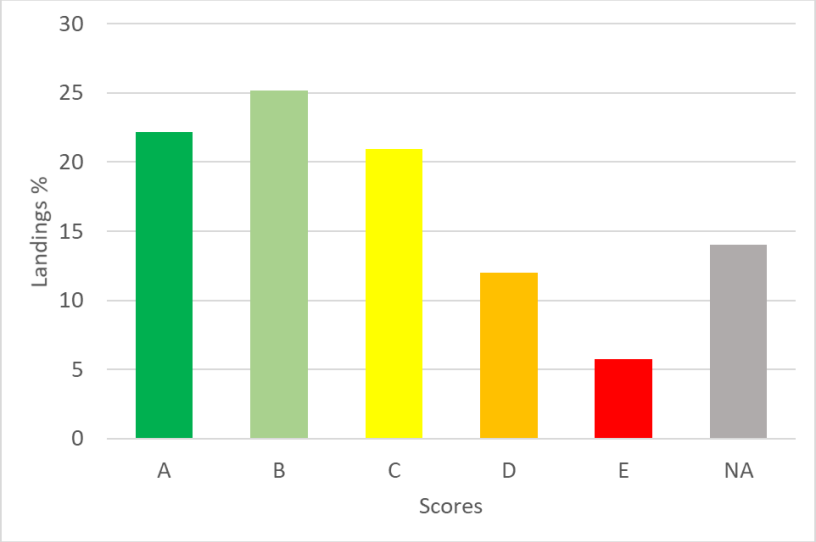


Figure 3 Preliminary distribution of scores for the indicator on stock status **expressed as a percentage of landings** for the **11,727 combinations of taxa-area combinations** compiled from the AER (therefore comparable figure to Figure 2 but expressed in landing volumes).

When weighting the 11,727 combinations according to their landings instead of species number (as EU fleet landings are available in the AER), the fraction of *NA* scores significantly decreases to 14.1%, indicating that, in the majority of cases, this scenario pertains to combinations of taxa/areas that are not relevant in terms of market volumes (Figure 3).

2.1.2 Recalculation of AER database scores using the additional sensitivity assessment from Cheung et al. (2005) and excluding NA scores because of scientific name issues

NB: This section presents an important improvement of the results (reduction of *NA* cases) and, although performed after the EWG 23-18 meeting, it was submitted and agreed by the working group.

The EWG 23-18 identified the primary reason for *NA* scoring in the taxa-area combinations derived from the 2021 AER data as the absence of sensitivity values for a number of species. It was observed that the data provided by Cheung et al. (2005) for fish (accessible on fishbase.org) and other marine organisms (such as invertebrates, marine mammals, available on sealifebase.org) were not referred to in the report of EWG 22-12 and hence the data was not included in the table associated with the IT tool. Subsequently, following the EWG 23-18, a member of the group conducted an additional analysis of the AER data, **incorporating those sensitivity values available on fishbase.org and sealifebase.org**, which were missing from the IT tool. As a result of this integration, the **number of taxa-area combinations scoring *NA* decreased** from 5,868 (50.0%) (referring to Figure 2 in chapter 2.1.1) **to 2,451 (20.1%, Figure 4)**. With this updated integration, the results from the IT tool showed 238 combinations scoring A (2.0%), 2,158 scoring B (18.4%), 4,209 scoring C (35.9%), 1,443 scoring D (12.3%), and 1,228 scoring E (10.4%) (Figure 4).

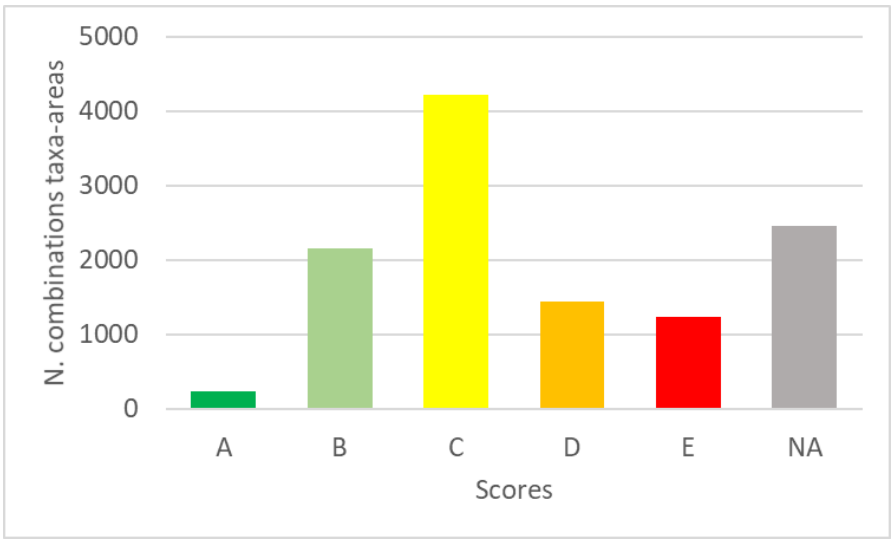


Figure 4 Preliminary distribution of scores for the indicator on stock status calculated for the **11,727 taxa-area combinations** gathered from the AER and recalculated **using Cheung et al. (2005) sensitivity values**.

Upon weighting the **11,727 combinations based on their landings**, **the proportion of *NA* scores including the sensitivity assessment provided by Cheung et al. (2005) decreases** from 14.1% (Figure 3) **to 4.9% (**
Figure *5*).

This underscores that, in most instances, such occurrences relate to combinations of taxa/areas that are minor in terms of market volumes.

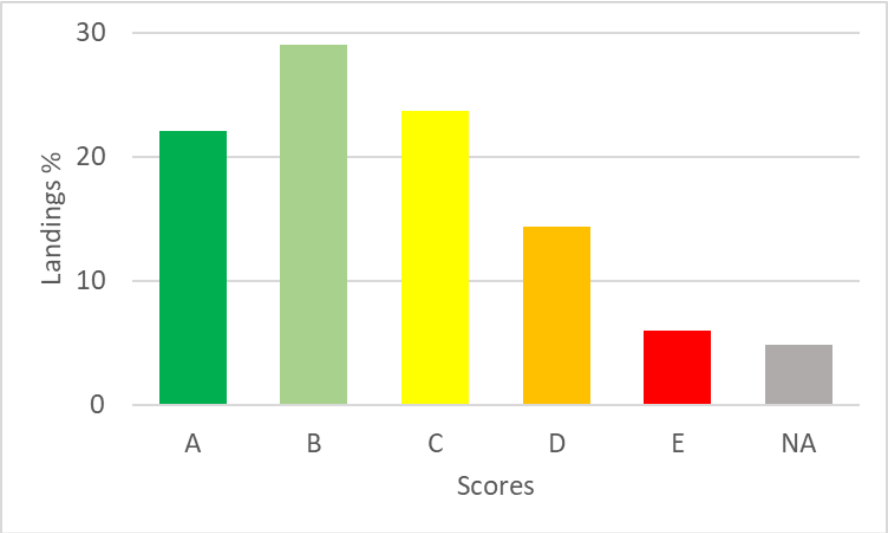


Figure 5 Preliminary distribution of scores for the indicator on stock status **expressed as a percentage of landings for the 11,727 combinations of taxa-area combinations** compiled from the AER and recalculated **using Cheung et al. (2005) sensitivity values**.

When an additional check was made including cleaning the AER data from landings which were referred as per genus (e.g., *Alloteuthis* spp.), family (e.g., Acanthuridae), large groups (e.g., Algae) or combinations of more than one species (e.g., *Alosa alosa*, *Alosa fallax*) the total combinations species-areas which were suitable to be scored by **the IT tool decreased to 9,652**, and the **final number of *NA* decreased to 376, corresponding to a 3.9%** (**Figure 6**; see Annex 1, AER data – *NA* cases to be checked). These 376 combinations species-areas correspond to 223 species and require further verification to determine if sensitivity data are available for those species.

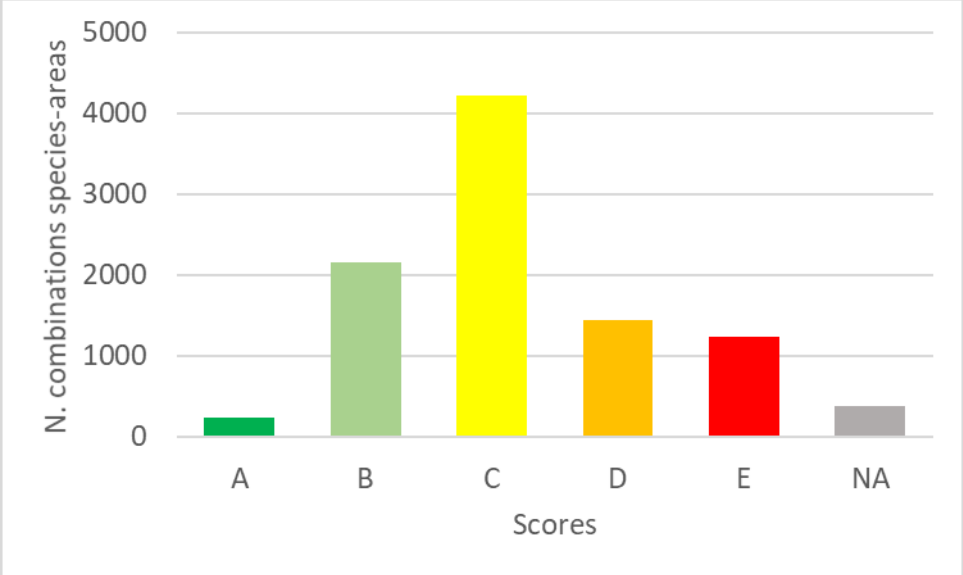


Figure 6 Final distribution of scores for the indicator on stock status calculated for the **9,652 species-area combinations** gathered from the AER.

Upon weighting the **9,652 combinations based on their landings**, **the proportion of *NA* scores further decreases to 2.3% (Figure 7)**.

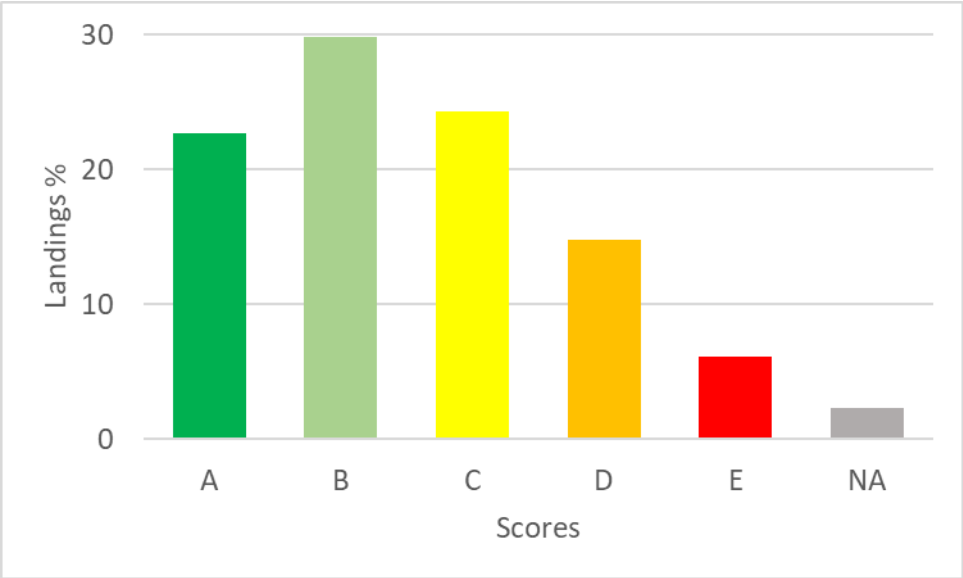


Figure 7 Final distribution of scores for the indicator on stock status expressed **as a percentage of landings for the 9,652 combinations of species-area combinations** compiled from the AER.

2.1.3 The RAM-database

To fulfil the Task 1 ToRs in terms of information consistency, an extensive comparison of the IT tool dataset and outputs with the RAM-database has been carried out. The summary of this comparative exploration is available in Annex 2.

The initial exploratory analysis was conducted at the species level, involving the comparison of the 150 species identified by the ad hoc 2354/2023 (used for the indicator on sensitive species), encompassing both EU landings and imports and accounting for 90% of the total volume of seafood products in EU markets, between the IT tool dataset and the RAM-database. Following a thorough examination of taxonomic names, the EWG observed that only 82 out of 150 species were present in the RAM database (i.e., this database does not include all species, but only those with a stock assessment). Consequently, subsequent analyses focused on the 316 stocks that are associated with the 82 species available in the RAM-database.

The next step of the in-depth examination of stocks in the two datasets was to consider stocks that were absent from the IT tool dataset but potentially present in the RAM database. The analysis identified 32 stocks with a quantitative assessment in the RAM database of which 28 were present in the IT tool but under system 1 (i.e., only a qualitative assessment), while 4 were completely absent in the IT tool. Notably, two of them (*Sparus aurata* and *Spicara smaris* in the Mediterranean Sea) were assessed before 2018 and were thus not included in the IT tool dataset (since the IT tool's temporal focus is on stock assessments conducted within the last 6 years). In contrast, the stocks of *Homarus americanus* in the Northwestern part of the Atlantic Ocean and *Merluccius gayi* in the Southeastern part of the Pacific Ocean were present in the RAM-database and were recently assessed (with reference years 2018 and 2020, respectively). The reason for the absence of these two stocks in the IT tool dataset is that their assessments were conducted within the framework of scientific committees of managing authorities (NMFS and SUBPESCA), which had not been considered by EWG 22-12.

The subsequent phase involved scrutinizing stocks assessed under System 1 in the IT tool, but where the RAM-database could provide quantitative stock assessment. According to this analysis, out of the 155 stocks evaluated in System 1 by the IT tool, only 28 were found in the RAM-database with a quantitative assessment. However, 11 of them (such as *S. aurata* and *S. smaris* in the Mediterranean Sea) were assessed before 2018 (older than 6 years), while the remaining 17 stocks were recently assessed by scientific committees of managing authorities (e.g., CFP, DFO, SUBPESCA, DETMCM, ISC, and MFish). These stocks are not considered in the IT tool because they were not in the EWG 22-12 list.

The final comparison was done on the level of agreement between the roads defined under System 2 by the IT tool and the potential roads that can be defined in accordance with the data available in RAM-database. Out of the 63 stocks evaluated under System 2 by the IT tool, 11 showed a reference year of the assessment available in RAM-database before 2018, hence they were correctly not considered in System 2 by the IT tool. Most (35 out of 52, i.e. 67%) of the remaining stocks showed consistent roads between the IT tool and RAM-database. The 17 stocks showing discrepancies in roads, for which a further check would be needed by the IT tool developer, are listed below:

- *Argentina silus* in Northeastern part of the Atlantic Ocean
- *Molva dypterygia* in Northeastern part of the Atlantic Ocean
- *Xiphias gladius* in Northeastern part of the Atlantic Ocean
- *Engraulis encrasicolus* in Eastern Central part of the Atlantic Ocean
- *Scomber colias* in Eastern Central part of the Atlantic Ocean
- *Thunnus albacares* in Eastern Central part of the Atlantic Ocean
- *Thunnus obesus* in Eastern Central part of the Atlantic Ocean
- *Thunnus alalunga* in Mediterranean Sea and the Black Sea
- *Xiphias gladius* in Mediterranean Sea and the Black Sea
- *Xiphias gladius* in Southwestern part of the Atlantic Ocean
- *Merluccius paradoxus* in Southeastern part of the Atlantic Ocean
- *Thunnus alalunga* in Southeastern part of the Atlantic Ocean
- *Xiphias gladius* in Eastern part of the Indian Ocean
- *Katsuwonus pelamis* in Western Central part of the Pacific Ocean
- *Thunnus alalunga* in Southwestern part of the Pacific Ocean
- *Xiphias gladius* in Southwestern part of the Pacific Ocean
- *Trachurus murphyi* in Southeastern part of the Pacific Ocean

The main reason for divergent results arises from disparities in the stock assessment methodologies employed between the RAM database and the IT tool, resulting in distinct evaluations of stock status. A comparison with the RAM database has not revealed any inconsistencies. The observed differences can be attributed to variations in the methodological approaches of the data sources used for the IT tool and the RAM database.

2.1.4 The EUMOFA database – primary imported species

Using the EUMOFA trade data, the ad-hoc contract 2185 (which focused on defining the stock status indicator following the STECF Spring 2022 Plenary) identified the country-level origin of imports for primary commercial species or groups of species. This ad-hoc contract also identified other relevant stocks, such as various cod stocks in Norway and the USA in both the Pacific and Atlantic oceans, as well as multiple tuna stocks in Mexico in both the Pacific and Atlantic oceans, among others.

The EWG 23-18 utilized these data to assess whether the IT tool had assigned scores to the most commercially significant species based on their imported volume.

A total of 20 imported species were selected for this exercise: *Clupea harengus, Gadus macrocephalus, Gadus morhua, Katsuwonus pelamis, Melanogrammus aeglefinus, Merluccius albidus, Merluccius angustimanus, Merluccius australis, Merluccius bilinearis, Merluccius capensis, Merluccius gayi, Merluccius hubbsi, Merluccius paradoxus, Merluccius productus, Micromesistius*

poutassou, Octopus vulgaris, Pollachius virens, Reinhardtius hippoglossoides, Theragra chalcogramma and *Thunnus albacares.*

Overall, and out of the 91 species-area combinations, the IT tool provided 7 combinations scoring A (7.7%), 26 scoring B (28.6%), 25 scoring C (27.5%), 16 scoring D (17.6%), 5 scoring E (5.5%), and 12 scoring *NA* (13.2%) (Figure 8). Therefore, regarding the main fish imports, the IT tool demonstrated good coverage.

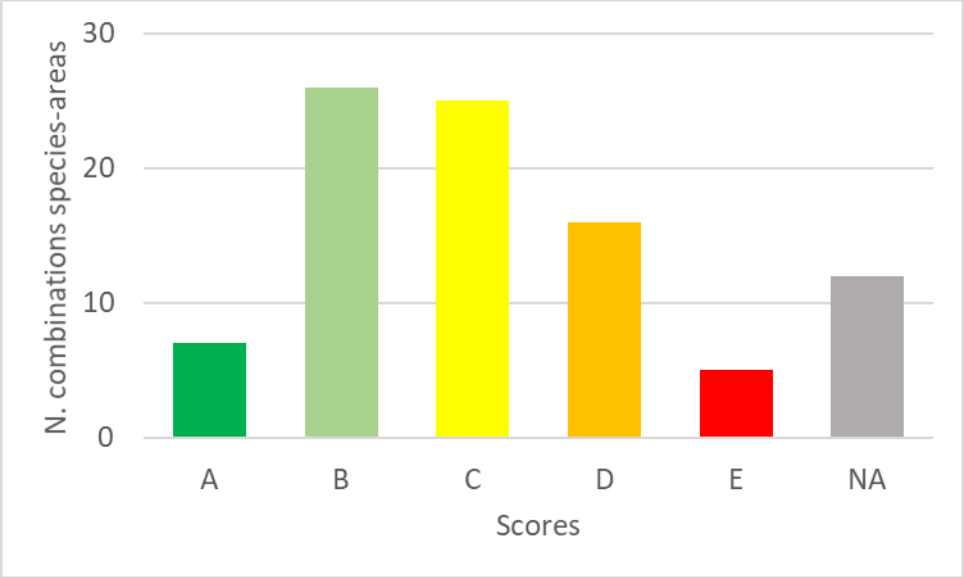


Figure 8. Preliminary distribution of scores for the indicator on stock status calculated for the 91 species-area combinations gathered from the EUMOFA database for the 20 most important imported species.

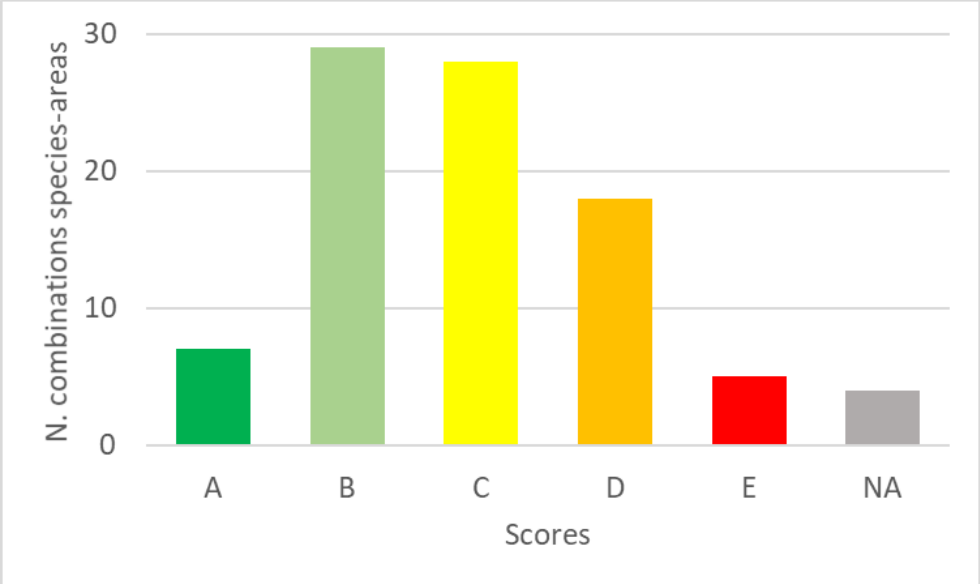


Figure 9 Final distribution of scores for the indicator on stock status calculated for the 91 species-area combinations gathered from the EUMOFA database for the 20 most important imported species and recalculated **using Cheung et al. (2005) sensitivity values**.

When including the sensitivity assessment provided by Cheung et al. (2005), the findings indicated a higher coverage (95.7%), with 7.7% receiving an A score, 31.9% with a B score, 30.8%

with a C score, 19.8% with a D score, 5.5% with an E score, and only 4.3% marked as *NA* **(Figure 9)**. With this additional sensitivity assessment, **the number of *NA* scores therefore decreased from 12 (13.2%) to 4 (4.3%) (Figure 9).**

2.1.5 ICCAT database – large pelagic species

A specific series of tests were conducted, mostly related to spatial management units, to evaluate the performance of the IT tool for large pelagic stocks using the ICCAT database. Based on these tests, the EWG 23-18 observed that the IT tool included all the 12 stock units of the six ICCAT species of large pelagic species (BFT, ALB, BET, YFT, SKJ, and SWO). However, several discrepancies arose when comparing stock assessment results retrieved from the ICCAT database with the corresponding stocks identified in the IT tool. In some instances, issues were evident, including variations in scores and/or divergent spatial units between the ICCAT and the IT tool. The EWG 23-18 acknowledged that ICCAT uses species-specific stock distribution maps for stock assessment purposes. The stock units of these highly migratory species often span over multiple FAO areas that are considered in the IT tool. Therefore, it was observed that, in some cases, the combinations of several FAO areas correlated well with stock distribution areas (e.g., bluefin tuna western stock unit is FAO areas 21, 31, and 41; bluefin tuna eastern stock unit is FAO areas 27, 34, 37, and 47). However, this was not the case for some other species/stocks (e.g., Albacore stocks and Swordfish stocks).

One remaining concern is the absence of online access to recent stock assessment results for bluefin tuna (BFT), leading the IT tool to score them using System 1.

2.2 Implementation of the method (decision tree developed by EWG 22-12)

The EWG 23-18 analysed the decision tree and identified a number of gaps/issues described below.

2.2.1 Gaps in relation to taxonomic resolution

The EWG 23-18 identified several marketed products that were lacking taxonomic resolution at the species level in the IT tool. The primary categories identified were:

- products categorized as "spp." (e.g., *Ammodytes* spp.);
- products categorized at the genus/family/order level (e.g., *Bothidae*).

However, these taxonomic resolutions do not significantly impact the scoring:

- The EWG 23-18 noted that, in a few cases, assessments are made at the genus level (e.g., *Ammodytes* spp. in FAO area 27.4, *Pseudotolithus* spp. in area 34).
- In instances where assessments are not conducted at the genus level, IUCN provides information at the genus level in a few cases, enabling the IT tool grading through System 1.

Additionally, the EWG 23-18 highlighted that the IT tool dataset includes several freshwater species that do not spend any part of their life cycle in marine waters (e.g., *Astacus astacus*, *Brachymystax lenok*). These freshwater species are still present in the IT tool database, but they should be removed.

2.2.2 Gaps in relation to scientific names

The EWG 23-18 encountered discrepancies in the referenced taxonomic names.

It appears that some of the 150 species identified by the ad hoc 2354/2023 (dealing with the indicator on sensitive species) were initially based on non-validated names from Fishbase and ASFIS FAO databases. By using the *rfishbase_validate_name* R function (i.e., it allows to check for alternate versions of a scientific name and return the scientific names FishBase recognizes as valid), the EWG 23-18 effectively recovered the validated names for all the 150 species and successfully rectified this issue.

The EWG 23-18 also noted that potential taxonomic disparities may arise because the IT tool relies on Fishbase to acquire the correct names of species/taxa, while the IUCN depends on the ASFIS-FAO reference list. To be noted that the CMO Regulation refers to the FishBase Information System or the ASFIS database of the FAO. However, the EWG highlights that this discrepancy is an issue beyond the responsibilities of the IT tool.

2.2.3 Mismatch in area

The EWG 23-18 emphasized discrepancies in the geographical delineation of certain stocks in the IT tool, as in the case of the Western Atlantic BFT, which was solely associated with FAO area 31, while FAO areas 21 and 41 were omitted. Consequently, the stock definition database was revised in the IT tool to address this issue.

2.2.4 Missing stock assessment outputs

Using the RAM-database, the EWG 23-18 identified instances in stock assessments where the reference values Bmsy or Fmsy were absent in the IT tool.

Potential explanations for this include:

- the IT tool exclusively opts for stock assessments conducted after 2018, deeming previous assessments were too dated to be used according to the chosen time criteria;
- following the work done in the EWG 22-12, the IT tool selectively includes stock assessments that were peer-reviewed within the context of scientific RFMO committees, thereby excluding national stock assessments. However, it has been stressed during the EWG 23-18 that also national stock assessments, which are publicly available and downloadable from a website, can be scrutinized in the framework of a rigorous peer-review process (e.g. South African hakes evaluated in the context of an international review panel every year, see: https://zivahub.uct.ac.za/articles/report/International_Review_Panel_Report_for_the_2022_International_Fisheries_Stock_Assessment_workshop/21747680

2.2.5 Missing System 1 outputs

Gaps have been identified for several species due to a lack of alignment between the IT tool and the IUCN grading or the sensitivity level for FAO area 37. These coding issues were manually corrected during the EWG meeting.

2.3 Recommendations for periodic data updates

The three sources of information that were identified in the ad-hoc contract (i.e., Balance Capacity STECF working group database, ICES Stock Assessment, Stock SMART NOAA) undergo annual updates. Therefore, regular data updates are recommended on an annual basis, specifically in December.

2.4 Recommendations for the development of the final IT tool and its testing

2.4.1 IUCN assessments

The EWG 23-18 delved into the examination of IUCN assessments that were conducted on various geographical scales, specifically distinguishing between global and regional assessments. The discussion extended to considerations regarding the integration of a rule within the IT tool, e.g., establishing a maximum acceptable timeframe between the assessments (that depends on the species lifespan, e.g., no more than 6 years between stock assessments for long-lived tuna species and 2 years maximum for small pelagic species). The EWG suggests to incorporate this rule as a mean to ensure the relevance and suitability of data within the IT tool, particularly with regard to the time elapsed since the last assessment was conducted.

2.4.2 Data collection

As highlighted in the ad-hoc contract, the main challenges in implementing the IT tool stem from the difficulty in combining various data sources. To enhance the tool, several issues related to data availability and corresponding recommendations are presently outlined.

Regarding national assessments of coastal stocks (such as mussels and scallops), they are largely omitted from the IT tool. This decision was made during EWG 22-12 due to the absence of peer review to validate the process. However, the EWG 23-18 recommends that, when assessments are conducted by well-recognized scientific bodies, they could be considered for inclusion provided they are easily accessible. The EWG 23-18 recommends exploring the development of a roadmap for integrating national assessments based on clearly identified criteria (i.e., peer-reviewed, and easily retrievable/downloadable) in line with international advices, expanding the range of products that can be graded by the IT tool. It is suggested that national assessments undergo testing and validation before integration. The process of identifying criteria for selecting RFMOs and their assessments could be discussed in a future STECF EWG and subsequently reported to the STECF plenary.

Database-related recommendations include:

- ICES Database: Despite the existence of a database with stock assessment outputs (i.e., F, SSB, etc.) accessible using the R tool, the EWG 23-18 suggests that ICES develop a tool to automatically extract additional data from ICES Advice, such as the recommended catch or effort, using R or any other database format. Additionally, regarding the link between old and new stock definitions, EWG 23-18 suggests that ICES should introduce a flag indicating that the old stock is no longer relevant for advice (i.e., older than 6 years), along with additional information on the new stock name, if applicable.
- NOAA Databases: The main issue is the difference in area definitions between NOAA Fisheries Regions and FAO areas. The EWG 23-18 recommends addressing this disparity.
- GFCM Database: The absence of a publicly available data extraction service and the lack of accessibility through an R script or web services are identified issues. The EWG 23-18 suggests that GFCM develops a tool or an R script to extract information from various databases compiling fisheries information, including Catches and Effort advice.

Lastly, considering the close relationship between System 2 and stock assessment results, the EWG 23-18 recommends exploring the potential use of stock unit areas from RFMOs maps by the IT tool for the species that are managed under different tuna-related RFMOs, in addition to the currently used FAO, NOAA, and GFCM areas. To avoid misinterpretation of stock unit, the EWG 23-18 suggests to the producers to provide the information on the capture area at stock level.

2.4.3 General recommendations for developments of the final IT tool

The incorporation of a user feedback mechanism within the future IT tool is recommended, providing users with the opportunity to emphasize the frequency and timing of updates, as well as eventual errors. This feedback loop serves as a valuable channel for enhancing the data-gathering, the overall quality of the scoring and the decision tree embedded within the tool, and thus the acceptance.

In the final version of the IT tool, a comprehensive description outlining the functionality of the tool and elucidating the updating process should be integrated. This detailed documentation will provide users with a clear understanding of how the tool operates and the mechanisms involved in the periodic updates. By elucidating the updating process, users and consumers can gain insights into the reliability and timeliness of the data, fostering transparency and confidence in the tool's capabilities. Overall, the user feedback and detailed tool description together contribute to a more user-friendly, transparent, and effective IT tool.

3 TASK 2 (INDICATOR ON SENSITIVE SPECIES)

The objective of an indicator on the bycatch risk of sensitive species is to provide transparent, comparable and reliable communication to the consumers, retailers, and producers. The basic information to communicate to consumers about the product they are about to purchase is whether the fishing practices used in the specific catch area may pose a potential risk of bycatch of sensitive species. For this purpose, it is important to be transparent on what is being assessed (species groups considered) and on the methodology.

The EWG 23-18, based on the work done during the ad hoc contract, agreed on an alternative wording of the indicator. It was deemed more appropriate to define the indicator as referring to "**the risk of negative interactions of a fishing gear targeting a specific species on a group of sensitive species**", rather than "indicator on fishing activities' impact on sensitive species" (in short, "**potential bycatch risk of sensitive species**"). In order to assess the "impact" of a fishery on a species (or group of species), it is necessary to have detailed information on the status of the population of this species at sea, total bycatch estimates, natural and human-induced mortality, and other life-history traits, information that are not available or easily accessible across different parts of the world.

The EWG 23-18 considered that a reasonable approach to develop a consistent score for EU and imported fishery products is to base this scoring on information obtained from national databases or reports, scientific papers, and other types of grey literature. For the EU products, it is potentially possible to access a more detailed level of information on bycatch by area and fishing gear and thus on the potential risk covered by this indicator, but this may create a discrepancy with imported products if a larger proportion of documents does not exist, are not found or are inaccessible to the experts.

3.1 Scope of the proposed approach

3.1.1 Inclusion of relevant sensitive species groups

In defining the sensitive species that should be covered, the EWG 22-12 decided to narrow the initial scope of the indicator to focus on air-breathing species, including marine mammals, sea turtles, and seabirds. This was tested in the ad hoc contract, however the EWG 23-18 considered that this scope was incomplete in the operationalization phase.

In order to evaluate if the scope is sufficient, it is essential to agree on a clear definition of "sensitive species" and, in a next step, which species should be considered for the indicator. A total list of 1,697 marine "sensitive" species was consolidated in Annex I of EWG 22-12, with almost 60% of them being fish (1,010 species), followed by the other lower trophic level species (495 species) and, with a relatively lower coverage, by marine birds (105 species), mammals (75 species), and reptiles (12 species). In the consolidated list, 1,390 out of 1,697 species were assessed by IUCN and have a corresponding IUCN status (CR/EN/VU/EX) for at least one assessment area (e.g., Global, Europe, Mediterranean, etc.). Given the fact that marine mammals, seabirds and turtles only cover around 10% of the full list, the EWG advised that the coverage of species should increase. However, it should be considered that the score distribution might worsen when adding new species groups into the scoring as it will likely capture more negative interactions (noting this also will depend on the adopted aggregation rule of scores among the different groups).

The EWG particularly discussed elasmobranchs (sharks and rays) and suggested that these should be included. They are often the main bycatch of some important fishing gears (e.g., drift longlines) and, sometimes, are target species or species of commercial importance in other areas. However, due to their life history traits, they often have relatively low productivity (i.e., slow growth, low reproductive potential and high longevity). Therefore, **the EWG 23-18 agreed on the importance of including elasmobranchs in this indicator**. The EWG stresses that, despite the growing conservation concern, effective conservation actions remain constrained by knowledge gaps (e.g. monitoring and species identification, heterogeneity of supporting information available over the areas). However, including elasmobranchs is a more complicated task compared to marine mammals, seabirds and turtles as several elasmobranch species are also commercial species. In addition, different species have different degrees of protection in different areas, including in relation to national rules that cannot be reviewed with certainty and updated periodically. One opportunity identified during this EWG 23-18 was to start implementing the elasmobranch (including sharks, skates, rays and chimaeras) by focusing on the most sensitive elasmobranch species.

In a first step, the EWG 23-18 thus advised to only include elasmobranch species that

- **are listed as prohibited under EU fishing opportunities regulations;**

  or

- **listed as threatened according to the IUCN global and regional assessments (i.e., VU, EN or CR).**

As IUCN assessments are conducted at different geographical scales and recent studies show the regional differences of elasmobranch conservation status, the EWG 23-18 suggests that regional IUCN assessments may be preferable for the purpose of the sensitive species indicator than a global assessment. For instance, the evaluation of sharks in the IUCN Mediterranean assessment revealed a less favourable status compared to the broader IUCN global assessment, therefore, it was deemed more appropriate to consider this assessment. The EWG 23-18 also notes that e.g., about half of marine mammal species are threatened following the IUCN global assessment (52%, see Annex I of EGW 22-12), and it may be advised to apply a consistent approach across taxa. However, all cetaceans are included in Annex IV of the Habitats Directive, which lists the species of interest to Europe that are in need of strict protection, and in the Marine Strategy Framework Directive (MSFD, 2008/56/EC). Therefore, the EWG decided to include all marine mammals in this indicator.

With the methodology and process in place for assigning risk scores, the EWG 23-18 also highlights that some other species or groups should be considered in the sensitive species indicator because of interactions with fishing gear that represent a risk for their populations. This is the case of some threatened finfishes, molluscs, echinoderms, corals or marine reptiles that are not yet included to

the EWG 23-18 species list. Nonetheless, EWG 23-18 acknowledges that incorporating all these categories into the indicator would be impractical and proposes, for a first implementation, restricting the inclusion of sensitive species to mammals, seabirds, marine turtles, and prohibited and threatened elasmobranchs using as much as is available a regional status assessment.

3.1.2 Selection of fishing gears

The fishing gears identified by the ad hoc were grouped into 12 categories: seines, bottom trawls, pelagic trawls, set nets, driftnets, purse seines, hooks and lines, set longlines, drifting longlines, dredges, pots and traps, and hand implements. This fishing gear classification (12 gears), compared to the CMO mandatory gear categories (7 gear categories), was considered by the ad hoc as an improvement to differentiate fishing gears with likely different effects on the bycatch risk (i.e., pelagic vs bottom contacting gears), yet considered insufficiently detailed by the EWG 23-18 to properly represent the bycatch risk diversity for the full set of species marketed in the EU. Therefore, the **EWG 23-18 suggests using a more detailed information on corresponding gears and codes from System 0 to System 1/2**, mostly in agreement with Commission Regulation (EC) No 26/2004 and Commission Implementing Regulation (EU) No 404/2011 (**28 gears, plus 4 gears added by the EWG 23-18 for a total of 32 gear categories**, see **Table 2**). Including all these gears would however require a revision of the CMO regulation by increasing the mandatory level of details on gear categories.

Table 2 List of gear categories from the CMO mandatory information (7 gears, column 1), proposed by the EWG 23-18 to be used for the scoring the indicator on sensitive species (32 gears, column 2) and corresponding FAO gear code (column 3).

Mandatory CMO information on the category of fishing gear from Annex III - Regulation (EU) No 1379/2013	List of gears suggested by EWG 23-18 for scoring the bycatch risk of sensitive species mostly based on Annex XI - Regulation (EU) No 404/2011	FAO gear Code
Seines	Beach seines	SB
	Danish seines	SDN
	Scottish seines	SSC
	Pair seines	SPR
Trawls	Beam trawls	TBB
	Bottom otter trawls	OTB
	Bottom pair trawls	PTB
	Midwater otter trawls	OTM
	Pelagic pair trawls	PTM
	Otter twin trawls	OTT

Gillnets and similar nets	Set (anchored) gillnets	GNS
	Driftnets	GND
	Encircling gillnets	GNC
	Trammel nets	GTR
	Combined trammel and gillnets	GTN
Surrounding nets and lift nets	Purse seines	PS
	Lampara nets	LA
	Boat operated lift nets	LNB
	Shore-operated stationary lift nets	LNS
Hooks and lines	Hand lines and pole lines (hand operated)	LHP
	Hand lines and pole lines (mechanised)	LHM
	Set longlines	LLS
	Longlines (drifting)	LLD
	Troll lines	LTL
Dredges	Boat dredges	DRB
	Hand dredges used on board a vessel	DRH
	Mechanised dredges including suction dredges	HMD
Pots and traps	Pots (traps)	FPO
Not included	Hand implements: wrenching gear, Clamps, Tongs, Rakes, Spears	MHI
Not included	Dredges	DRX
Not included	Seine nets	SX
Not included	Midwater trawls	TM

Among the four additional gear categories that are not on the list of fishing gear in Annex III of the CMO Regulation, the category of hand implements was included in the ad hoc contract and the EWG 23-18 estimates that it should be considered as these gears are used to catch some species

marketed in Europe (e.g., mussels, sea urchins). The EWG 23-18 also included three relatively generic fishing gear categories (i.e., dredges, seine nets and midwater trawls) as, in many scientific documents, these gears were not sufficiently specified.

The EWG 23-18 also discussed the fact that in the specific case of purse seine, the indicator scoring on the bycatch of sensitive species would substantially gain in meaningfulness if split into seines targeting small pelagic fish species vs. free-schools of tunas and tuna-like species vs. those using Fishing Aggregating Devices (FADs), as this latter category presents a substantially higher risk of sensitive species bycatch (including ghost fishing when FADs are lost drifting at sea). This however requires an approach to provide verifiable information on the use of FADs that is not currently mandatory through the CMO regulation and should be foreseen as a future potential improvement.

3.1.3 Selection of commercial target species

While this indicator focuses solely on the combination of gear and area, understanding the target commercial species is crucial for identifying the main gear used to catch them and the capture areas.

To address this, the ad hoc group strategically selected the top 150 marine target species in terms of volume in the EU market. This selection was based on data from the EUMOFA database for imported seafood products and EU landings data from the FDI database. These species, representing both EU landings and imports and constituting 90% of the total volume of seafood products in EU markets, are targeted in various areas worldwide using a diverse range of fishing gears. This selection is expected to encompass the majority of fishing gears and capture areas used globally, thus facilitating the calculation of this indicator in most cases.

However, although the primary aim of the ad hoc was to identify fishing gears and fishing areas and propose a methodology using a restricted list of target species for testing purposes, the EWG recommends incorporating a more comprehensive list of target species in future developments of this indicator to cover a broader range of fishing gears and areas.

3.1.4 Bycatch risk assessment and scoring

Overall, the ad hoc contract adopted a precautionary approach, assigning the highest risk value when uncertainties and varying values were identified.

The **System 0** proposed by the ad hoc, which is based solely on the fishing gear used, covers all the combinations gear-areas identified for the 150 selected commercial species and potential bycatch risk at a higher resolution than the current CMO regulation (i.e., the precise gear type is used), but it adopts a very precautionary stance by assigning the worst score in the presence of different values. **EWG 23-18 observes that the precautionary approach of System 0 does not allow for recognizing improvement measures or providing incentives for better bycatch management.** This approach is less appealing for producers aiming to showcase the efficiency of sustainable practices. Furthermore, without nuanced scores, consumers and retailers may disregard labelling, as most fisheries would be ranked equally as high risk.

The **System 1** represents a more precise rating system, integrating two sources of information, namely gear type and fishing area (i.e., by utilizing large FAO fishing areas). While System 1 is more precise than system 0 in its approach, it faces limitations due to the broad spatial resolution of FAO areas, restricting its capacity to distinguish variations in risk levels at a more detailed geographical scale.

The proposed **System 2** from the ad hoc, which foresees the integration of precise fishing areas (and could potentially also include mitigation measures), could overcome the limitation of System 1. However, concerning the potential inclusion of mitigation measures, its implementation would demand full traceability and a robust strategy, posing challenges for achieving comprehensive

coverage of commercial products, especially those originating from non-EU waters. In addition, this could also require a control system implying third party certification.

In contrast to Systems 1 and 2 for other indicators (i.e., seabed impact and stock status), the sensitive species indicator encounters difficulties due to overly general mandatory information in the CMO Regulation. Therefore, **EWG recommends a CMO revision with refined gear definitions, such as distinguishing between pelagic and demersal gears**.

Moreover, the simple conversion of scores from a 1 to 3 scale to a 1 to 5 scale in the ad hoc contract faced criticism from EWG 23-18. This criticism was rooted in concerns about the scientific robustness of such a conversion, as the existing literature predominantly employs rankings ranging from 1 to 3. Additionally, the utilization of an "Expert override" mechanism to filter out improbable interactions was faulted for introducing expert judgments that may undermine the reproducibility of the process.

3.2 Data availability

Before making this indicator operational, the EWG 23-18 discussed the level of information that should be targeted when examining the scientific documents available for assigning risk scores. Valuable scoring information should probably focus on whether there is a risk of bycatch in a specific area with a specific gear.

The **EWG recognizes the impossibility of ensuring that all available information could be examined**. While scientific papers are relatively accessible, the search and processing of grey literature, as well as national and official databases (such as from NOAA) can be very challenging. Additionally, it should be noted that such reports/databases may be written in different languages.

A straightforward gear-based assessment, specifically the proposed system 0 in the ad hoc, was based on scientific articles with global estimates and assessments. However, the EWG expresses concern that such a rating might inherently be an approximation, potentially leading to unjust penalties for fisheries with minimal risk to sensitive species, referred to as false negatives.

The tables 2 and 3 presented below provide a summary of the findings related to data availability from scientific papers identified through the literature search conducted during the ad hoc contract. These tables present the count of records that could potentially be utilized to assign a risk score.

It is important to note that this literature search, while conducted scientifically through an R script that automatically selected relevant scientific articles, may not be exhaustive. The EWG 23-18 has emphasised that manually searching for individual species, areas, and gears can yield additional information, particularly from grey literature.

Furthermore, certain FAO areas, such as the Central Atlantic Ocean or the southern regions of all oceans (as indicated in Table 2), were inadequately covered by scientific literature. However, EWG 23-18 acknowledges the existence of various reports and databases at the national authorities' or RFMOs' levels.

Another aspect relevant to gear-based information is the different coverage of gear-specific assessments for different types of gear and taxa (

Table ***4***). When few or no studies are found for a certain combination of gear-area, this can lead the score to false negatives, by adopting the System 0 rating.

Table 3 Number of scientific records (qualitative, semi-quantitative and quantitative, mainly scientific papers) identified at FAO area level by the ad hoc contract that permitted to inform on a risk score of sensitive species bycatch per FAO fishing area and species group.

FAO area	Scientific literature			Source of additional grey literature
	Mammals	Seabirds	Turtles	
21	3	8	2	NAFO, NEAFC, NASCO, Canada (DFO), US (NOAA), ICCAT
27	20	18	2	ICES, NEAFC, ICCAT, NASCO
31	1	2	7	ICCAT, CRFM
34	1	-	9	ICCAT, CECAF, WECAF
37	4	4	5	GFCM, STECF
41	4	10	3	ICCAT
47	1	5	3	SEAFO, ICCAT
48	-	3	-	CCAMLR, CCSTB
51	26	1	28	IOTC
57	10	5	4	IOTC, Australia (AFMA)
58	-	3	-	CCAMLR, CCSTB
61	1	3	1	NPFC
67	5	5	1	NPFC, US (NOAA)
71	7	4	5	WCPFC, NPFC, Australia (AFMA)
77	12	9	9	WCPFC, NPFC, US (NOAA)
81	11	5	2	SPRFMO, Australia (AFMA), New Zealand
87	9	6	4	SPRFMO
88	-	2	-	CCAMLR, CCSTB
in high Seas				Agreement to prevent Unregulated High Seas Fisheries in the central Arctic Ocean (CAOFA)

Table 4 Number of scientific records (qualitative, semi-quantitative and quantitative, mainly scientific papers) identified at gear level by the ad hoc contract that permitted to inform on a risk score per gear type and sensitive species group (mammals, seabirds, turtles).

Gear type	MAMMALS	SEABIRDS	TURTLES
bottom trawl	5	3	5
dredge			1
driftnet	7		4
gillnet	30	16	8
hook and line	1		1
longline	4	28	20
longline (drifting)	13		12
pelagic longline		6	3
set longline	2	6	1
pelagic trawl	4	2	
pot and trap	6		2
purse seine	22	1	11
seine	2		
trawl	6	3	
multiple gear types	18	30	20

3.3 EWG 23-18 methodology for scoring

The EWG 23-18 deliberated on and formulated a methodology designed to minimise subjectivity, in terms of individual expert judgement, based on the ad hoc proposal and ensure a consistent ranking method across regions and species. The methodology is also reproducible and transparent to enhance credibility and acceptance. The approach used is conservative, so as to give a high rating (high potential risk of bycatch) in cases where little or no information is available.

3.3.1 Bycatch risk assessment and scoring

The EWG 23-18 recalls that what is being measured is the potential risk of fishery interaction with sensitive species, without information in most cases whether bycatch will actually cause an impact on the population. Hence, the EWG 23-18 underlines the necessity in renaming the indicator to clarify this distinction (from "impact on sensitive species" to "potential bycatch risk of sensitive species"). **The indicator will only be able to assign a risk score to the potential exposure of certain groups of sensitive species to bycatch, defined as the potential overlap of a group of sensitive species and a fishery in different fishing areas, based on available literature on bycatch rates and different forms of risk assessment, or general information on fishing gear selectivity and post-capture mortality of different sensitive species**. This definition differs from the risk posed by the harvesting of a sensitive species inducing a risk of depletion of the population as a whole, which is in most cases unknown.

To reduce the degree of potential expert subjectivity in the scoring, the EWG 23-18 discussed and developed a more transparent and reproducible scoring formula (BOX 1), which is less susceptible to potential subjectivity notably by assessing the quality assessment of the publicly available bycatch information (Table 5). Such a more robust approach (BOX 1) was developed during the EWG 23-18 and tested on selected case studies (see section 3.5).

In this new approach for scoring bycatch risk, it was attempted to consider and differentiate between different levels of:

- **information quality**, and
- **identified risk level involving one or more groups of sensitive species**.

BOX 1 Calculation of the bycatch risk score associated with a given supportive study (**the higher the score value, the higher the bycatch risk**) (see also separate file Annex 3 - Task 2).

An overall scoring is deduced from each supportive study along with the following steps:

- **Score the bycatch risk from 1 to 3 for each bycatch species group** (1: low risk; 2: medium risk; 3: high risk of negative interaction, and 0 when no information is available). These scores were determined based on data extracted from reference papers. In certain types of documents, relative risk values are provided, typically ranging from 1 to 3, as required for this assessment. Such documents may include scientific articles employing PSA or similar methodologies. In instances where direct scoring from publications was not feasible, alternative approaches were utilized. This involved either a) assigning a score based on explicit mentions within the article regarding the level of bycatch risk in a particular area and fishing gear, such as phrases like "high-medium-low level of bycatch" or "high-medium-low risk of bycatch," or b) employing expert judgment in interpreting available data or information presented in the document [as an example, mammals = 1, seabird = 3, marine turtles = 1, endangered sharks = 2].
- Perform an **average over the groups of sensitive species** (i.e. turtles, mammals, birds, elasmobranchs) that have scores from 1 to 3 (excluding scores with 0, i.e. when no information is available) [e.g., from the above = 7/4 = 1.75].
- **Rescale the average score from 1 to 3 into a 5-level score (1 to 5)** using the 5/3 scaling factor and round to the lower whole number to reach all levels from 1 to 5 [e.g., from the above = 1.75*5/3 = 2.92 (rounded to 2)].
- Then **apply a possible downgrade to the 5-level score** by:
  - **+1 (which worsens the estimate of possible bycatch risk) if more than one bycatch groups are scored at medium or high risk** (score 2 or 3 in the 3-level scale, respectively) **of interaction** (i.e. a fishing activity affecting more than one sensitive group should be scored as putting overall more risk than an activity pressuring only one sensitive group) [e.g., from the above = 2+1 = 3],
  - **+1 if the quality of the information is relatively poor** (i.e. when the score of the selected quality criteria is below the mean level [quality score from 4 to 7], see Table 5) [e.g., low-quality information summing 4 over 7, thus from the above = 1 + 3 = 4, which is the score D.

Thus, compared with the attempts made during EWG 22-12 and by the ad hoc team, this approach also gives weight to what is scientifically known about the risk that a fishing gear poses to multiple groups of sensitive species.

The scoring process should be efficient and straightforward, moving away from examining individual evidence with some expert judgement (such as a new reference to a scientific publication) to assigning a score based on automatic calculation following some predefined rules (see BOX 1). This ensures that the process is streamlined and easy to follow. Hence, the database can and should be updated regularly with new supporting information (at least every five years) to account for updated evidence of bycatch risks.

Table 5 Quality assessment of the publicly available bycatch information. A total quality score is attributed to each information based on four criteria (**the lower the score, the higher the quality level**).

Criteria		**Maximum points**
Criterion 1: Sensitive species specificity		**1**
The information is relevant to document bycatch of: A species group (low = 1) or a sensitive species-specific (high = 0),		
Criterion 2: Sound methodology (including reliability) – The information has a sound and well documented methodology (that has been published).		**3**
The presented methods should allow transparency for the replicability of the information. A sound methodology is documented in sufficient details and is available for consultation, which contains: Grey literature + qualitative information = 3 Peer reviewed publication + Bycatch rate = 2 Peer reviewed publication + ERA = 1 Peer reviewed publication + PBR = 0	*Ecological Risk Assessment* *Potential Biological Removal*	
Criterion 3: Geographical coverage - Data allows to produce an information with suitable geographical coverage		**2**
Global coverage = 2 FAO area = 1 FAO subdivision = 0		
Criterion 4: Temporal coverage		**1**
Relevant information is older than 10 years = 1 Relevant information is 10 years-old or more recent = 0		
	Sum	**7**

The motivation behind the assignment of different quality levels of the bycatch information following the four criteria are found below.

Sensitive species specificity

This relates to a criterion rating the supportive study against the degree of specificity to the impacted sensitive species. A better scoring is provided (one point difference) to the bycatch study

that specifically addresses the interaction at the species level compared to a more aggregated level (species group vs species-specific). This is nevertheless consistent with scientific studies that generally align the effective level of bycatch risk to either a species-group or a given species depending on the actual gear impact.

Sound methodology (including reliability)

This relates to a criterion that rates the reliability and quantitativeness of the supportive studies in measuring a negative interaction. The EWG proposes that the best available scientific information on bycatch interaction is an estimate of the magnitude of bycatch in the specific fishery targeting the commercial species relative to the status of the sensitive species. These studies are unfortunately very rare. Proxies and assessment methods with various accuracies are therefore needed.

Potential Biomass Removal - The PBR method is the best-rated method as it aims to ensure that human-caused mortality is below levels that could lead to population depletion while considering uncertainty and potential biases in the available information. The PBR is calculated using the following formula:

$$PBR = Nmin \times 0.5Rmax \times Fr$$

where N_{min} is the 20th percentile of the estimated population size, R_{max} the maximum theoretical or estimated annual population growth rate of the population in question, and F_r is a recovery factor between 0.1 and 1.0 that allocates a fraction of expected net production toward population growth and accounts for uncertainties in R_{max}, N_{min}, or errors in the determination of stock boundaries that might prevent population recovery (Wade, 1998).

Ecological Risk Assessment - Many forms of ecological risk assessments exist that can inform on fishery-interactions with sensitive species, spanning from qualitative through semi-quantitative to fully quantitative (e.g., Hobday et al. 2011). The literature search identified as a Productivity Susceptibility Analysis (PSAs), which is a semi-quantitative assessment in data-deficient circumstances. Challenges with PSAs are that a variety of methodologies exist, complicating comparability of outcomes, and it applies a precautionary approach creating many false positives because it returns too conservative scores as demonstrated compared with MSE-related work (see Hordyk and Carruthers, 2018). Any form or risk assessment is however taking into account the potential implications of the bycatch, such as the productivity of a certain species, not only the presence of a sensitive species as bycatch in a fishery. Therefore, the EWG considers this type of literature to be the second best alternative as a proxy underpinning a risk score related to bycatch of sensitive species.

Bycatch rates, or absolute bycatch - Bycatch rates, and even more absolute bycatch numbers is a clear indication of some negative interaction with fisheries but without the corresponding sampling effort and an idea on the population abundance is not a sufficient information to deduce an adverse effect on the impacted sensitive species.

Geographical coverage

Local studies are more reliable (better score of 0) than those conducted on a larger or global scale (score of 1 or 2, respectively), and particularly when there is a lack of clear distinction between fisheries and specific areas.

Temporal coverage (i.e. age of the assessment)

Old bycatch data or time series may relatively quickly become outdated to inform on the bycatch risk. On the other hand, publications in scientific journals on specific bycatch interactions are likely not to be frequent so that 10 years appears to be a relevant time period to differentiate between

low and high-quality information. However, the EWG 18-23 emphasizes that capturing the effect of effort for improving the gear selectivity and reducing the risk of interaction will be possible in the preliminary phase prior implementation where stakeholders could inform on recent studies. Such accounting for a temporal component is essential for the purpose of this labelling in order to incentivise a change in fishing practices.

3.3.2 Scoring the supportive studies and final score aggregation of bycatch risk

In order to obtain a risk rating for bycatch of sensitive species associated with seafood products from fisheries in all fishing areas globally, it is necessary, due to the incompleteness of the data, to aggregate the existing scientific evidence. To obtain a meaningful and robust indicator from the mandatory information that can be obtained under the current CMO regulation, scoring at largeFAO fishing area or gear category aggregation level cannot be considered scientifically valid, nor informative for the purpose of the indicator. Ideally, an indicator should be based on the situation of the different fisheries operating in an area, targeting certain species with a certain gear type, and if possible also including information on bycatch mitigation measures that are in place and effective. However, the coverage of information available for different fisheries is uneven and of differing scientific robustness. There are different ways of aggregating the available information depending on the objective.

BOX 2 Calculating a bycatch risk score for a given combination of gear-area based on several supportive studies, if any (see separate file Annex 3 - Task 2).

In case there are several supportive studies for each species group, the EWG 23-18 has reflected on several ways forward to account for the scoring of all individual supportive studies, including mutually exclusive choice:

- taking the maximum score value among all the supportive bycatch studies,
- taking the average score value,
- taking the score issued by the most reliable study (e.g., most recent or species specific or more rigorous).

As far as the ranking system is concerned, it is necessary at this stage to aggregate the information to a coarser level whenever the information is not at the same level of resolution for each combination of target species, gear and area ("levelling the playing field"). Alongside this aggregation, a very conservative approach would be to assign the worst score to a given gear when there is only one pseudo-métier (i.e., the combination of a gear and a target species) among all the pseudo-métiers using that gear that scores 5. A less conservative approach, but one that is likely to reduce the number of negative interactions that do not actually occur ("false positives" of a negative risk to occur), would be to use the median score among the pseudo-métiers. It is overall advisable to avoid that a few different and marginal fisheries would determine the aggregated indicator score, which would lead to an overall lack of contrast in the relative scores.

When different risk scores are identified for a given gear type and/or fishing area, and no specific information is available for the specific fishery, one could choose to apply a precautionary approach and assign the highest risk score found - or picking the median risk score, affecting score when it comes to pooling some similar gears. When taking a full precautionary approach, the overall scoring is driven by a few combinations. As an example, the score could be driven by a few different and marginal fisheries (in terms of volume), and with no sufficient contrast in the scores that can incentivize a change in fishing practices. An alternative may also be providing ranges, but this

complicates the final scoring of the indicator on sensitive species relative to the indicators on stock status and seabed pressure.

Overall, the more conservative approach above creates a bias towards the worst scores, noting however that false positives (of negative risk to occur) could be an incentive to provide more detailed information, while the less conservative approach using the median value will generate a bias towards medium levels that will remove this incentive. The incentive for improvement during the stakeholder phase prior implementation would thus be favoured by the more conservative approach (see section implementation plan).

Finally, the EWG 23-18 observes that it may be required to transform (also at each multi-annual update) the final scores to obtain a bell-shaped distribution of scores (in number of sensitive species) that will rank the fishing practices in relative terms when comparing fisheries to each other for a given indicator, so that the indicator incentivizes the use of the best available fishing techniques without adding more virtuous categories (such as A+, A++, etc.).

3.3.3 Potential bias

One issue related to data consistency is that the scientific literature may be biased towards reporting high risks. Often, scientific studies focus on high-risk fisheries and e.g., mitigation trials, and low-risk fisheries may not be prioritised due to less relevance. Robust scientific evidence may also differ between regions and fleets, as monitoring and observer programmes are costly and have poor coverage overall and in particular in e.g., small-scale fisheries.

3.4 Operationality

Before a meaningful indicator on sensitive species could be considered for implementation within a regulation, the EWG 23-18 stresses that the CMO regulation would need to be revised to reflect a higher level of spatial and gear type information as mandatory components. Splitting e.g., trawls into pelagic and demersal would also be beneficial to the seabed indicator, and higher spatial resolution is beneficial to the stock status indicator.

The proposed approach for a risk indicator for sensitive species, which was developed by EWG 23-18 to enable consistent and reliable scoring, is to some extent feasible up to a system 1 approach based on readily available input data, i.e. commercial species, gear type and fishing area - given that the CMO Regulation can be modified to increase the level of detail on gear type and fishing area. Before operational implementation, further work is also needed to improve the coverage of gears-areas combinations (based on additional commercial species which have not been considered in the ad hoc) and sensitive species in line with the proposed approach. Future developments towards a more comprehensive, meaningful and robust ranking system for this indicator, covering all relevant commercial products and sensitive species, therefore include carrying out more literature reviews to cover more commercial species at system 1 level, as well as more sensitive species groups (the top priority being the inclusion of elasmobranchs). **The case studies carried out by EWG 23-18 can provide guidance on the time required to achieve the System 1 approach**.

The EWG 23-18 also emphasises that the level of precision for the indicator must be tested before being implemented, and what has been explored during the EWG is the methodology for scoring and its reproducibility.

Decisions also need to be taken on:

1. Which additional sensitive species are essential to include before operationalisation?

2. What would be an appropriate process and resources needed for regular updates?
3. Who will be responsible for verifying the information and/or risk scores?

The EWG 23-18 recalls that the introduction of such a new indicator should follow an implementation plan, including setting a database linked to the automatic scoring tool, and make the scoring publicly available to stakeholders, together with a procedure to update the system and the scoring as soon as new information comes in (see dedicated section below).

3.4.1 Process for information/database update

An indicator on potential risks for bycatch of sensitive species will require regular updates in the underpinning information, and is not something that may be fully automated and requiring expert judgement at some level. This process can be structured in different ways, where one opportunity is to prioritise recent information on mitigation measures implemented in a given area. Ecological risk assessments informing, e.g., the Australian fishery management, are updated every five years, which may be indicative of relatively high frequency of update. Another option is that updates may be done continuously as new data is provided in a parallel database ("Updated database") to the operational one, but this requires more resources allocated to allow for e.g., validation of information. The operational database and scoring system could therefore be updated at a lower frequency when substantial changes have occurred.

New additional information from studies and revision of scoring could thus regularly flow into the updated (non-operational) database. New information includes recent evidence from peer-reviewed scientific studies and possibly from information brought by the industry that are proven to be scientifically robust such as deduced from electronic monitoring. The pace of such update should be defined either regularly (e.g., every 5 years with the Australian example) or when a substantial level of changes occurs. An annual update of the operational database with the continuously updated database would however be an incentive for an immediate improvement of practices. Streamlining the update of the input info to scoring is required possibly via a data call issued regularly. Because of the cost for the industry to provide new data, it is likely that most of the information will be provided by the scientific community when proving the negative interactions, or on the contrary their mitigation. This would avoid, to some extent, the fisheries without resources for monitoring (e.g., small-scale fisheries) to be penalised by the absence of local resources in documenting possible negative interactions.

The EWG 23-18 recognizes that an additional useful work would be to collate legal requirements already in place for the industry to use bycatch reduction devices in certain areas that would likely affect the scoring if proven to be efficient. For now, the scoring could ignore the past and current efforts made to reduce the bycatch risk. A first step would be to include in the scoring if some devices are mandatory by law, and a second step would moderate the score improvement depending on effectiveness, controllability and compliance.

During the EWG 23-18, the group agreed that the link between the table reported in the ad hoc report (ad hoc Annex 1) and the bibliographic information given in the ad hoc report (ad hoc Annex 2) was not transparent and reproducible as it was not possible to associate each target species-area-gear combination with the quality of bycatch data, the type of associated paper (e.g., scientific paper, grey literature etc.) and the sensitive species involved (when reported). The EWG 23-18 has therefore provided a method to relate the quality scoring of individual supportive studies and the final scoring at different levels of resolutions (Systems 0 to 2).

The EWG 23-18 recognises that further information is needed before implementing the indicator in relation to the issue of ensuring an equal "level playing field" and to avoid incomplete information from being used, especially for the imports representing 70% of seafood consumed in the EU. Overall, the EWG 23-18 therefore concludes that **the present state of the methodology behind the indicator is meaningful to be tested with an increased coverage, but still not to be implemented at this stage**.

3.4.2 Implementation plan of the sensitive species indicator

Following a precautionary approach and with more detailed information used, i.e. moving from system 0 or 1 towards system 2, the products with high-risk ranking are overall foreseen to decrease although the proportion of change cannot be quantified at this stage. The final distribution of low, medium and high-risk scores for commercial products on the market will depend on the sensitive species occurrence, fishing practices and number and quality of the bycatch studies included in the system. The initially limited number of sensitive species groups in the implementation of the sensitive indicator might lead to an increase in risk levels when additional sensitive species are incorporated.

The EWG 23-18 recommends an implementation in 6 steps, the last step being an operational update (**Figure 10**):

- step 1: current status of the (pre-)database prepared by the EWG 23-18 (12/2023),
- step 2: Pre-database filling by a further ad hoc (dedicated scientific group of experts in bycatch assessments) and/or STECF EWG,
- step 3: A beta-version of the database is proposed to the stakeholders on a permanent platform (to be decided),
- step 4: the database is filled by the dedicated scientific group after analysing the existing peer-reviewed scientific bycatch information received from the stakeholders in step 3 - the analysis of new scientific bycatch information by the scientific group can take place in parallel,
- step 5: first operational and publicly available database used to score the products for the bycatch risk of sensitive species (with merging with the other indicators) - a continuously "updated database" is kept separate to prepare the next update of the scoring system,
- step 6: after a fixed period (e.g. 5 years) or substantial changes in the database or continuously depending on practical feasibility, the operational database will be updated, keeping in mind that a too low frequency of update may represent an obstacle to rapid implementation of the best practices of bycatch reduction.

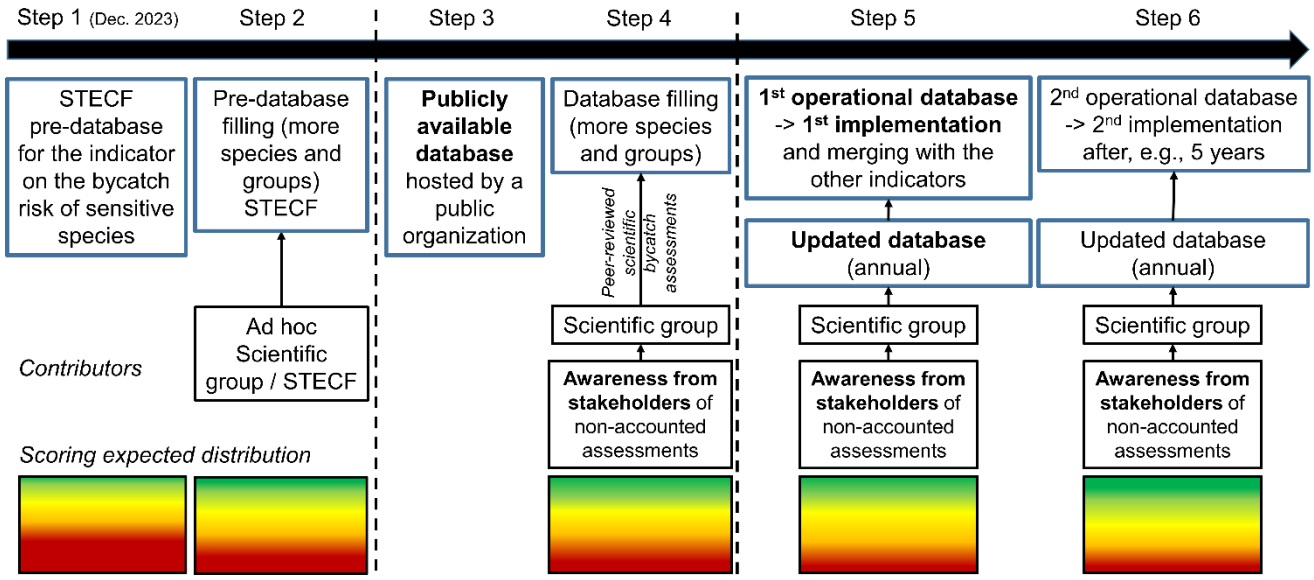


Figure 10 Implementation plan in six steps of the indicator on the bycatch risk of sensitive species.

3.5 Case studies - Task 2 - on bycatch risk of sensitive species

*3.6.1 Jumbo flying squid (*Dosidicus gigas*) in FAO 87 Southeast Pacific, caught with jigging (hooks and lines)*

3.6.1.1. EWG 23-18 scoring the bycatch risk

According to the method evaluated by EWG 23-18, the score for sensitive species in this fishery indicates the least cause for concern (Table 6).

Table 6 Example of scoring the bycatch risk of Jumbo flying squid using Hook and line in area FAO 87 deduced from an individual supporting study (here the SPRFMO, 2022) using the scoring method developed during the EWG 23-18 (see BOX 1, the lower the score, the lower bycatch risk, except for the value of 0 in the score per bycatch group information that refers to an absence of available information).

Target: Jumbo flying squid		Hook and Line (FAO 87)
Score per bycatch group information	Mammals	0
	Seabirds	0
	Turtles	1
	Elasmobranchs	0
	Combined score (1 to 5 scale)	**1 =((1/1)X5/3)=1.66 (rounded to the nearest lower whole number 1)**
Bycatch information quality	sensitive_species_specificity	0
	sound_methodology	0
	geographical_scope	1
	temporal_coverage	0
	Global score on information quality	**0 (if the sum is below 4 the final score is 0)**
Final score (bycatch groups and information quality)		**1**

3.6.1.2. Comparison with other rating methods: Seafood watch

Squid, Jumbo. Southeast Pacific. 11/5/18 Seafood Watch Consulting Researcher (https://www.seafoodwatch.org/)

The Monterey Bay Aquarium's Seafood Watch program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. Seafood Watch makes its science-based recommendations available to the public.

This analysis includes the Chilean and Peruvian fisheries as well as the Chinese fishery for Humboldt squid in the high seas off the Chilean and Peruvian exclusive economic zones (EEZs). In Chile and Peru, the majority of the stock is exploited with jigging (with or without lights). In international waters outside of Chilean and Peruvian EEZs, the Chinese fishery uses mostly hand jigging, and larger vessels with mechanized jiggers operate a few months out of the year.

Criterion 1: Impacts on the species under assessment (thus similar to the Stock status indicator of Task 1). This criterion evaluates the impact of fishing mortality on the species, given its current abundance. When abundance is unknown, abundance is scored based on the species' inherent vulnerability, which is calculated using a Productivity- Susceptibility Analysis. The final Criterion 1 score is determined by taking the geometric mean of the abundance and fishing mortality scores.

Criterion 2: Impacts on Other Species (bycatch and discard risk, thus to some extent similar to the sensitive species indicator of Task 2). Seafood Watch defines bycatch as all fisheries-related mortality or injury to species other than the retained catch. Examples include discards, endangered or threatened species catch, and ghost fishing. When information on other species caught in the fishery is unavailable, the fishery's potential impacts on other species is scored according to the Unknown Bycatch Matrices, which are based on a synthesis of peer-reviewed literature and expert opinion on the bycatch impacts of each gear type. The fishery is also scored for the amount of non-retained catch (discards) and bait use relative to the retained catch. To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard/bait score.

Criterion 3: Management Effectiveness. Five factors are evaluated in Criterion 3: Management Strategy and Implementation, Bycatch Strategy, Scientific Research/Monitoring, Enforcement of Regulations, and Inclusion of Stakeholders. Each is scored as either 'highly effective', 'moderately effective', 'ineffective,' or 'critical'.

Criterion 4: Impacts on the Habitat and Ecosystem. This Criterion assesses the impact of the fishery on seafloor habitats (thus similar to the seabed impact of Task 1), and increases that base score if there are measures in place to mitigate any impacts. The fishery's overall impact on the ecosystem and food web and the use of ecosystem-based fisheries management (EBFM) principles is also evaluated. Ecosystem Based Fisheries Management aims to consider the interconnections among species and all natural and human stressors on the environment. The final score is the geometric mean of the impact of fishing gear on the habitat score (factor 4.1 + factor 4.2) and the Ecosystem Based Fishery Management score.

All Criteria are determined as follows:

Score >3.2=Green or Low Concern

Score >2.2 and ≤3.2=Yellow or Moderate Concern

Score ≤2.2 = Red or High Concern

And the overall recommendation is calculated as follows:

• **Best Choice** = Final Score >3.2, **and** either Criterion 1 or Criterion 3 (or both) is Green, **and** no Red Criteria, **and** no Critical scores
• **Good Alternative** = Final score >2.2, **and** no more than one Red Criterion, **and** no Critical scores, **and** does not meet the criteria for Best Choice (above)
• **Avoid** = Final Score ≤2.2, **or** two or more Red Criteria, **or** one or more Critical scores.

The flying jumbo squid caught by jigging scores moderate concern (yellow) for criterion 1 (species) and low concern (green) for criteria 2 (bycatch) and 4 (habitat and ecosystem) in all fisheries (Chilean, Peruvian and Chinese jigging). For Criterion 3 (management), all rank moderate concern except Chinese fisheries that are ranked high concern (red). Overall, they have a moderate (yellow) or low (green) concern (all are considered a "good alternative").

Table 7 Rating from Seafood Watch.

Species/fishery	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Overall recommendation
Chile Southeast	2.6	5	3	3.9	3.3 (good alternative)
Peru southeast	2.6	5	3	3.9	3.5 (good alternative)
Southeast Pacific, China	2.6	5	2	3.9	3.5 (good alternative)

Conclusion: With the method tested by the EWG 23-18, the score for sensitive species in this fishery (equal to 1) depicts the lowest concern, in agreement with the lowest-concern score provided by Seafood Watch (

Table *8*Table 7).

*3.6.2. Yellowfin tuna (*Thunnus albacares*) in FAO 51 Indian Ocean, Western, caught with purse seine*

3.6.2.1. EWG 23-18 scoring the bycatch risk

With the method tested by the EWG 23-18, the score for sensitive species in this fishery (4, corresponding to D) depicts a high concern (

Table ***8***).

Table 8 Example of scoring the bycatch risk of Yellowfin tuna using purse seines in area FAO 51 deduced from a supporting study using the scoring method developed during the EWG 23-18 (see BOX 1). Values of 0 in the score per bycatch group information refers when no information is available. The higher the score, the higher risk of bycatch.

Target: Yellowfin tuna		Purse seines (FAO 51)[1]
Score per bycatch group information	Mammals	2
	Seabirds	0
	Turtles	0
	Elasmobranchs	3
	Combined score (1 to 5)	**4** **=((2+3)/2)X(5/3) =4.16 (rounded to the nearest lower whole number 4, see BOX 1)**
Bycatch information quality	Sensitive species specificity	0
	Sound methodology	1
	Geographical scope	1
	Temporal coverage	0
	Global score on information quality	**0** **(if the sum is below 4 the final score is 0, see Table 5, here the sum is 2)**
Final score (bycatch groups and information quality)		**4**

[1] Roberson et al. (2022)

3.6.2.2. Comparison with other rating methods: Seafood Watch

Tunas and large pelagics - Indian Ocean. Seafood Watch Consulting Researcher March 1, 2021 Seafood Watch Standard used in this assessment: Fisheries Standard v3 (https://www.seafoodwatch.org/)

This analysis focuses on fisheries in the Indian Ocean for albacore tuna (*Thunnus alalunga*), southern bluefin tuna (*Thunnus maccoyii*), bigeye tuna (*Thunnus obesus*), skipjack tuna

(*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*) and swordfish (*Xiphias gladius*) caught in purse seines, longlines, gillnets, handlines, hand-operated pole and lines, and trolling lines as well as blue sharks (*Prionace glauca*) and shortfin mako sharks (*Isurus oxyrinchus*) caught in drifting longlines.

Criterions 1-4 explained in the section "flying jumbo squid" before.

Score >3.2=Green or Low Concern

Score >2.2 and ≤3.2=Yellow or Moderate Concern

Score ≤2.2 = Red or High Concern

The tropical FAD purse seine fisheries and the disassociated purse seine evaluation for yellowfin tuna is scoring as of a high concern (red) for all criteria except for criterion 4 (habitat). For bigeye and skipjack tuna, criteria 2 and 3 also rank high concern (red). All have low concern for criterion 4 but the overall recommendation is red (avoid) for all fisheries/species.

Table 9 Rating provided by Seafood Watch.

Species/fishery	Criterion1	Criterion 2	Criterion 3	Criterion 4	Overall recommendation
Yellowfin tuna	1.0	1.0	1.0	3.9	1.4 (avoid)
Bigeye tuna	2.2	1.0	1.0	3.9	1.7 (avoid)
Skipjack tuna	3.3	1.0	1.0	3.9	1.9 (avoid)

Conclusion: With the method tested by the EWG 23-18, the score for sensitive species in this fishery (4) depicts a high concern (

Table ***8***, score of 4, D rating, over 5 categories), which is consistent with the highest concern score provided by Seafood Watch (Table 9, worst rating over 3 categories).

3.6.3. Yellowfin tuna in FAO 71 Pacific Western and central caught with Hook and Lines

3.6.3.1. EWG 23-18 scoring the bycatch risk

With the method tested by the EWG 23-18, the score for sensitive species in this fishery (3, corresponding to C) depicts a medium concern (

Table ***10***).

Table 10 Example of scoring the bycatch risk of Yellowfin tuna using Hook and line in area FAO 71 deduced from supporting studies using the scoring method developed during the EWG (see BOX 1). Values of 0 in the score per bycatch group information refers when no information is available.

Target: Yellowfin tuna		Hook and Line (FAO 71)[1]	Hook and Line (FAO 71)[2]
Score per bycatch group information	Mammals	1	1
	Seabirds	1	0
	Turtles	3	3
	Elasmobranchs	3	3
	Combined score (1 to 5)	**3**	**3**
		((1+1+3+3)/4)*(5/3) =3.33 (round to the nearest lower whole number 3)	**((1+3+3)/3) *(5/3)= 3.88 (rounded to the nearest lower whole number 3)**
Bycatch information quality	Sensitive species specificity	1	0
	Sound methodology	1	0
	Geographical scope	1	1
	Temporal coverage	0	1
	Global score on information quality	**0**	**0**
		(if the sum is below 4 the final score is 0)	
Final score (bycatch groups and information quality)		**3**	**3**

[1] Jaiteh et al. (2021), [2] Peatman et al. (2021)

3.6.3.2. Comparison with other rating methods: Seafood watch

Western and Central Pacific Tunas and Swordfish. Seafood Watch Consulting Researcher January 13, 2020 Seafood Watch Standard used in this assessment: Fisheries Standard v3 (https://www.seafoodwatch.org/).

This analysis focuses on the longline, purse seine, trolling line and pole and line fisheries within the western and central Pacific Ocean (WCPO), North Pacific and South Pacific that target the following seven species: swordfish and albacore, bigeye, Pacific bluefin, southern bluefin, skipjack, and yellowfin tuna

Criterions 1-4 explained in the section "flying jumbo squid" before.

Score >3.2=Green or Low Concern

Score >2.2 and ≤3.2=Yellow or Moderate Concern

Score ≤2.2 = Red or High Concern

Yellowfin tuna caught with drifting longlines in the Western Central Pacific Ocean (WCPO) score red (high concern) in criterion 2 (bycatch) and 3 (management), and green (low concern) in criterion 1 (species) and 4 (habitat). Bigeye tuna, pacific bluefin tuna and southern bluefin tuna. All have a green score in criterion 4 (habitat and ecosystem) but red in criterion 2 and 3. Overall, they all have an avoid rating.

Table 11 Rating given by the Seafood Watch.

Species/fishery	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Overall recommendation
Yellowfin tuna	5.0	1,0	1,0	3,9	2.1 (avoid)
Bigeye tuna	4.3	1,0	1,0	3,9	2,0 (avoid)
Pacific bluefin tuna	1.0	1,0	1,0	3,9	1,4 (avoid)
Southern Bluefin tuna	2.2	1,0	1,0	3,9	1,7 (avoid)

Conclusion: With the method tested by the EWG 23-18, the score for sensitive species in this fishery (3) depicts a medium concern (

Table ***10***), which is lower than the highest concern score provided by Seafood Watch (Table 11).

3.6 Conclusions of Task 2 (indicator on the bycatch risk of sensitive species)

The EWG 23-18 focused on increasing the robustness of the methodology and feasibility of the scoring proposed in the ad-hoc, as a preliminary step of operationalisation. In particular, the **development of a methodology for including verifiable additional information on specific risks of bycatch interaction** allows inserting in a systematic, comparable and transparent way to move from System 0 to a more elaborated system, named System 1/2 as it is all integrated. **This methodology includes the systematic evaluation of the bycatch risk information by sensitive species groups from publicly available literature, as well as of its quality using four objective criteria**.

The EWG 23-18 however **recommends testing** (e.g., by an ad hoc or an EWG) **the sensitivity** of the proposed methodology on information quality **using a large number of bycatch studies over numerous gears, areas and sensitive species groups**. The overall objective of that indicator is **to account for an average risk between sensitive species groups while substantially highlighting a high bycatch risk for any group**. The number and proportion of sensitive groups at high bycatch risk (scored 2 or 3) by gear using a large number of bycatch studies will provide robust insights on this methodology to best discriminating the gears in terms of cross-group bycatch risk.

The final scores on the bycatch risk of sensitive species resulting from the methodology established by EWG 23-18, **for the three selected fisheries** (case studies in section 3.5), were found to be **consistent with** the scores evaluated for the same fisheries by the world-recognized seafood rating scheme **Seafood Watch**. This verification test supports the capacities of the methodology created by the EWG 23-18.

While the indicator on the bycatch risk of sensitive species is not yet ready for implementation, **important progress was made to demonstrate the feasibility and an implementation plan (Figure *10*) was set to fill the main gaps**, in particular the database on bycatch-related studies where the dedicated scientific group and stakeholders will have the opportunity to contribute (steps 2 to 4). The robustness of the approach and consistency of the scoring results will also be further tested when the database will be more complete prior operational implementation.

4 SUMMARY TABLE ON THE THREE SUSTAINABLE FISHERIES INDICATORS

Table 12 summarizes the main information types used by each scoring system for the three selected indicators, therefore including the indicator on the impact on the seabed from the STECF EWG 22-12 Report.

Table 12 Summary of the information used by each system for the indicator on the stock status, the bycatch risk of sensitive species (EWG 23-18) and the impact on the seabed (EWG 22-12). The lower system corresponds to the lowest level of information used to define the scoring, noting that the lowest systems cannot access the highest scores.

	Information used (various detail levels)	**Score range (maximum range from A to E)**	**Coverage of wild-capture seafood products in volume (actual level) including eventual unresolved cases – (*Not Available* - *NA*)**
Indicator on the stock status (former 'fishing pressure indicator')			
System 1	IUCN stock status and sensitivity index	B to E	High coverage
System 2	Quantitative information on stock assessment (Biomass/MSY Btrigger, F/FMSY or FMSY proxy, Catch or effort advice)	A to E	Medium-low coverage (most EU products + well-advised imports)
Indicator on the bycatch risk of sensitive species (including so far marine mammals, seabirds, turtles and sharks)			
System 0	CMO mandatory gear list (7 categories)	A to E as some gears cannot have a bycatch risk	Very high coverage
System 1/2 to be implemented (see plan)	Commercial species name (CMO Regulation) + gears mostly based on Annex XI of Regulation (EU) No 404/2011 (32 categories) + FAO fishing area + eventual downgrade from the number of impacted sensitive groups and quality of bycatch risk information (4 criteria)	A to E	High coverage (90%)
Indicator on the impact on the seabed (from the EWG 22-12 Report)			
System 1	CMO mandatory gear list (7 categories) including habitat type (EUNIS level 2 with the depth limits, 43 categories)	A to E as some gears cannot impact the seabed	High coverage
System 2	Voluntary in the FAO gear list (88 categories including 26 categories that are not in the CMO gear list) including habitat type (EUNIS level 2 with the depth limits, 43 categories)	A to E	High coverage
Future "System 3"?	Regional specificities by FAO area on water depth and fraction of trawled surface area.	A to E	

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EWG-23-18 – Annex 2 - Task 1 - Tables 1. Stocks available in RAM Database. Table 2 Stocks available in the IT Tool.pdf
EWG-23-18 – Annex 3 - Task 2 - Scoring sensitive sp bycatch risk Dec 2023

List of Background Documents

Background documents are published on https://stecf.ec.europa.eu/meetings-calendar/past-meetings

List of background documents:

EWG-23-18 – Doc 1 - Declarations of invited and JRC experts (see also section of this report Contact details of EWG-23-18 participants)

EWG 23-18 Ad hoc Fishing pressure indicator – renamed stock status indicator.pdf
EWG 23-18 Ad hoc Fishing pressure indicator – renamed stock status indicator - Operationalizing_data.xlsx

EWG 23-18 Ad hoc Sensitive species - Methodological report.pdf
EWG 23-18 Ad hoc Sensitive species - Methodological report - Annex 1.xlsx
EWG 23-18 Ad hoc Sensitive species - Methodological report - Annex 2.xlsx

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