JRC SCIENCE FOR POLICY REPORT

Scientific, Technical and Economic Committee for Fisheries (STECF)
-
Criteria and indicators to incorporate sustainability aspects for seafood products in the marketing standards under the Common Market Organisation (STECF-20-05)

Edited by Didier Gascuel, Jean-Noël Druon
& Hendrik Doerner

Joint
Research
Centre

EUR XXXXX EN

This publication is a Science for Policy report by the Joint Research Centre (JRC), the European Commission's science and knowledge service. It aims to provide evidence-based scientific support to the European policymaking process. The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of this publication. For information on the methodology and quality underlying the data used in this publication for which the source is neither Eurostat nor other Commission services, users should contact the referenced source. The designations employed and the presentation of material on the maps do not imply the expression of any opinion whatsoever on the part of the European Union concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Contact information

Name: STECF secretariat

Address: Unit D.02 Water and Marine Resources, Via Enrico Fermi 2749, 21027 Ispra VA, Italy

E-mail: jrc-stecf-secretariat@ec.europa.eu

Tel.: +39 0332 789343

EU Science Hub

https://ec.europa.eu/jrc

JRCXXXXX

EUR XXXXX EN

PDF	ISBN XXXXXXX	ISSN 1831-9424	doi:XXXXXXXX
STECF		ISSN 2467-0715	

Luxembourg: Publications Office of the European Union, 2021

How to cite this report: Scientific, Technical and Economic Committee for Fisheries (STECF) – Criteria and indicators that could contribute to incorporating sustainability aspects in the marketing standards under the Common Market Organisation (STECF-20-05). Publications Office of the European Union, Luxembourg, 2021, EUR 28359 EN, ISBN XXXXXX, doi:XXXXXXXX, PUBSY No.

Authors:

STECF advice:

Abella, J. Alvaro; Bastardie, Francois; Borges, Lisa; Casey, John; Catchpole, Thomas; Damalas, Dimitrios; Daskalov, Georgi; Döring, Ralf; Gascuel, Didier; Grati, Fabio; Ibaibarriaga, Leire; Jung, Armelle; Knittweis, Leyla; Kraak, Sarah; Ligas, Alessandro; Martin, Paloma; Motova, Arina; Moutopoulos, Dimitrios; Nord, Jenny; Prellezo, Raúl; O'Neill, Barry; Raid, Tiit; Rihan, Dominic; Sampedro, Paz; Somarakis, Stylianos; Stransky, Christoph; Ulrich, Clara; Uriarte, Andres; Valentinsson, Daniel; van Hoof, Luc; Vanhee, Willy; Villasante, Sebastian; Vrgoc, Nedo

EWG-20-05 report:

Gascuel, Didier (Chair); Borges, Lisa; Döring, Ralf; Jung, Armelle; Villasante, Sebastian; Absil, Christine; Afonso Ondina; Barz, Kristina; Cozzolino, Maria; Dewals, Jean-François; Di Natale, Antonio; Druon, Jean-Noël; Gieseler, Jörn Steffen; Goti, Leyre; Grati, Fabio; Gómez, Sílvia; Ioannou, Myrto; Kreiss, Cornelia; Llorente Garcia, Ignacio; Lloret, Josep; Lucas, Sterenn; Malvarosa, Loretta; Savina-Rolland, Marie; Scarcella, Giuseppe; Sala, Antonello; Stark, Michèle; Tičina, Vjekoslav; Van Hoof, Luc; Vermard, Youen; Von Dorrien, Christian; Ziegler, Friederike

TABLE OF CONTENTS

SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF) - CRITERIA AND INDICATORS TO INCORPORATE SUSTAINABILITY ASPECTS FOR SEAFOOD PRODUCTS IN THE MARKETING STANDARDS UNDER THE COMMON MARKET ORGANISATION (STECF-20-05)

The report of EWG 20-05 was reviewed by the STECF at its 66th plenary meeting held virtually from 22-26 March 2021.

Request to the STECF

STECF is requested to review the report of the STECF Expert Working Group meeting, evaluate the findings and make any appropriate comments and recommendations.

Background to the EWG work

Regulatory marketing standards for fishery products are established under the common market organisation (CMO; Regulation (EU) No 1379/2013). In 2019, an evaluation of the implementation of these marketing standards was carried out to assess whether they were still fit for purpose (SWD(2019) 453 final). The evaluation identified shortcomings regarding the effectiveness of the current marketing standards framework in achieving the objectives set out in the CMO Regulation of 2013. In particular, the existing marketing standards do not sufficiently contribute to a level playing field on environmental and social aspects and have not been equipped to deliver on the objective of enabling the EU market to be provided with sustainable products (SWD(2019) 455 final).

The revision of the marketing standards is included as an initiative under the Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system. STECF EWG 20-05 was requested to support the development of robust policy options for the revision of the EU regulatory marketing standards in terms of incorporating sustainability aspects. The main objectives of this EWG were to identify suitable criteria and indicators and to assess their potential to be incorporated in regulatory marketing standards, ideally for both fishery and aquaculture products (FAPs) on the EU market, independently of their origin (domestic and imports).

The STECF EWG 20-05 met on-line from 23th to the 27th November 2020 and was attended by 42 participants, including 30 experts (7 STECF members), 8 observers, 3 DG MARE representatives and 1 JRC representative.

STECF observations

The EWG work

EWG 20-05 was tasked to assess existing sustainability criteria and indicators for fisheries and aquaculture products in the EU, explore possibilities to assign or combine sustainability criteria / indicators and provide limits of the different combinations of criteria / indicators.

The STECF EWG 20-05 was able to build on preparatory work carried out under two ad hoc contracts preceding the launch of the EWG. This preparatory work consists of two reports (one for fisheries

and the other for aquaculture) that provide a mapping of existing methodologies providing sustainability assurance claims, including the identification and description of the criteria and indicators used in these methodologies.

STECF notes that the EWG 20-05 was tasked with addressing respectively: (i) environmental aspects for fished products, (ii) environmental aspects for aquaculture products and (iii) the social aspects of FAPs in general. To accommodate this, the EWG 20-05 meeting was split into three sub groups, each concentrating on a specific task.

STECF notes that information available for the three sub-tasks differed widely, with information available on fisheries and aquaculture being quite sufficient while information on the social dimension somewhat limited.

STECF notes that an enormous amount of work has been undertaken under the two ad hoc contracts and by the EWG 20-05 both during and after the actual meeting. Extensive discussions were held and documented on individual indicators, on the systems of scoring and on combining indicators. The EWG 20-05 report provides an analysis of sustainability aspects that could be addressed through marketing standards and proposes a methodology for measuring and communicating these sustainability aspects along the supply chain.

The proposed scoring system

STECF notes that the general principle of the system of indicators proposed by EWG 20-05 to be developed for FAP is not based on an absolute scale with sustainable/not sustainable criteria, but is based on a relative scoring system, where a seafood product is assessed to be relatively more / less sustainable than another seafood product across a set of criteria. For example, a product receiving a A+ score means that it is ranked in the best 10% of all scored products. The intent of such a system is to encourage continuous dynamic progress towards higher environmental and social standards in FAPs. Therefore, it requires the scoring to be re-evaluated at regular intervals for all FAPs products at once, as knowledge and data availability progress and more FAPs become more sustainable.

STECF notes that EWG 20-05 proposes a three-tier system (i.e. expanding the current system; developing a System 1 based on available data; and developing a System 2 based on additional data) to address the identified shortcomings regarding the effectiveness of the current marketing standards. In expanding the current system, the first step is to start with the currently required mandatory information, as defined in the CMO Regulation for fisheries products, which includes information on species, area of capture and fishing technique applied. EWG 20-05 suggests that in the short term this system of mandatory information should be applied to cover all FAPs, hence also cover processed fisheries products. Additionally, for all FAPs (including aquaculture products), information provided by the producer on species, place of production/catch and production technique/métier should in the revised system be of a much higher resolution than under the current CMO Regulation.

For a further development of robust policy options for the revision of the EU regulatory marketing standards in terms of incorporating sustainability aspects, EWG 20-05 suggests the introduction of a scoring system on a set of environmental and social criteria. The proposed scoring would be an appraisal performed by an external assessment body (or an expert tool still to be developed), either based on data publicly available (hereinafter referred to as System 1) or based on additional data provided by producers or importers (hereinafter referred to as System 2).

STECF notes that the rationale behind defining two systems (System 1 and 2) is that data availability differs widely between different FAPs. Under System 1, publicly available information is used. Having a System 2, based on additional information provided by the producers, would allow producers to obtain a more specific, and in cases a higher, sustainability score. This potentially provides an incentive to producers to share more extensive production information to meet the data requirements of System 2.

To illustrate the concept, STECF provides an example of the scoring for three contrasted theoretical fishery products sold on the EU market (Table 5.1.1). This exercise is meant to illustrate that a poor score for a given criterion does not necessarily imply a poor overall score. According to the EWG suggestion, the E to A+ categories should be defined according to specific objectives, in term of percentages of the product volume ranked per category (for instance: 10% in the two extreme

A+ and E categories, which need to be flagged, and 20% for each of the A, B, C, E intermediate categories).

The three theoretical products considered here as case studies, are defined as follows:

. Product 1, scored under system 2 according to information provided by producers, originates from a trawl fishery in a well-managed area (possibly the North East Atlantic) with low ecosystem impacts and high social standards; it thus ranks in the best 30 or 50% (final score A or B).

. Product 2 also originates from a trawl fishery, but is scored under system 1 for all criteria, while imported from a fishing area where management and social standards are low; it thus ranks in the worse 30%, or even 10% (D or E).

. Product 3 refers to a "best case" fishery; indicators are not all perfect, but comparatively to others this product exhibits a final score in the top 10% (A+).

Table 1. Example of scoring for three contrasted theoretical fishery products placed on the EU market (see products characteristics in the text)

Dimension	Criteria	Product 1	Product 2	Product 3
Environment	Fishing pressure	A	D	A+
	Fisheries management	A	No score	A
	Impact on ETP and sensitive species	A	No score	B
	Unwanted landings and discards	B	D	A
	Impacts on the seabed	D	E	A+
	Impact on marine food webs	B	No score	A
	Carbon footprint	C	E	A+
	Waste and pollution	A+	D	A
Social	Working condition (production)	A+	C	B
Final score		**A or B**	**D or E**	**A+**

STECF observes that in the EWG 20-05 report the relationship between System 1 and System 2 is not yet fully detailed. The EWG 20-05 report specifies that the highest scores can only be obtained under System 2 (ranging from A+ to E, with the latter being the lowest degree of sustainability) while System 1 would only allow low or medium scores (From B to E). Therefore, the option to move to a higher sustainability scores by moving from System 1 and System 2 should provide an incentive to producers to fulfil the requirements of System 2. However, it may arise for some products that they will be scored under System 2 at a lower level based on additional information than the original score under System 1. Rules need to be defined to avoid such a perverse incentive.

STECF notes that for some criteria, the information required to move from System 1 to System 2 is already available. This is for example the case for a more detailed indication of the fishing area, which is already mandatory information for products fished in the North East Atlantic. Even if not mandatory, more detailed information for aquaculture is also available within the EU (from the data collection EU MAP), especially regarding the type of production system. The possibility to directly

implement System 2 for certain criteria could be considered for those products for which this information is available.

Another option mentioned by the EWG would be to directly implement System 2 without using System 1, at least for some criteria. STECF notes that in such a case only products for which this information is available would be scored, while a preliminary grey "No score" (i.e. score unknown) could be attributed to the others (likely many of the imported products; product 2 in table 5.1.1 as an example) until the additional required information is obtained.

STECF notes that both Systems 1 and 2 are based on a set of criteria. STECF observes that EWG 20-05 also provided preliminary suggestions for the governance of such a system, but both for the governance of the scoring mechanism of individual indicators and for the compilation for the aggregated score, a fully operational workflow still needs to be developed. This also includes addressing concrete issues such as who is going to be involved in the scoring and how frequently the system/data should be updated.

STECF observes thus that additional work is required both for the scoring of the individual indicators and for the compiling of individual indicators into one overall sustainability score. STECF agrees nevertheless with the suggestion of EWG 20-05 that based on the sustainability criteria and indicators for both the environmental and social dimension developed, a scoring system type 1, hence based on mandatory information (and as suggested: based on a limited set of criteria) could still be developed without major hurdles in the short term. A pilot system for FAP based on a few products would be useful to provide a testing ground for the further development of the system. This would allow for a more detailed assessment of the (international) legal implications of the introduction of such as a system.

General comments

STECF observes that this scoring system is of a fundamentally different nature than the current information requirement under the CMO. In the current system producers are required to provide product data which allows, to some extent, the buyer/consumer to make his/her own personal assessment of the product's sustainability, based on simple attributes such as species, area of catch and fishing technique used. The proposed scoring system would provide a sustainability score to be displayed on the product. Thus, the sustainability appraisal would not be done *by* the buyer/consumer but *for* the buyer/consumer.

STECF notes that the EWG 20-05 was not able to discuss whether the standardisation in the sustainability scoring between aquaculture and fished products would be feasible. This implies that a given score is not comparable for both product types (e.g. a C score is not signalling the same for the same species coming from aquaculture or from fisheries). Thus, the score itself should be clearly associated to the category of FAP it is referring to (aquaculture or wild product).

STECF notes also that EWG 20-05 concentrated on developing a set of indicators for fisheries and another set for aquaculture, for unprocessed fresh and chilled products at production site only (harbour landing or farmgate). Although sustainability aspects along the value chain (processing, transportation and sales) are also important and may need to be considered, this remained outside the scope of EWG 20-05.

STECF notes that the proposed system is clearly aimed to be complementary to the existing certification schemes and labels, and not competing. STECF observes however that this aspect needs further detailing for this to be the case. This includes both aspects of how the schemes and labels relate to the EU score and how these can guarantee a level playing field, now and in the future.

STECF notes that the revision of the marketing standards is included as an initiative under the EU's Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system initiative. A generic framework of a scoring system is foreseen to be developed for all types of food products and not only FAPs. STECF underlines however that fisheries FAPs have unique attributes (as being a wild capture activity depending on the natural productivity of ecosystems rather than being an agricultural production) that must be specifically considered, as highlighted by the criteria and indicators selected by the EWG.

STECF conclusions

STECF concludes that the EWG 20-05 answered its TORs and acknowledges that the analysis produced is comprehensive and of a high standard. STECF notes that the EWG 20-05 report provides a sound basis for the further development of policy options to include sustainability criteria in the marketing standards for fishery and aquaculture products.

STECF acknowledges that substantial work is still needed to develop a fully operational system. In particular, an intensive testing phase using pilot products will be required. Nevertheless, STECF concludes that the necessary elements and data requirements should be readily available to implement a scoring of type System 1 without major hurdles.

STECF concludes that the work of the EWG 20-05 strongly suggests that the revision of the CMO regulation should as a minimum include more detailed information necessary to allow a robust assessment of sustainability. This especially includes the fishing gear and area (as the current wide categories appear to be insufficient) and the typology of aquaculture production systems. These data would not directly provide a sustainability indicator but would allow the buyer/consumer to make his/her a better informed own appraisal of the product's sustainability.

STECF concludes that for the scoring system to become effective and accepted by the fishing/aquaculture sector, companies along the value chain, other stakeholders and consumers, it needs to be transparent, traceable and be developed with all parties along the market chain. In particular there needs to be (i) Transparency both in the data used and the way the data are processed that result in a FAP sustainability score. (ii) Traceability of the FAP along the entire marketing chain, starting at an initial FAP sustainability score at landing harbour/farm gate, along the chain of processing and transportation until the final consumer sustainability score. To achieve this and be able to be open and transparent the system needs to be developed and tested involving all parties along the market chain.

STECF concludes that further detailing is needed to ensure the proposed system complements rather than competes with existing certification schemes and labels. This includes both aspects of how the schemes and labels relate to the EU score and how these can guarantee a level playing field, now and in the future.

STECF concludes that the work presented here demonstrates enough potential and operationality of the system proposed to give confidence to progress the further development of the system. Some specific steps could be taken already in 2021 through dedicated contracts on, for example, the collection and assessment of data available, before a dedicated follow-up EWG in 2022.

Contact details of STECF members

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

Name	**Affiliation[1]**	**Email**
Abella, J. Alvaro	Independent consultant	aabellafisheries@gmail.com

Name	**Affiliation[1]**	**Email**
Bastardie, Francois	Technical University of Denmark, National Institute of Aquatic Resources (DTU-AQUA), Kemitorvet, 2800 Kgs. Lyngby, Denmark	fba@aqua.dtu.dk
Borges, Lisa	FishFix, Lisbon, Portugal	info@fishfix.eu
Casey, John	Independent consultant	blindlemoncasey@gmail.com
Catchpole, Thomas	CEFAS Lowestoft Laboratory, Pakefield Road, Lowestoft, Suffolk, UK, NR33 0HT	thomas.catchpole@cefas.co.uk
Damalas, Dimitrios	Hellenic Centre for Marine Research, Institute of Marine Biological Resources & Inland Waters, 576 Vouliagmenis Avenue, Argyroupolis, 16452, Athens, Greece	shark@hcmr.gr
Daskalov, Georgi	Laboratory of Marine Ecology, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences	Georgi.m.daskalov@gmail.com
Döring, Ralf (vice-chair)	Thünen Institute [TI-SF] Federal Research Institute for Rural Areas, Forestry and Fisheries, Institute of Sea Fisheries, Economic analyses Herwigstrasse 31, D-27572 Bremerhaven, Germany	ralf.doering@thuenen.de
Gascuel, Didier	AGROCAMPUS OUEST, 65 Route de Saint Brieuc, CS 84215, F-35042 RENNES Cedex, France	Didier.Gascuel@agrocampus-ouest.fr
Grati, Fabio	National Research Council (CNR) – Institute for Biological Resources and Marine Biotechnologies (IRBIM), L.go Fiera della Pesca, 2, 60125, Ancona, Italy	fabio.grati@cnr.it
Ibaibarriaga, Leire	AZTI. Marine Research Unit. Txatxarramendi Ugartea z/g. E-48395 Sukarrieta, Bizkaia. Spain.	libaibarriaga@azti.es
Jung, Armelle	DRDH, Techopôle Brest-Iroise, BLP 15 rue Dumont d'Urville, Plouzané, France	armelle.jung@desrequinsetdeshommes.org

Name	**Affiliation[1]**	**Email**
Knittweis, Leyla	Department of Biology, University of Malta, Msida, MSD 2080, Malta	Leyla.knittweis@um.edu.mt
Kraak, Sarah	Thünen Institute of Baltic Sea Fisheries, Alter Hafen Süd 2, 18069 Rostock, Germany.	sarah.kraak@thuenen.de
Ligas, Alessandro	CIBM Consorzio per il Centro Interuniversitario di Biologia Marina ed Ecologia Applicata "G. Bacci", Viale N. Sauro 4, 57128 Livorno, Italy	ligas@cibm.it; ale.ligas76@gmail.com
Martin, Paloma	CSIC Instituto de Ciencias del Mar Passeig Marítim, 37-49, 08003 Barcelona, Spain	paloma@icm.csic.es
Motova, Arina	Sea Fish Industry Authority, 18 Logie Mill, Logie Green Road, Edinburgh EH7 4HS, U.K	arina.motova@seafish.co.uk
Moutopoulos, Dimitrios	Department of Animal Production, Fisheries & Aquaculture, University of Patras, Rio-Patras, 26400, Greece	dmoutopo@teimes.gr
Nord, Jenny	The Swedish Agency for Marine and Water Management (SwAM)	Jenny.nord@havochvatten.se
Prellezo, Raúl	AZTI -Unidad de Investigación Marina, Txatxarramendi Ugartea z/g 48395 Sukarrieta (Bizkaia), Spain	rprellezo@azti.es
O'Neill, Barry	DTU Aqua, Willemoesvej 2, 9850 Hirtshals, Denmark	barone@aqua.dtu.dk
Raid, Tiit	Estonian Marine Institute, University of Tartu, Mäealuse 14, Tallin, EE-126, Estonia	Tiit.raid@gmail.com
Rihan, Dominic (vice-chair)	BIM, Ireland	rihan@bim.ie
Sampedro, Paz	Spanish Institute of Oceanography, Center of A Coruña, Paseo Alcalde Francisco Vázquez, 10, 15001 A Coruña, Spain	paz.sampedro@ieo.es

Name	**Affiliation[1]**	**Email**
Somarakis, Stylianos	Institute of Marine Biological Resources and Inland Waters (IMBRIW), Hellenic Centre of Marine Research (HCMR), Thalassocosmos Gournes, P.O. Box 2214, Heraklion 71003, Crete, Greece	somarak@hcmr. gr
Stransky, Christoph	Thünen Institute [TI-SF] Federal Research Institute for Rural Areas, Forestry and Fisheries, Institute of Sea Fisheries, Herwigstrasse 31, D-27572 Bremerhaven, Germany	christoph.stransky@thuenen.de
Ulrich, Clara (chair)	IFREMER, France	Clara.Ulrich@ifremer.fr
Uriarte, Andres	AZTI. Gestión pesquera sostenible. Sustainable fisheries management. Arrantza kudeaketa jasangarria, Herrera Kaia - Portualdea z/g. E-20110 Pasaia – GIPUZKOA (Spain)	auriarte@azti.es
Valentinsson, Daniel	Swedish University of Agricultural Sciences (SLU), Department of Aquatic Resources, Turistgatan 5, SE-45330, Lysekil, Sweden	daniel.valentinsson@slu.se
van Hoof, Luc	Wageningen Marine Research Haringkade 1, Ijmuiden, The Netherlands	Luc.vanhoof@wur.nl
Vanhee, Willy	Independent consultant	wvanhee@telenet.be
Villasante, Sebastian	University of Santiago de Compostela, Santiago de Compostela, A Coruña, Spain, Department of Applied Economics	sebastian.villasante@usc.es
Vrgoc, Nedo	Institute of Oceanography and Fisheries, Split, Setaliste Ivana Mestrovica 63, 21000 Split, Croatia	vrgoc@izor.hr

REPORT TO THE STECF

EXPERT WORKING GROUP ON Criteria and indicators to incorporate sustainability aspects for seafood products in the marketing standards under the Common Market Organisation (EWG-20-05)

Virtual meeting, 23-27 November 2020

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 20-05 on "Criteria and indicators to incorporate sustainability aspects for seafood products in the marketing standards under the Common Market Organisation", which met remotely from 23th to 27th November 2020,

- **General Príncipes**

The overall aim of the EWG 20-05 was to identify some critical aspects of sustainability of fisheries and aquaculture products (FAPs), that could be incorporated into a scoring system in order to inform consumers and actors along the supply chain. Such a system would differ from most certification and label schemes as it would not intend to establish whether a given product is sustainable or not. Thus, while the scoring would be mandatory (at least in the medium term), no absolute thresholds of sustainability apply and only a relative ranking of products is targeted. The objective is to compare the performance of seafood products, according to the set of criteria that are considered in the scoring system, with the long-term goal to incentivise improvement in both sourcing and production practises.

The EWG suggests to develop the scoring system step by step, starting with a System 1 based on simple indicators for data-limited fishery and aquaculture products, while products benefiting from key additional data may allow a more reliable assessment of sustainability criteria under a System 2. The low confidence generally expected from the simple system 1 was designed to produce from low to medium scores, while considering more criteria and more robust indicators lead to a wider range of scores, potentially including the highest levels of scoring. Such a combined approach should evolve over time, potentially starting with a limited number of products rated according to System 2, and then gradually increase their proportion as more data become available. At the same time, the scoring system itself should be gradually improved, in particular on the basis of feedback from stakeholders.

Provided that all stakeholders, including producers, can take ownership of the scoring tool and possibly change their practices in consequence, such a scoring approach can lead to generalizing the current good practices that are expected to progressively become the common standards. Higher environmental standards should emerge at the same time, thus becoming the new and achievable good practices. Consequently, **the overall scoring approach intends to initiate and/or encourage a virtuous cycle of improvement and a continuous dynamic of progress towards less ecological and environmental impacts and higher social standards in seafood production and trade.**

- **Scoring of fished products**

For fished products, the EWG selected **eight sustainability criteria** (Table 1.1) based on their **importance** as recognized priorities in terms of sustainability, and their current **applicability** at the scale of a given product placed on the EU market.

For six criteria, the EWG was able to identify a scoring risk-based approach based only on the mandatory information currently available for all fresh and chilled fish products, according to the CMO regulation (i.e. the species, fishing gear type and fishing area). The EWG stresses that such a risk-based approach, referred to as System 1 (see § 3.2), would provide coarse scores and should not be implemented until a test phase has been completed to assess the scoring feasibility, reliability and consistency of each criterion.

More importantly, the possibility of switching from this simple System 1 to the more robust System 2 should be offered to all producers and importers as soon as they provide additional well-defined and verifiable voluntary information. This additional information should allow their products to be rated on the basis of the more reliable System 2, which gives them the possibility to distinguish themselves from a more generalized rating of their product type, if justified.

The EWG considers that **the coexistence of the two rating systems is a powerful incentive for all players in the fishing industry to make efforts to collect and provide the additional information needed to better assess the sustainability of their products**.

Table 1.1 – Summary of criteria and scoring approaches of the sustainability of fished product in System 1 and 2 (more details in Tables 3.3 and 3.7; RBA: Risk-Based Approach; ETP: endangered, threatened, protected species; F/Fmsy: ratio of fishing mortality over fishing mortality at maximum sustainable yield; B/Bo: ratio of stock biomass over the mean equilibrium unfished biomass; FUI: fuel use intensity; RFMO: Regional Fisheries Management Organizations**).**

Criteria	System 1	System 2	
	Scoring approach and Indicators	***Additional information required***	**Scoring approaches and Indicators**
Fishing pressure	RBA based on the proportion of overfished stocks by FAO area, and the vulnerability index per species	*Detailed fishing area (thus stock identity)*	. Score based on mean F/Fmsy over 5 years
Fisheries management	RBA using a scoring of RFMOs performances	*Detailed fishing area (stock identify, and associated management body)*	. Stock-based rating using management rules categories . RFMO rating of the management performances
Impact on ETP and sensitive species	No assessment possible	*Sub-area of fishing and precise fishing gear*	. RBA by 'ETP-oriented' pseudo-métier . RFMO rating of the conservation performances
Unwanted landings and discards	RBA by gear type and species	*Sub-area of fishing and precise fishing gear, including mesh size*	. RBA by 'unwanted catch-oriented' pseudo-métier . RFMO rating of the unwanted catch performances
Impacts on the seabed	RBA by gear type and species	*. Step 1: Fishing gear* *. Step 2: Fishers' declarations on habitats*	. RBA by fishing gear (step 1) . RBA based on habitats (step 2)
Impact on marine food webs	No assessment possible	*Detailed fishing area (thus stock identity and associated management body)*	. Score based on the mean B/Bo ratio (as a proxy of indirect impacts on prey and predators)
Carbon footprint	RBA by gear type and species	*. Fishers' declarations on FUI* *. or: input factors of FUI models*	. Score based on FUI declarations (opt.1) or FUI estimated from models (opt.2)
Waste and pollution	RBA by pseudo-métier	*. Step 1: Sub-area of fishing and fishing gear* *. Step 2: additional parameters*	. RBA by 'plastic use-oriented' pseudo-métier . RFMO rating of management performances regarding plastic

- **Scoring of aquaculture products**

In order to implement an evaluation of sustainable aquaculture production, the EWG considers that additional information on the aquaculture production system is required to the current mandatory information (species, country of production). In the case of European products, the production system can be easily identified according to the EU DCF and EUMAP classification systems (Table 4.1). Such a classification should probably be adapted and then adopted as a globally usable categorization of aquaculture production technologies. Accordingly, **the production system type from which the farmed organisms originates should be considered as mandatory information for all imported aquaculture products**.

The EWG suggests to score the sustainability of farmed products using **twelve criteria** (Table 1.2). Under the simple System 1, these criteria would be scored according to the performances of each production system, including the species and the production technology. System 2 requires the creation of a database, making more detailed information available for products from aquaculture. Information at the country level will be sufficient for a few indicators (at least as a first step of System 2), however the information needs to be collected at the farm level for the majority of indicators (see Table 1.2). Therefore, the switch from System 1 to System 2 should be an

opportunity offered to the producers to potentially differentiate themselves from a generalized average for their product type, provided that they provide the required reliable and verifiable information for the evaluation.

Table 1.2 – Scientific basis of scoring under System 1 and additional data required to move to System 2 (EIA: Environmental Impact Assessment; LCA: Life Cycle Assessment; GHGs: Green House Gases)

Criteria	Rating in System 1	Additional data required in System 2
Effluents	Rating by production system based on models, literature, etc.	Specific data collected at the farm level (on effluent management)
Protection of wild populations: escapees	Rating by production system	Rating by country and production system
Protection of humans: therapeutic treatments	Available statistics by country on use per species and production system	Specific data collected at the farm level (on therapeutic chemicals)
Feed: source of marine raw materials	Used/non-used, feed dependency by production system	Specific data collected at the farm level (on feed composition)
Source of agricultural ingredients	Used/non-used, feed dependency by production system	Specific data collected at the farm level (on risk crops)
Waste management	Waste disposal system per country	Specific data collected (still to be developed)
Interaction with critical habitats and species	No assessment possible under System 1	Country-level compliance with international agreements on protected areas
Non-therapeutic chemical inputs	Used/non-used (NB: in the EU, organic implies non-used)	Specific data collected at the national or farm level
Environmental assessment	Country-level benchmark comparing the effectiveness of EIA of countries	Same as in System 1
Area-based management	Country-level benchmark comparing the effectiveness of EIA of countries	Same as in System 1
Energy use (on farm, all types)	Per production system/species based on LCA reviews	Specific data collected at the farm level (on total energy used)
Carbon footprint (farm gate GHGs)	Score based on LCA reviews per production system/species	Specific data collected at the farm level determining farm gate GHGs

- **Scoring of the social dimension**

Regarding the social dimension of sustainability, the EWG identified **three main criteria** and suggests a three-step process (Table 1.3). Under System 1, the scoring would be established at the country level, depending in step 1 on the ratification of the core labour standard conventions of the International Labour Organisation (ILO) and, in step 2, of the level of enforcement of these conventions. In a medium to longer-term process (System 2), producers and importers should be asked to provide information on the fleet segments for fished products or to production system type for aquaculture, in order to assess social criteria at the scale of the production unit.

While step 2 would require a significant preliminary work prior implementation, step 1 could be easily implemented in the short term and would be a useful approach to highlight major social contrasts between the countries that export FAPs to the EU.

As for System 2, the scoring will be established at a finer scale than countries, based on additional information voluntarily provided by producers or importers. Such a system would only be proposed for products issued from countries where the required information can be made available at the production unit scale, and can be verified through traceability. This currently, among others, includes EU Member States.

Table 1.3 – Summary of preliminary indicators suggested to score social criteria in FAPs

Criteria	System 1 – Assessment at the country level		System 2 - Assessment at the scale of "production unit"
	Step 1	Step 2	
Working conditions for FAP production	**Ratification** of ILO conventions	Level of **enforcement** of ILO conventions, regarding age, gender, nationality, education	score by fleet segment or production system type
Working conditions in the processing of fish			Score by small region or by firm category
Fair production (impact on local communities)		Remuneration, with ref. to minimum wage indicators	Remuneration by fleet segment or production system type

- **Towards an operational scoring system**

The report provides additional findings on the reliability and feasibility of the suggested criteria (§ 6.1). Various approaches are described and discussed towards combining all indicators and considering uncertainty in a final unique scoring at the product level (§ 6.2).

The EWG stresses that **the foreseen scoring system has to be considered as complementary to the existing certification schemes and labels** and not as an alternative. It should also be underlined that such a scoring applies to the production sector only (thus providing a score at landing/farmgate). A "transport" criterion could be rather easily added for fresh and chilled products, while the scoring of processed FAPs should also include specific processing and packaging impacts. This could be done combining the suggested system with approaches commonly used for food products (e.g., PEF, LCA). This especially requires to ensure traceability for all FAPs along the full supply chain, considering that processed FAP represent more than 50% of the household expenditure in fish and seafood products.

Finally, the EWG detailed the additional work that is still required for each criterion before system 1 and 2 can be implemented (Table 6.5 and §6.4). It stressed that **substantial preparatory work is still required before any scoring system can be implemented** and therefore considers that the most effective and efficient process would be to entrust this work to a dedicated small team of experts under the guidance of a scientific committee, in combination with a dedicated broader network of scientists and specific STECF EWGs.

Provided a sound consultation of stakeholders and the requested statistical analyses may have been primarily conducted, **a new EWG should be organised in late 2021 or early 2022**, with the objective to set up an operational scoring system in the short term (Table 1.4). In the medium term, a step by step procedure in two or three years should be envisaged, where specific STECF EWGs would progressively add new operational criteria within the scoring system, based on the analyses provided by the dedicated team. It would likely be desirable for acceptance that the full implementation process of the scoring system be conducted in close cooperation with stakeholders, and evaluated step by step by the STECF plenary.

Table 1.4 – Scoring that could be implemented in the short-, medium- or longer-term perspective.

Criteria	Short term	Medium term	Longer perspect.
Fishing pressure	Systems 1 & 2	Systems 1 & 2	
Fisheries management	NA	Systems 1 & 2	
ETP & sensitive species	NA	System 2	
Unwanted catches	System 1 (if feasible) or NA	Systems 1 & 2	
Impacts on the seabed	System 1	Systems 1 & 2.1	System 1 & 2.2
Impact on food webs	NA	System 2	
Carbon footprint	System 1 (if feasible) or NA	Systems 1 & 2.1	System 1 & 2.2
Waste and pollution	System 1 (if feasible) or NA	Systems 1 & 2	
Aquaculture criteria	Grey score	System 1	Systems 1 & 2
Social criteria	System 1, step 1	System 1, step 2	Systems 1 & 2

1 INTRODUCTION

1.1 Terms of Reference for EWG-20-05

Background and general objectives

One of the measures established under the common market organisation (CMO) are regulatory marketing standards for fishery products. The current marketing standards[1] (all of which exist for more than 20 years) lay down uniform quality characteristics for certain fishery products sold in the EU, whatever their origin.

In 2019, an evaluation of the implementation of the marketing standards was carried out to assess whether the existing marketing standards were still fit for purpose. The results of the evaluation are reflected in a Commission Staff Working Paper[2].

The evaluation identified shortcomings regarding the effectiveness of the current marketing standards framework in achieving the objectives set out in the CMO Regulation of 2013[3]. In particular, the existing marketing standards do not sufficiently contribute to a level playing field on environmental and social aspects and have not been equipped to deliver on the objective of enabling the EU market to be provided with sustainable products. Consequently, the revision of the marketing standards is included as an initiative under the Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system[4].

For that purpose, the Commission would like to engage the scientific community and, in particular, this STECF EWG to help with the development of robust policy options for the revision of the EU regulatory marketing standards in terms of incorporating sustainability aspects.

The STECF EWG will be able to build on preparatory work that was subject to a separate contract preceding the launch of the EWG. This preparatory work consists of two reports (for fisheries and aquaculture, respectively) that provide a mapping of existing methodologies providing sustainability assurance claims, incl. the identification and description of the criteria and indicators used in these methodologies.
On that basis, the main objective of this EWG will be to assess the identified criteria and indicators in terms of their potential to be incorporated in regulatory marketing standards, ideally for both fishery and aquaculture products (FAPs) on the EU market, independently of their origin (domestic and imports).

Specific objectives

The specific objectives of the EWG will be to help:

- identify sustainability aspects (environmental and possibly social) that could be addressed through the marketing standards; and

[1] Council Regulation (EC) No 2406/96 of 26 November 1996 laying down common marketing standards for certain fishery products, OJ L 334, 23.12.1996, p. 1–15
Council Regulation (EEC) No 1536/92 of 9 June 1992 laying down common marketing standards for preserved tuna and bonito, OJ L 163, 17.6.1992, p. 1–4.
Council Regulation (EEC) No 2136/89 of 21 June 1989 laying down common marketing standards for preserved sardines and trade descriptions for preserved sardines and sardine-type products, OJ L 212, 22.7.1989, p. 79–81.

[2] Commission Staff Working Document SWD(2019) 453 final of 20 December 2019

[3] Regulation (EU) No 1379/2013 of the European Parliament and of the Council of 11 December 2013 on the common organisation of the markets in fishery and aquaculture products, amending Council Regulations (EC) No 1184/2006 and (EC) No 1224/2009 and repealing Council Regulation (EC) No 104/2000, OJ L 354, 28.12.2013, p. 1–21, recitals (18) and (19).

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

- propose transparent methods of measuring and communicating along the supply chain such sustainability aspects, based on scientifically sound, simple and verifiable criteria and indicators.

Tasks

Task 1: Assess existing sustainability criteria and indicators for fisheries and aquaculture products in the EU.

The EWG should assess the feasibility of using a number of existing criteria and indicators for regulatory marketing standards. For this assessment, the EWG is requested to take into account to which degree the information and data underlying these criteria and indicators is publicly and easily available to the actors along the supply chain, both for domestic and imported products, for example:

- traceability information for fishery and aquaculture products made mandatory by the EU regulation, e.g. control regulation, CMO, FIC
- Scientific advice provided by independent bodies at international and EU level, e.g. in relation to MSY
- Scientific advice provided by independent bodies at international and EU level e.g. MSY achievements
- EU and international standards on environmental, social and economic sustainability e.g. ILO ratifications

This assessment should cover the different types of FAPs, i.e. wild unprocessed fish, farmed unprocessed fish and processed products consisting of one main FAP ingredient.
Some of the existing indicators are calculated at stock level or aggregated at the level of ecosystems (e.g. MSY) while others are estimated at the fishing fleet level (e.g. AER, Balance indicators). Consequently, the EWG would need to take this aspect into account when investigating the feasibility of using such existing indicators at product level.

Task 2: Explore possibilities to assign or combine sustainability criteria / indicators

The EWG should identify for the various types of FAPs possible combinations of criteria / indicators used for the assessment of sustainability. The dimensions of sustainability covered by each combination could be different (environmental and/or social).

Ideally, the EWG should for each type of FAP identify different combinations that vary in terms of criteria and complexity to offer a range of possibilities.

For each identified combination, the EWG should propose a grading / weighting method that could ideally lead to one or several product scores or thresholds. For each combination, the EWG is required to provide all sources of data / information and the necessary calculations to obtain the final sustainability score or grading of the product.

Task 3: Limits of the different combinations of criteria / indicators

In order to assist the Commission in identifying realistic policy options for regulatory marketing standards, the EWG should provide a critical analysis of the different combinations identified. In particular, the EWG should analyse them in the light of the following aspects:

- **Scientific soundness** of the chosen measures and indicators
- **Breadth** in terms of the product scope covered
- **Effectiveness** in terms of distinguishing more sustainable from less sustainable products
- **Verifiability** of the measures and indicators (incl. availability of necessary data and complexity of data gathering)
- **Simplicity** and clarity in terms of conveying a clear message through the supply chain and possibly the consumer

Importantly, the analysis should also identify the general challenges (or obstacles, if applicable) of defining sustainability criteria and indicators (or combinations thereof) that could, in practice, be translated into EU regulatory marketing standards.

1.2 Background information from the ad hoc contract

1.2.1 General approach

Upstream to STECF EWG20-05, DG MARE requested the work of two experts on the sustainability criteria and indicators addressed by existing sustainability schemes in the seafood sector. One expert worked on the fisheries sector, and another one on the aquaculture sector. They were requested to:

- provide a mapping of existing schemes concerning sustainability issues (both in aquaculture and fisheries sector)
- analyse the way that existing schemes address these issues (which indicator they used, which data they used …)

In order to respond to the DG MARE expectations, both experts produced a database, called Annex 1, mapping the existing schemes in fisheries or aquaculture and providing basic information about their scope (sustainability dimensions covered, products considered …). This first database doesn't provide detailed information on sustainability indicators.

From this first database, in agreement with DG MARE, a limited set of schemes have been selected (7 for fisheries and 8 for aquaculture), according with the following requirements:

- Major scheme in the market
- To address all sustainability issues identified in the first database (Annex 1)
- To include the full breadth and the full depth of sustainability indicators

Table 2.1 - List of selected schemes for fisheries and aquaculture report

Selected fisheries schemes	Selected aquaculture schemes
• Marine Stewardship Council, • Friend of the Sea, • Pêche Durable (French label), • Valduvis, • FAO guidelines on Fisheries certification, • Iceland Responsible Fisheries Management, • Marine Conservation Society (Consumers guide)	• Aquaculture Stewardship Council, • Whole Foods Market Quality, • Marine Conservation Society, • EU Organic Regulation, • FAO guidelines on Aquaculture certification, • Sustainability Assessment on Food and Agriculture Systems, • World Benchmarking Alliance, • World Wide Fund for Nature methodology

From this selection experts derived a second dataset, referred as Annex 2, which includes details on sustainability indicators, identifying which indicators are used by which label to assess the sustainability of aquaculture or fishing practice.

Along these two databases, each expert produced a report presenting:

- Some global figures and information on aquaculture and fisheries schemes. For example, both reports provide information on main issues addressed in aquaculture schemes and in fisheries schemes.

- Key elements for a better interpretation of the databases. For example, both reports provide details on the information contained in columns in each of the databases.

1.2.2 Organization of the database (Annex 2)

Annex 2 is a detailed listing without any hierarchization of criteria. It allows identifying which schemes address which criteria of sustainability in a way to identify "key" criteria or sub-criteria.

For the sake of harmonization, the two reports and the associated databases have been built according to a common structure, described in Table 2.2.

Table 2.2 – Structure of Annex 2: columns title and interpretation

Title of the columns (Aquaculture / fisheries)	Interpretation
Criteria	Defines a category that refers to a fairly general question or problem in sustainability (e.g. impact on stocks, impact on habitats, pollutant emissions ...)
Sub-criteria	Splits the sustainability criteria in refined categories that address a more specific issues concerning sustainability
Indicator Reference	Gives information on where to find indicator in the reference document (specific to each scheme)
Indicator	Provides information on how the schemes deal with each indicator
Methodology / Formula / threshold / grading	Provides the calculation methodology that is used to calculate the indicators
Weighting	The importance/weight of each indicator in measuring sustainability
Accessibility of data	Gives information if the data used is mostly private or could be publicly available.
Data used	Provides reference information on the data necessary for calculating the associated indicator.

In order to make Annex 2 more easily accessible for experts, a summary identifies the correspondence between the selected labels and the sustainability criteria or sub criteria.

1.2.3 Main findings and obstacles

Regarding the sustainability dimensions covered by the various analysed schemes (with no distinction between aquaculture and fisheries)

- Schemes mainly address **environmental** issues in their assessment.
- Some considerations to **social** issues are addressed in some schemes, but they are limited to a small number of criteria or sub-criteria.
- **Economic** issues are comparatively less addressed.

Some schemes are rather transparent on the way they are assessing and scoring sustainability but, at the opposite, others provide very little information on the underlying methods used. This may limit the understanding of some certification systems.

There are still a number of sustainability criteria that are not considered in the analysed schemes, in particular in relation to recent food or climate change issues. These missing criteria may constitute future challenges to any sustainability scoring system.

In accordance with both reports, and looking at the purpose on the current Working group, several obstacles can also be identified:

- *Access to data:* This will be a big issue regarding the expectation and the objective of the working group.

- *Need of experts for the assessment:* Most of the examined schemes are certification-based. Consequently, associated indicators **require the intervention of one or more experts and a case by case analysis**. Depending on the method of certification or rating, this can be very expensive and time-consuming, while the approach envisaged by the Commission for the revised marketing standards does not necessarily imply certification. In that sense, certification schemes are not replicable when incorporating sustainability aspects for seafood products in the marketing standards.
- *Some indicators are not viable at international level*: The commission's intention is to assess all seafood products placed on the EU market, of which a major part is imported. It appears that many of the indicators identified in these reports cannot be used for these imported products, especially due to the lack of data.

2 OBJECTIVES AND GENERAL APPROACH

2.1 A partial approach of sustainability dedicated to all FAPs (From a yes/no question to a scoring of sustainability performances)

According to the ToRs and to STECF plenary specifications, the overall objective of the EWG is not to define what sustainable fisheries and aquaculture are, neither to identify a method or a list of criteria able to provide such a definition. It aims at **identifying some aspects of sustainability that could be incorporated into a scoring system in order to inform actors along the supply chain**.

This implies that some aspects, even if scientifically demonstrated as important for the sustainability of seafood production, will likely not be considered in the system, at least in a first step, and this mainly for feasibility reasons, based on currently available methods and data.

Therefore, the approach the EWG intended to develop differs from most labelling approaches, as its purpose is only to deliver a relative score. **No score threshold was defined to establish whether the considered product is sustainable or not. The objective is only to compare the performances between seafood products, according to the set of criteria that are considered in the scoring system**.

In other words, such an approach to sustainability does not consider a Yes/No question, but rather delivers a relative score that only considers a selected set of sustainability criteria. The final goal of such a partial system is to promote incentives towards sustainability on the market for the selected criteria for both producers and consumers, noting that the system may not be sufficient to ensure the sustainability of the entire fishing and aquaculture production systems. Such an approach has to be considered as a tool among others, which may help to improve sustainability aspects. Therefore, it should be a new additional tool to promote sustainability in the fisheries and aquaculture sectors, but it is obviously not intended to replace nor even remedy any insufficiency of other tools such as fisheries management or product certification and labelling. This system however is designed to be as impartial as the available data is (and will be) and it should contribute to improving sustainable behaviours over time as it promotes incentives (virtuous cycle).

In particular, since the scoring related to the environmental dimensions of sustainability will include quantitative criteria measuring several ecological impacts of fishing on ecosystems, this system will likely contribute to minimize these impacts as required by the CFP. The scoring of social aspects, although associated to a lower feasibility in comparison to environmental aspects, would help identify high social standards and reduce the non-ethic or most controversial social practices within the seafood production system.

Such a system intends to be applicable to all FAPs placed in the European market independently of their area of production (Europe or imported). This implies that the system has to be in line with the World Trade Organisation (WTO) framework not to discriminate foreign products. Like all the marketing standards used under the CMO, the scoring system has to be based on the same scientific, transparent and non-discriminating criteria that applies to all products independently of

their origin. Therefore, the WTO rules exclude the introduction of a mandatory certification to enter the EU market.

2.2 A scoring dedicated to the production sector... as a first step

In accordance with its ToRs, EWG 20-05 focused on rating sustainability in the production sector. All experts agree however that taking sustainability into account in the post-production sector, including transportation and processing, is an absolute necessity. This is especially the case if the rating is to be provided to value chain actors in the EU, which is to say to importers, wholesalers, retailers or consumers. In other words, building a system dedicated solely to production, even if it can meet certain consumer expectations (especially on low fishing impacts on marine resources and ecosystems), could be counterproductive if the value chain is not accounted for, especially for processed FAPs. High scores attributed to a fishery product using an overpack or transported for example by air from a long distance could lead to justified criticism and, ultimately, to a discredit of the entire rating system itself. The criticism will be even sharper if the system intends to favour price incentives to the end-users, i.e. the consumers.

Therefore, the EWG provides information strictly related to the fisheries and aquaculture production sectors, what can be considered as **a part of a broader and more reliable approach where a scoring on processing and distribution to the EU has to be specifically defined and combined to those of the production sector for all FAPs.**

As a first step, one can imagine limiting the scope of the sustainability grading to non-processed FAPs, which constitute a major share of the overall market. In this case, the impacts of transport could and should be taken into account, adding to the aforementioned criteria at least one specific indicator on CO2 emissions, in relation to the origin of the product and the means of transport used.

However, the transport issue is not specific to FAPs, and has probably to be considered in a more general approach taking into account all the impacts of transport, processing and distribution. Such a scoring of sustainability may be reflected in other initiatives under Farm to Fork. It must therefore be aligned with the approaches developed for the whole food processing sector, especially using Product environmental footprint (PEF) and Life cycle analysis (LCA) methods and indicators. In particular adding the distribution step to the scoring system, while critical to be able to compare imported with domestic products, needs to be well-thought, as important rating distortions of products can arise between types of transportation and distance from production to consumption.

2.3 Building an iterative process

2.3.1 An evolving scoring system (Systems 1 and 2) …

A clear difficulty to build such a scoring system relates to the data required to assess any sustainability criterion. As a first step, the EWG tried to provide guidance to build a very simple scoring system only based on currently available data for all FAPs placed on the EU markets, i.e. information that are currently mandatory in regulation, for example through traceability and consumer information requirements. Because such a system would have clear and very strong limitations, the EWG assumed that additional information could be provided voluntarily by producers or importers, leading to a more robust and reliable scoring of the sustainability criteria and, therefore, to a more accurate and potentially higher rating of products that benefit from this additional information with a sufficient level of confidence.

Thus, the EWG aimed at developing **a step by step process, starting with simple and coarse indicators for data-limited fishery and aquaculture products, while products benefiting from key additional data may allow a more reliable assessment of sustainability criteria. The low confidence generally expected from the first simple system was designed to produce from low to medium scores, while considering more criteria and robust indicators lead to a wider range of scores, potentially including the highest levels of scoring**.

These two systems, i.e. the simpler and more limited (referred as system 1) and the more reliable and probably more complicated and costlier (system 2), will be first presented successively in the following sections of this report, as if DG MARE had to choose one or the other – or to interpret them potentially as two sequential steps. Then, we will discuss the possibility of combining the various options in a system where the scoring of a given FAP would depend on information available about it, thus within a mixed system 1 and 2 where the scoring depends on the available data for a given FAP.

Such a combined system should evolve over time, potentially starting with a very limited number of products rated according to system 2, and then trying to gradually increase their proportion. At the same time, the scoring system itself should be gradually improved, in particular on the basis of feedbacks.

More generally, the scoring system itself must be intrinsically scalable, as new criteria and indicators of sustainability should and could be gradually considered, depending on societal expectations, the improvement of scientific knowledge or the availability of data required for an improved scoring. An example would be the inclusion of **animal welfare criteria** not only for the aquaculture (as it is done later in this report following the latest EU recommendations https://ec.europa.eu/fisheries/animal-welfare-eu-aquaculture_en) but also in wild fisheries, as welfare needs of aquatic animals are increasingly and inextricably entwined with the need for conservation of their populations, communities and their environment, an approach that is entirely consistent with the concept of ecosystem-based management (Diggles et al. 2011). Another example is the inclusion of **human health criteria**, in line with the development of the EU Farm to Fork Strategy.

2.3.2 … to encourage improvement toward more sustainability in FAPs

This evolving scoring system intends to encourage a progressive improvement in fishing and aquaculture practices over time promoting a virtuous cycle. In some cases, a very simple approach may effectively flag the products with the lowest environmental or social standards, which can have a significant impact on their trade, leading to their gradual elimination. On the other hand, while such "red flags" should be used with caution, such a simple scoring system may also be useful and efficient in highlighting good practices to the consumers. In this sense, its ultimate objective is to incentivise stakeholders along the supply chain to favour wild and farmed seafood products that are produced with higher standards of environmental and social sustainability.

Provided that all stakeholders, including producers, can take ownership of the scoring tool and possibly change their practices in consequence, such a system can lead to generalizing the current good practices that are progressively expected to become the common standards. The higher environmental standards of the more refined system 2 should emerge in parallel, thus becoming the new and achievable good practices. Consequently, **the overall scoring system intends to initiate and/or encourage a virtuous cycle of improvement and a continuous dynamic of progress towards less ecological and environmental impacts and higher social standards in seafood production and trade**.

2.4 Methodological approach for scoring and standardisation

According to the ToRs, two **dimensions** of sustainability were considered by the EWG: the environmental and social dimensions. In practice, the work of the EWG was organised into three sub-groups, with regular plenaries in order to ensure consistency between sub-group approaches. Sub-groups refer to:

. The environmental dimension of fished products,
. The environmental dimension of the farmed products,
. The social dimension of both the farmed and fished products.

Each sub-group selected the **criteria** to be taken into account for a scoring of FAPs, i.e. the main aspects that are commonly recognized as part of the sustainability of fisheries or aquaculture and which could be included in practice in the scoring, especially in terms of data requirement. These **criteria therefore define the main categories of ecological impacts or social issues that the EWG proposes to include in the rating system**.

(Note that the ad-hoc reports refer to the terms 'criteria' and 'sub-criteria', while this report uses the terms 'dimensions' (e.g. for environment) and 'criteria' (e.g. for impact on the seafloor or aquatic nutrient emissions) for consistency with others scientific studies).

For each criterion, the EWG then specified one or several **indicators**, i.e. a quantitative metric that can be used to measure to what extent the product can be considered as sustainable regarding the related criteria. For some indicators, the EWG was able to directly suggest a rating of the product depending on information associated with the product (e.g. rating of the seafloor impact related to the used fishing gear). For the others, the EWG made an attempt to specify how indicators should be calculated and which data will be required.

For many criteria, especially when quantifying an impact is difficult without a case-by-case analysis, **the EWG suggests using risk-based indicators**. Such approach renders possible the identification of situations where an ecological impact (or an unethical social practice) is likely to occur. Therefore, these indicators do not guarantee that a given sustainability criterion is met (or not) but they simply indicate whether the product is likely (or not) to meet this criterion in a relative scale of sustainability (more or less sustainable practices). The huge advantage of this risk-based approach is that it can be easily applied to a wide range of products. Thus, the EWG considers that this approach will be essential for many criteria, in order to ensure the scoring of all FAPs on the market. However, the major limitation of such risk-based approach is that the resulting score, justified on average, can be to some extent misleading at the product level. Some of them may likely be undervalued relative to their actual sustainability, while others could benefit from unjustified good scores.

Finally, for all the indicators for which a rating can already be defined at this stage of the work, the sub-groups were asked to provide standardized values. In most cases, these values were defined using a six-level scale, from E (worse) to A+ (best). When sustainability targets are clearly defined (such as Fmsy, the fishing mortality currently adopted as the CFP target with respect to exploitation rates of fish stocks), a high score (A or A+) is assigned when the target is reached. When no targets exist, a good mark refers to a low or very limited impact (e.g. on Endangered, Threatened and Protected - ETP species, or in terms of nutrient emissions, etc.) or to a situation considered to be the most desirable in terms of sustainability (e.g. area-based aquaculture management).

The combination of the different indicators at the product level is discussed in the last part of this report.

3 SUSTAINABILITY CRITERIA AND INDICATORS FOR FISHED PRODUCTS

3.1 Selection and definition of criteria

Using the results of the ad hoc contracts, and in particular the Annex 2, the expert group selected 8 sustainability criteria based on the two following characteristics:

- Its **importance**: Is the criterion considered a well-known and recognized priority in terms of sustainability?
- Its **feasibility**: can this criterion be assessed at the level of a given fishery product? And are the required data readily available or can be made available for all products?

The definition and rationale of each criterion, as well as its potential limits if applicable, are specified below (§3.1). We then focus on the definition and rating of the associated indicators under the simple scoring system 1 (§3.2) and the more robust scoring system 2 (§3.3).

3.1.1 Fishing pressure

Starting from the seminal work of Graham (1935) and from the official UN conference set in Rome in 1955, sustainability has been historically defined referring to the concept of overfishing. In this view, avoiding overfishing was considered sufficient to ensure sustainability of the exploited fish

stocks, in such a way that many stakeholders are commonly confounding the two concepts: the fisheries sustainability and the absence of overfishing.

Such an approach of sustainability is based on single-species models of the dynamics of fish population where overfishing itself is defined as the situation where any increase in the fishing pressure is leading, on the long or medium term, to a decrease in the total catch that can be obtained from the stock. Conversely, the fishing pressure that allows to expect the maximum catch on average and over the long term (i.e. the well-known Maximum sustainable yield, MSY) is the limit of overfishing. This fishing pressure can be quantified referring to a fishing mortality, therefore introducing the Fmsy target, i.e. the fishing mortality which is expected to simultaneously ensure to catch the MSY on the long term and to avoid overfishing.

According to international commitments, the Fmsy has been adopted by the EU as the target for fish stocks management (EU regulation 2013). In particular, the Fmsy is the basis of the scientific advice delivered each year by ICES and STECF for all stocks subject to catch limits through the TACs regulation.

In order to define the more appropriate indicators, several aspects need to be added to this very general scheme:

- For a given stock, the Fmsy and the MSY itself refer to a given state of the ecosystem (for example with regard to the abundance of prey, predators or competitors of this stock, but also potentially to the characteristics of its habitat, etc.) and to a given fishing pattern (which depends on the fishing gear used and in particular the meshes and legal landing sizes).

- On the contrary to what many stakeholders (including most consumers) think, sustainability in such an approach is not defined based on fishing impact on the stock, but according to the expected long-term catch. Thus, avoiding overfishing does not mean that the fishery has no impact on the stock. Its renewal by the recruitment of young fish from reproduction is assured but the depletion of the abundance of older age classes generally leads to a very significant decrease in the entire biomass of the fish stock.

- Due to the natural variability, especially in the yearly recruitment, but also due to the short-term changes occurring in fishing practices and to the uncertainty inevitably associated to every fish stock assessment, the status of a given stock may change from one year to the other even if the TAC is regularly set according to the scientific advice. This is especially true when the stock is close to the overfishing limit, what should logically be the result of a Fmsy management strategy. As a consequence, any fishery indicator that is only based on the stock status (overfished Y/N) would require yearly updates, while it would be poorly informative on the extent to which the fishing pressure is close of not to the Fmsy target.

- Even when TACs are set in line with a scientific advice, which predicts that fishing mortality is equal to Fmsy and even if the real catch is equal to the TAC, the fishing mortality observed retrospectively usually differs from the expected Fmsy. This lag is due to the assessment uncertainty, which is amplified by the inability to predict in advance the exact trajectory of the stock. In particular, the scientific advices related to the TAC are usually based on the stability assumption that the recruitment of the coming year will be equal to the average of the previous years, what never happens in practice.

From these considerations, the EWG concluded that a criterion of sustainability based on the stock status alone, as a Yes/No question, would be insufficient. However, this can be a stopgap in a risk-based approach used as a coarse scoring system in data poor situations. Provided the required data can be made available, the assessment of fishing pressure with regard to the Fmsy target over the recent years (and not one year) would be much more informative and should be as much as possible the basis of the scoring system.

In this sense, **this first selected criterion of fishery product aims at assessing to what extent the current fishing pressure exerted on the related stock is able to achieve the objective of Fmsy management for this particular stock**. In other words, this criterion refers to the ex-post assessment of sustainability at the scale of each fish stock, as based on single-species assessment methods. Such a criterion must evidently be supplemented by other indicators dedicated to the ecosystem impacts of fisheries and to other aspects of fisheries management.

3.1.2 Fisheries management

The management system is a key aspect of sustainability as it determines how fisheries are regulated in order to achieve not only the sustainability of fishing pressures at the stock level, but more generally all the sustainability criteria linked to an ecosystem approach. Ideally, fisheries management should be evaluated on the basis of its ability to define appropriate management objectives as regards to those of stocks and ecosystems and to effectively ensure that these sustainability objectives are met. The assessment of these aspects, in particular at the scale of a given product placed on the EU market, appears however to be very difficult and likely impossible at least in the short or medium term future. Consequently, **proxies of the fisheries management performance** must be defined.

The first proxy concerns the tools that are used to regulate fishing pressure. While some fisheries are poorly regulated, others are managed using a wide range of regulatory tools. The history of fisheries management, particularly in Europe but not only, shows that the rules related to the characteristics of the gear are often first implemented (e.g. mesh and gear sizes), followed by fishing effort limits and then by a system of catch limits based on TACs and quotas. Provided management measures are science-based, the latter is generally considered as the most efficient. This is because there is often a weak relationship between the fishing effort that can be regulated and fishing mortalities, while the establishment of TACs and quotas allows generally fishing pressure to be set according to the productivity of the stock. Therefore, from no or poor management to the TAC regulation, **the tools used to regulate the fishing pressure exerted on a given stock** (and therefore on a given product) can be considered as informative on the development and performance of the underlying fisheries management system. Such an approach could be developed at the product level, provided information on the related stock is made available.

The performance of a management system also depends on the completeness of the rules adopted to guarantee an **ecosystem approach** and the establishment of a **data collection** system capable of informing management decisions accordingly. The ability of the system to ensure regulatory compliance through **monitoring and control** is also an important aspect for sustainability, as well as for the quality of fisheries **governance**. The latter could in particular be assessed by examining the involvement of the various categories of stakeholders involved in the governance process.

Concerning the ecosystem approach, these aspects (data collection, control and governance) are generally enforced for all stocks of a given area, and thus are not species specific (or very difficult to assess at this level) but are more related to the specific body in charge to provide the scientific advice and to define or at least coordinate the management rules and enforcement. For shared stocks, this has to be done at an international level through the Regional fisheries management organizations (RFMOs), while coastal resources can be efficiently managed at the country level. Consequently, any assessment of fisheries management related to these aspects could use a risk-based approach at the RFMO or country level, regardless of the scoring system (1 or 2). Ultimately, the evaluation of the "fisheries management" criterion should ideally combine aspects defined at the stock or product level and others related to the body in charge of management.

3.1.3 Impact on ETP and sensitive species

- Rational

The accidental catch of ETP and sensitive species is a major issue for the conservation of marine biodiversity and it may have unexpected impacts on the ecosystems functioning and resilience. As a priority, this concerns marine mammals, seabirds, turtles and some finfish, especially numerous species belonging to the group of rays and sharks. Additionally, the constant increase of public awareness for a healthy environment during the last decades has decreased the social acceptance for unsustainable practices in economic activities, especially for emblematic species. This topic is therefore a significant ecological issue as well as a clear expectation of the civil society. The accidental catch of ETP and sensitive species needs to be considered as a top priority in the recognition of what a sustainable fishery must be.

The protection of ETP and sensitive species is a requirement of the CFP regulation which is closely linked to the European environmental legislation's such as the Birds[5] and Habitats[6] Directives, the Marine Strategy Framework Directive (MSFD[7]) and the new Technical measures regulation (EU 2019 [8]). The CFP clearly states as an objective to "be coherent with Union environmental legislation, in particular with the objective of achieving good environmental status by 2020 as set out in Article 1(1) of [the Marine Strategy Framework Directive], as well as with other Union policies."

The Regulation on technical measures in particular is sets to "minimise the impacts of fishing gear on marine ecosystems and in particular on sensitive species and habitats". This includes:

- the prohibition of catching marine mammals or marine reptiles and seabirds covered by Directive 2009/147/EC,
- the creation of real-time closures dedicated to the protection of sensitive species,
- the introduction of additional restrictions on the construction and operation of certain fishing gear or even the total prohibition on their use in a given area,
- specific restrictions applied to the use of driftnets which in certain areas has resulted in significant catches of sensitive species.

Regulation (EC) No 1967/2006 of 21 December 2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea is still in force but do not include significant additional restriction related to sensitive species. In contrast, technical measures are also part of the Commission acts as stand-alone regulation such as the shark finning onboard vessels regulation[9]

➢ Definitions

By **ETP species** we considered Endangered, Threatened and Protected species corresponding to the following definitions of the IUCN criteria:

Endangered: species or taxa whose numbers have been drastically reduced to a critical level or whole habitats have been so drastically impaired that they are deemed to be in danger of extinction on the short or medium term. Also included are those that in all probability are already extinct, i.e. they have not been seen in the wild in the past 50 years.

Threatened: species suffering of threats of extinction based on its population demographics, biological characteristics, such as body size, trophic level, life cycle, breeding structure or social structure requirements for successful reproduction, and vulnerability due to aggregating habits, natural fluctuations in population size (dimensions of time and magnitude) (based on IUCN definition).

Protected: refers generally to any vegetal or animal species that a government declares by law to warrant protection; most protected species are considered either threatened or endangered. This definition extends to Regional or International conventions that include a list of protected species due to their decline in the wild, as a result of human or other causes. Among international lists of protected species, the one defined by the CITES is very strict and has been signed by almost all Countries, in such a way that species included in that list have a peculiar and binding status. Other International conventions ratified by EU MS or by MS from where the product originates should also be considered, even if they are not necessarily binding for the Governments. Assuming that the listing of any species at national or regional level highlights the needs to devote special attention

[5] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

[6] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

[7] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy

[8] Regulation (EU) 2019/1241 of the European Parliament and of the Council of 20 June 2019 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures.

[9] Regulation (EU) No 605/2013 of the European Parliament and of the Council of 12 June 2013 amending Council Regulation (EC) No 1185/2003 on the removal of fins of sharks on board vessels

to its conservation, other lists must be included such as of the Conventions from Barcelona, Oslo-Paris (OSPAR), Bern, Bonn (CMS), Helsinki (HELCOM), Cartagena (SPAW), Nairobi, Abidjan, etc.

By **Sensitive species** we considered species whose conservation status, including its habitat, distribution, population size or population condition is adversely affected by pressures arising from human activities, including fishing activities. In the case of European waters, this includes species listed in Annexes II and IV of Directive 92/43/EEC, species covered by Directive 2009/147/EC and species whose protection is necessary to achieve good environmental status under Directive 2008/56/EC. The EWG was not able to determine if these ETP-type of lists and even the concept of sensitive species itself were in use in non-European waters/countries. This implies that any indicator related to sensitive species has to be considered with care in the scoring of the "Discards and impact on ETP species" criterion to ensure it cannot be considered as discriminant.

3.1.4 Unwanted landings and discards (other than ETP)

Some catches can be considered as unwanted (implicitly by the fishers themselves and consequently by the overall society) because they are undersized or not marketable due to the market demand or to the feed habits of consumers, or because the fisher has no quota or no more quota at the time of fishing, or because the catch composition rules impose to avoid catching these species.

Unwanted catches can be landed or discarded at sea. In the first case they are used for petfood as raw material for industrial processing, or considered as waste. As for discards, they are returned mostly dead at sea. In the EU, the recent and progressive implementation of the landing obligation incentives fishermen to improve selectivity and their onboard practices to favoring survival or to land these catches.

Globally, even if a (usually rather small) fraction of discarded fish can survive, unwanted catches induce unwanted impacts on the related species and, thus, cannot be considered a sustainable practice. In any case, it is increasingly considered by the society that killing wild animals without any justification (like providing food to humans) is ethically unacceptable. Furthermore, in some cases, such unwanted catches can seriously affect fish populations and even disturb the functioning and resilience of marine ecosystems.

The European policy is taking a keen interest in these issues, in particular through the CFP[10] and the introduction of the landing obligation[11]. The EWG considers that **minimizing unwanted catches, regardless of whether they are landed or discarded dead in the sea, is an important criterion to consider for the sustainability of fisheries**.

3.1.5 Impacts on the seabed

One of the main urgent challenges at present is to implement fisheries management framed within environmental policies that considers both the protection of fishery resources as well as marine habitats (Tallis *et al.* 2010). The Marine Strategy Framework Directive (MSFD, EU Dir. 2008/56/EC) required that all Member States adopt measures to achieve Good Environmental Status (GES) in its territorial waters by 2020, in line with Ecosystem Approach to Fisheries (EAF) objectives. Achieving GES implies protecting marine ecosystems, preventing ecosystem degradation and restoring ecosystem health whenever possible, while developing at the same time the sustainable use of marine resources. Specifically, descriptor 6 of GES acknowledges the importance of sea-floor integrity by describing what the benthic habitats will look like when GES has been achieved: "Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected".

Furthermore, the Common Fisheries Policy (CFP Regulation (EU) No 1380/2013 of the European parliament and the Council of 11 December 2013) urged in its Article 2 to implement an ecosystem-based approach to fisheries management, where environmental impacts of fishing activities should be limited, among other aspects. Art 4 of the New Technical measures regulation also includes this

[10] https://ec.europa.eu/fisheries/cfp_en

[11] https://ec.europa.eu/fisheries/cfp/fishing_rules/discards_en

target, specifying that the environmental impacts of fishing activities on seabed habitats should be in line with point (j) of Article 2(5) of Regulation (EU) No 1380/2013. In this sense, the ecosystem-based approach to fisheries management seeks to manage the use of natural resources while preserving both the biological wealth and the biological processes necessary to safeguard the composition, structure and functioning of the habitats of the ecosystem affected.

Fishing impacts on marine habitats can be significant, particularly on habitats of high productivity and fragility, and consequently on marine biodiversity (Auster *et al*. 1996, Rijnsdorp *et al*. 2017, IPBES 2019). The real effect will depend on the type and extension of each habitat and the fishing method, as well as the interaction between the fishing activity and the ecosystem components (Thrush and Dayton, 2002). The EWG noted that the same concept should theoretically be extended to the pelagic environment, as limiting the fishing impacts overview only to benthic habitats can bias the assessment of sustainability. However, no scientific consensus nor standard methods does exist yet regarding the assessment of fishing impacts on pelagic habitat. Progress is however expected following ongoing developments on the overall GES assessment of pelagic habitats in EU waters (MSFD D1C6). As a consequence, the EWG acknowledges that **limiting the scoring to fishing impacts on the seafloor is a first and useful step, which notably fits the current MSFD approach**.

Although both active and passive gears may impact the benthic habitats, there is a large scientific consensus regarding the strong impacts of mobile bottom-contact gears on the seabed (mostly trawled gears see e.g. Sánchez, 2000; Thrush and Dayton, 2002; Amoroso *et al*., 2018). Therefore, impacts on the seafloor are strongly related to the fishing gear and its specific technology, and bottom trawls as well as dredges are usually considered the most impacting fishing gears.

The same gear can however have different impact depending on the seabed. Furthermore, the trawled surface and the thickness of impacted sediment for a given quantity of fished product should likely be considered. Although it is well known that passive artisanal fishing gears such as trammel nets and bottom longlines have usually a lower impact than bottom trawl on benthic habitats, this must not be taken as granted because in some fragile essential fish habitats (EFHs) such as coralligenous beds in the Mediterranean or other habitat forming species such as maërl in the North Atlantic and Mediterranean and kelps in the North Atlantic, these gears may still pose a threat to the fragile sessile communities that inhabit therein (The N2K group, 2017).

As a consequence, measuring the fishing impact on the seafloor is a challenging issue that has been intensively studied in various recent EU research projects (e.g. Benthis, Discardless, Response, Minouw, etc.). In particular, the recent EU program Benthis[12] suggested a set of pressures and state indicators to assess the impact of fisheries on the seafloor. However, these indicators refer to an analysis conducted at the scale of an entire ecosystem and appear to be inappropriate to a scoring at the level of a given fish product. Therefore, in the following 3.2 section the EWG rather suggests **a new qualitative rating system based on expert judgments** that should be considered as a first step towards the establishment of a detailed quantitative rating system.

The EWG noted that such a rating system on the market might complement the habitat credit system suggested by Benthis in order to reduce the impact of bottom trawling on the soft sediment habitats dominating the continental shelf areas of Europe. In such a credit system, possibly set in combination with technical measures, fishers would get a quota of habitat credits and would have to pay more for fishing in ecological sensitive areas and less in the core fishing grounds.

3.1.6 Impact on marine food webs

Extraction of a species or group of species through fishing may have, depending on the extracted quantity, a direct effect on other compartments of the considered food web, e.g. a food shortage for predators (fish, mammals, birds) or a release in predation for prey. Moreover, species extraction may have a more general indirect effect on the food web structure through food web cascade. It may notably lead to less efficient trophic transfers in the food web, thus to less productive ecosystems, but also to higher instability in the biomass of the various ecosystem components,

[12] https://www.benthis.eu/en/benthis.htm

thus inducing higher year-to-year catch variabilities (Rooney and McCann 2012, Maureaud *et al*. 2017).

The necessity to minimize the fishing impact on marine ecosystem is part of the EU CFP Regulation 1380/2013 art. 2.46, while the MSFD considers the Good Environmental Status (GES) of marine food webs through the descriptor 4.

A large diversity of criteria and indicators has been proposed to assess the impact of fishing and the resulting status of marine food webs. However, most of them if not all have been developed in the context of characterizing the global impact of the whole fishing activity in a given area, or monitoring ecosystems health in space and time. As a consequence, those criteria appear useless or of little interest to score sustainability at the level of a given fish product.

Size- or trophic level-based criteria can illustrate this assertion. Indeed, a large biomass of large fish or predators (they are often the same) is usually considered as a criterion of a good ecosystem's health, which can be assessed using indicators such as the Mean trophic level (MTL) or the Mean maximum length (MML). In contrast, a large proportion of predators or of large fish on the market tells us nothing on sustainability as it may arise from either a very healthy underlying ecosystem or a high-impact and unsustainable fishery targeting these big fish.

Another thinking path is to consider that all components of the food web have to remain sufficiently abundant in such a way to maintain the trophic structure and functioning of the ecosystem. Balanced harvest, where fishing mortalities are aligned to the natural productivity of all combined species, has been suggested as the appropriate fishing strategy to this goal (Zhou et al., 2010; Garcia et al., 2012). This approach has however been criticized and no scientific consensus is clearly established on the matter (Froese et al., 2015; Burgess et al., 2015). In any case, the fulfillment of such a fishing strategy would be clearly impossible to assess at the scale of a fish product.

A more simple and pragmatic approach is to consider the fishing impact on the various levels of the food chain. From that point of view the MSY approach commonly used to assess fisheries sustainability appears obviously insufficient as it refers to single-species modeling approaches not considering species interactions and especially the trophic interactions. Decreasing the biomass of predators to Bmsy may have, at least in some cases, major consequences on the biomass stability of prey and on the shaping of biodiversity on the long run (Rooney and McCann, 2012). On the other hand, impacts on preys have direct and measurable effects on their predators (Engelhard et al., 2014). Therefore, as an attempt to take into account the impact of fishing on the food web, the EWG suggests using, at least initially, **the impact of fishing on the relative abundance of the stock, assuming that changes in biomass can spread to prey and predators and finally to the overall food web**. In other words, the decrease in biomass at a given trophic level is considered as a disturbance likely to impact the entire food web. The related indicators are presented below, depending on the rating system.

3.1.7 Carbon footprint

The issue of energy is central for both the environmental and economic dimensions and thereby for the social sustainability of fisheries. Indeed, fisheries account for 0.5% of the global greenhouse gas (GHG) emissions (FAO 2018) and are highly dependent on fossil fuels, which represent the major proportion of these GHG emissions but also a major cost for fisheries likely impairing its economic sustainability. While fuel consumption appears limited for some small-scale or subsistence fisheries using passive gears, only the GHG emissions of non-motorized fisheries are not dominated by fossil fuels.

The EWG considers this is an important point, especially from the consumer's point of view, as consumers are often interested in the subject of carbon footprint. The EWG noted that carbon footprint can be provided by a partial Life Cycle Assessment (LCA) limited to the environmental impact "climate change". Thus, the LCA approach is a way to study carbon footprint of a product, including the production sector as well as the transport and processing sectors. However, even if a few initiatives exist, this type of study is still very limited in the sector of wild fishery products. The

EU has launched its own initiative about Product environmental footprint (PEF), developing guidelines for how to assess the environmental footprint of products, including fisheries products[13].

These analyses showed that **the bulk of the carbon footprint of a seafood product from fisheries is due to fuel consumption**, accounting for between 60 and 90% of emissions up to the point of landing (Tyedmers, 2004, Parker et al. 2018). Therefore, at least as a first approach, the rating of carbon footprint due to the production sector only, i.e. the fishing activity itself, i.e. excluding post-harvest steps like processing, packaging and transport to market, can be based on fuel consumption. A good overview over fuel use and greenhouse gas emissions is provided by Parker et al. (2018), showing that fuel consumption among other things depends on the gear used in fisheries, but also on target species/stock and its status. Certain general patterns do emerge across fishing methods and the major groups of target species they are used for that could form the basis for rating. Thus, the rating of carbon footprint will depend on the scoring system considered in the following sections.

3.1.8 Waste and pollution

Waste and marine pollution from all human activities are obvious threats for the environmental sustainability. In fisheries, waste may come in different types related to fishing operations such as black waters (toilet waters), grey waters (e.g. waters from showers, baths, laundry, kitchens, dishwashers) and marine litter (any persistent, manufactured or processed solid material discarded into the sea, rivers or on beaches brought indirectly to the sea with rivers, sewage, storm water or winds; or discarded or lost at sea).

The EWG notes that assessing all types of waste and pollutions due to fisheries would likely be an inaccessible goal for a scoring system applied directly to FAPs sustainability. On the other hand, marine litter is a major waste at sea and a major pollutant from fishing vessels, while lost fishing gear account for a significant part of marine litter due to fisheries (European Parliament[14]). In addition, plastic pollution recently became a particular and justified concern for all the society, including of course FAP's consumers. Therefore, the EWG considers marine litter and more specifically **the quantity of plastic litter due to fisheries** could be the only indicator considered for this broad Waste and pollution criterion, at least in the simple scoring system, referred as system 1.

3.2 From criteria to indicators, under a simple scoring system based on available data only (system 1)

3.2.1 General approach for a simple scoring based only on currently available data

As a first step, the EWG analysed what could be done in terms of sustainability scoring with the information only currently available on all fish products placed in the EU markets. In practice, this implies that **only data which are mandatory under the consumer information provisions of the CMO regulation will be considered in this first scoring system referred as system 1**.

The EWG points out that this information is currently only available for fresh and chilled products. Therefore, no rating system can be put in place for processed products, until the legislation imposes the same consumer information rules, thus making available what appears to be the minimum information required for any assessment of the product durability.

Risk-based approaches will be used intensively under system 1. Such approaches provide for each category of fishery product a risk-based assessment of sustainability criteria that could be considered on the basis of mandatory information only. Such a rating should be understood as a

[13] https://ec.europa.eu/environment/eussd/smgp/pdf/Fiche_fish.pd

[14] https://www.europarl.europa.eu/news/en/headlines/society/20181005STO15110/plastic-in-the-ocean-the-facts-effects-and-new-eu-rules

probability for the product to meet the criteria, this probability being defined on average for all products of the same category regardless of its own specific characteristics.

The current CM0 Regulation (n°1379/2013) specifies in its Article 35 that all "fishery products marketed within the Union, irrespective of their origin or of their marketing method, may be offered for sale to the final consumer or to a mass caterer only if appropriate marking or labelling indicates:

- The commercial designation of the species and its scientific name,
- The area where the product was caught, according to the 14 ICES divisions in the NEA (FAO area 27), to the 4 FAO sub-areas in the Mediterranean Sea and to the 17 remaining FAO statistical areas otherwise.
- The category of fishing gear used in capture fisheries, as laid down in Annex 3 of the Regulation, i.e. using 7 main fishing gear categories: seines, trawls, gillnets and similar nets, surrounding nets and lift nets, hooks and lines, dredges, pots and traps."

It should be noted that, according to article 39 of the CMO Regulation, additional voluntary information may be mentioned all along the supply chain and then provided to consumers. This especially includes more detailed information on the type of fishing gear, as listed in Annex 3 of the regulation (28 categories). More geographical details on the fishing area can also be added.

The EWG noted that the FAO statistical areas are not necessarily matching with the areas covered by the competent RFMOs (Fig. 3.1). This implies that some species can be declared on the label as taken in a given FAO area that is larger than the management RFMO area, resulting in a useless information for the sustainability assessment. This is for instance the case for non-tuna products from the Indian Ocean, where the South Indian Ocean Fisheries Agreement (SOFIA) is covering the southern part of FAO areas 51 and 57.

Probably more importantly, some FAO statistical areas are not covered by any RFMO, as it is the case in some parts of the Pacific and tropical Atlantic. However, in some areas, even if they are not formally recognized as RFMOs, regional bodies can be identified that are in charge to assess stocks and coordinate fisheries management. The EWG suggests an additional analysis should be conducted to identify which part of the fish products imported on the EU market is coming from areas related to a given RFMOs or assimilated body in charge of fisheries management coordination. This point is later developed with reference to system 2 and the establishment of a reference list of assessed stocks

Figure 3.1 – Maps of the 19 FAO statistical areas for fisheries (left) and of the non-tuna RFMOs

A scoring system based only on the mandatory information would currently be very imprecise exhibiting several limits that need to be clearly identified and that are analysed in more details in the following paragraphs. Thus**, the main goal of analysing system 1 is to assess its capabilities using mandatory information, as well as to evaluate the limits of such a system.**

At the same time, this simple and coarse system has a major advantage as it could be applied to all fishery products, including those for which no direct information is available. System 1 therefore could be the basis used at least for fishery products for which no voluntary and verifiable information is provided by stakeholders along the supply chain. This also justifies identifying and detailing what can be done, even if little, under system 1.

3.2.2 Fishing pressure

Many fish stocks are distributed on areas that are much smaller than the FAO statistical areas. Even in the case of European waters, limits of some stock do not match the ICES divisions, while several independent stocks of the same species can be present in a given division. This is for instance the case for many plaice or Nephrops stocks. Therefore, for a large part of products placed on the EU market, mostly but not exclusively the imported ones, mandatory information does not allow to link the product to a given stock. As a consequence, assessing, even roughly, the fishing impact on the originating stock of the product is impossible and neither the current or recent status of this stock.

However, in an attempt to evaluate the usefulness of the mandatory information, two indicators could be built, that will be discussed later:

1 - A simple risk-based approach might consider **the percentage of fish stocks by FAO statistical area that is outside the biologically sustainable limits** as an indicator of the probability for a given product to originate from an overexploited stock according to its fishing area. It should be noted that FAO assessments are provided at the statistical area only (i.e. not at a finer scale) and are based on a percentage expressed in number of stocks, across all species confounded and regardless of their size and landings. Consequently, the percentage of unsustainably fished stocks is not really a probability of unsustainability at the product level. These assessments that are updated every two years highlight however important contrasts between these very large FAO areas (Fig. 3.2) in terms of fishing pressure and mean stock status.

In the EU area, the FAO ranking suggests that the Mediterranean and Black Sea is the worst area worldwide with about 63% unsustainably fished stocks, while the North-East Atlantic (NEA) is better evaluated with 22% of unsustainably fished stocks.

In European waters, it would be possible to use more precise estimates based on ICES, GFCM and STECF assessments, which are synthetized at a finer scale (by ICES divisions in the NEA and by basin in the Mediterranean Sea) in the annual STECF report of the CFP monitoring. This synthesis is however based on a different methodological approach with different indicators than in the FAO synthesis. It leads for instance to more pessimistic diagnosis at the global scale (about 90% and 39% of overfished stocks in the Mediterranean Sea and NEA respectively, STECF 2020). Thus, mixing the two systems might be confusing and considered as unfair between domestic and imported products.

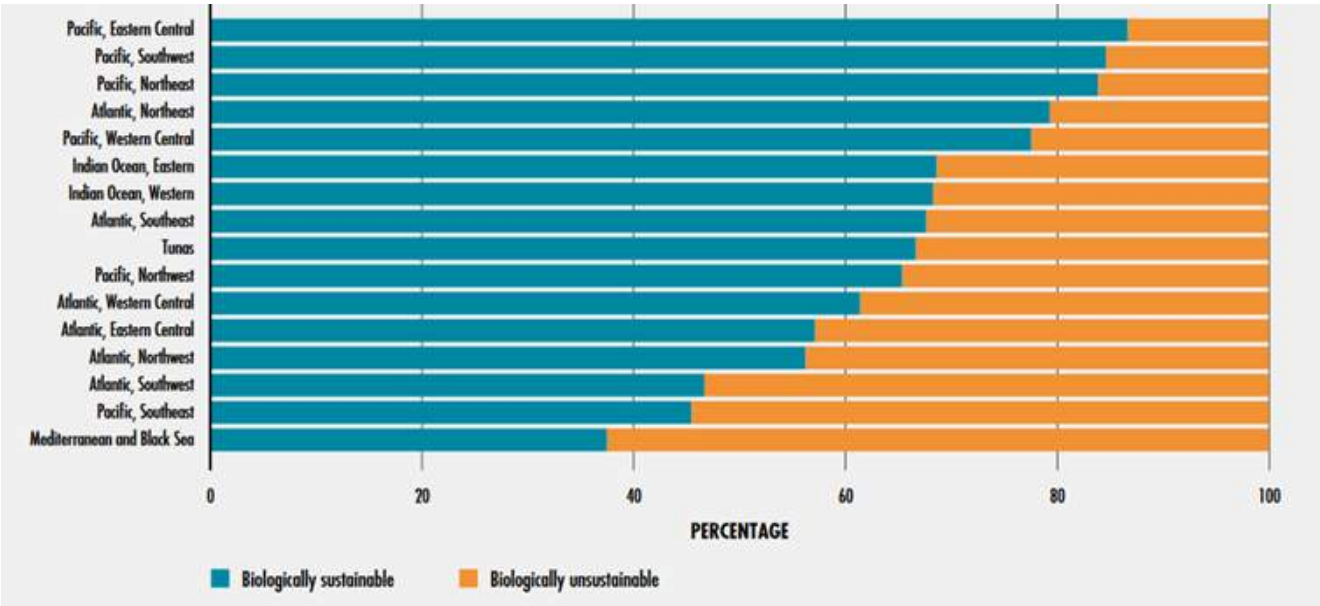

Figure 3.2 – Percentage of stocks fished at biologically sustainable and unsustainable levels, by GA Statistical area, in 2017 (FAO 2020)

Theoretically, a more precise system could also be considered by crossing FAO areas and major groups of species, as defined in the FAO FIRMS database (http://firms.fao.org/firms/summaries/in). However, an analysis of this database suggests that it includes only a small number of stocks with poor global ocean coverage. The EWG concludes that this idea of crossing areas and groups of species probably requires further investigation, but already appears much less powerful than a stock-level analysis, such as that presented under System 2 ... and for which the data included in FIRMS could be useful.

2 – Another risk-based analysis could make use of **life history traits at the species level as an indicator of the vulnerability of the species to fishing**. Indeed, a long-living and slow-growing species that exhibits a low fecundity for instance (such as the deep-water species) would be more vulnerable to the same fishing pressure, thus exhibiting a higher risk to be overexploited, than a short-living and fast-growing species with a higher fecundity. In such an approach, the vulnerability index defined by Cheung et al. (2007) and mentioned in WKLIFE (2019) could be used to propose a scoring for all the species specified in Annex 2 of the CMO regulation.

Such a scoring clearly does not directly refer to the stock status from which the product originates (see System 2 for this). However, it provides semi-quantitative information regarding **the risk that a product originates from a stock that is subject to an unsustainable fishing pressure**. A bad score ('E') indicates products that are caught in a highly overexploited zone and that are characterized by a high sensitivity to fishing given their biological characteristics. Conversely, a good score ('B') is awarded to a product from a stock unlikely to be overexploited and with a low ecological sensitivity to fishing. The lack of 'A' scoring is inherent to the limitations of the approach.

Table 3.1 – Preliminary scoring suggested for the criterion "Fishing pressure" under the simple scoring system 1.

		Vulnerability index of the species		
		Low	medium	high
Percentage of stocks fished at biologically unsustainable levels (by FAO area)	< 20	**B**	**C**	**D**
	20-50	**C**	**D**	**E**
	>50	**D**	**E**	**E**

The use of this scoring could be confusing as most stakeholders will likely consider that a good score is a guarantee of no overfishing. This is why we set the highest possible score in this rating system to B, clearly suggesting that there is still a risk of overfishing. This B score is consistent with a product that corresponds to a low sensitive species to fishing caught in a large area where is probability to be overfished is low.

In such a system, products originating from well-managed stocks could absolutely be poorly scored, which is **a strong incentive for producers and importers to provide the more detailed information required to move from system 1 to system 2**, where the same product could have a higher score according to its more refined characterization of sustainability in term of fishing pressure.

3.2.3 Fisheries management

As indicated in paragraph 3.1.2, fisheries management is a key aspect of sustainability that should be assessed on the basis of information linked, on the one hand, to the stock and, on the other hand, to the body in charge of organizing and/or coordinate the management of the related fisheries. Since information is unavailable in System 1 to link a given product to the originating stock, the first (and important) part of the assessment of the "Fisheries management" criterion will

be missing. Due to time constraints, the EWG was not able to determine the feasibility of the scoring for this criterion in system 1, i.e. whether the construction of a very simple risk-based approach based only on the FAO area and species is feasible and whether this system would be able to provide an informative score of this criterion. Therefore, only some general principles are listed below as a starting point for further investigations.

The basic idea for this criterion under system 1 is to **assign for each product the rating of the body involved in the management of the related fisheries**. The first step is therefore to link the product to a given body based on the mandatory information on the species and the fishing area. Such a link is obvious for European products, and should lead to consider two different situations (conventionally referred as two different 'bodies' in the following): the management by the EU in the NE Atlantic based on ICES advices, and the management by the EU in the Mediterranean Sea, under the umbrella of the GFCM. However, it should be noted that European domestic products will likely be scored using System 2 (sea § 3.3.2).

Regarding imported products, three cases emerge. The simplest case relates to tuna and tuna-like species whose fisheries and stocks are almost all managed under the umbrella of a Regional fisheries management organization (RFMO, see Fig. 3.3). These RFMOs can easily be identified depending on the fishing area. The second case concerns the management of shared stocks, which is generally ensured or coordinated by non-tuna RFMOs. These management bodies are responsible in particular for providing the scientific advice, defining management rules and coordinating their enforcement. The last case concerns coastal resources that are usually directly managed at the national level. In the EU this includes, for example, many stocks of crustaceans and shellfish.

A preliminary analysis should therefore be conducted, crossing species from CMO Annex 2 and FAO areas, in order to determine if a RFMO or a specific country can be associated to all products, or at least to most of them. This exercise would likely be easy for some species (e.g. tuna species, but also many large finfish stocks) but complicated for others and definitively impossible for some of them. Setting up a scoring for the Fisheries management criterion would make senses only if this latter impossible association can be considered as negligible. Existing databases, compiled through company initiatives, such as ISSF https://iss-foundation.org/about-tuna/status-of-the-stocks/interactive-stock-status-tool/, could be helpful to assess stock status on product level.

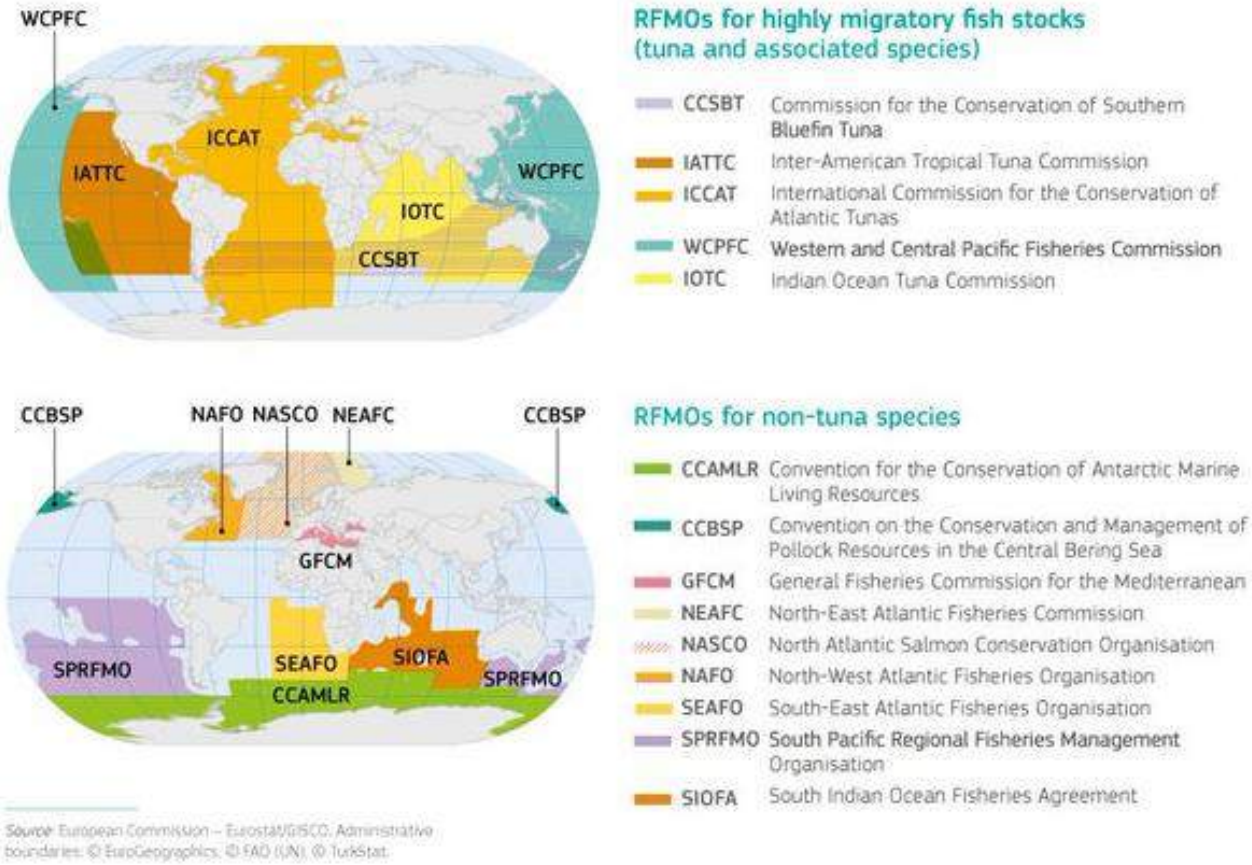

Fig. 3.3 – Map of RFMOs (Regional fisheries management organisations)

The second step is not easier. It consists in the scoring of all the above-mentioned bodies. In principle, such a scoring should consider indicators related to the following aspects (these lists of questions are not exhaustive):

- The **management system** itself: are MSEs (management strategy evaluations) used for at least a significant part of the catch? Are multiannual management plans (including TAC or HCR or ECR (Harvest and Effort control rules) or combinations) in place for a large fraction of the catch in percentage? Are management measures (e.g. minimum size, closed areas, closed seasons, technical measures, licence systems) set up for most stocks and fishing gear or fisheries?
- The consideration of **ecosystem targets** and rules able to ensure an ecosystem approach to fisheries management: are ecosystems models used in the scientific advice? Are management targets set beyond MSY according to the ecosystems objectives? Are specific and efficient rules defined to protect ETP species and vulnerable habitats? Are MPAs part of the management policy?
- **Control and compliance** with management rules: are there specific ex-post assessments on compliance and what do they tell us? What are the statistics about infringements?
- **Data collection**: is a data collection program implemented? Does it allow a standardized information for shared stocks? Does it include an observer program?
- **Participatory management**: Is there any stakeholder consultation process in the management system? Is this process clear, inclusive and transparent?

In practice, not only would these principles require further consideration before they become operational, but the rating itself would be a difficult exercise. This would likely be expensive and time consuming but possible for all RFMOs as the information required is generally publicly available. The EWG also notes that all RFMOs are periodically audited independently, which could be useful for such an assessment. As regard to coastal resources, it is probably impossible to assess

and score the performance of fisheries management systems of all countries exporting products to the EU from their national available information.

As a consequence, the EWG concludes that **scoring the criterion "Fisheries management" would be difficult, if not impossible, in System 1**. In practice, this therefore means that this criterion probably cannot be implemented in the short term. However, as this criterion is important and could introduce significant contrasts, in particular between domestic and imported products, or within imported products, the EWG considers that additional analyses should be carried out on the subject. A preliminary analysis should be set up to study the feasibility of the aforementioned first step, i.e. the association of products to the RFMOs or countries. This will clarify how the rating itself could and should be further considered in a next step.

3.2.4 Impact on ETP and sensitive species

The EWG considers that assessing any potential impact of fishing on ETP species would require the operator be able to provide data at least on the specific gear type (using for instance the detailed classification of fishing gears listed in Annex 3 or the CMO regulation and possibly the technical characteristics of the gear) and on the area of catches at a finer scale than FAO areas.

Under System 1, the lack of information about mesh or gear sizes renders nearly impossible the estimation of discard and/or bycatch rates of ETP and sensitive species. The EWG considers that the levels foreseen of the available mandatory information under System 1 (i.e. the gear categories and FAO area) are far too broad to be of any help for a meaningful scoring of the fishing impact on ETP species at the scale of a given product placed on the EU market. Even if it was feasible (which is unlikely), judging only the volume of discards or unwanted catches by gear type and large FAO area appears to be too vague information compared to the distribution of species and fisheries which in most cases are much more granular. Therefore, this would likely lead to highly misleading scores of the fishery products placed in the market. Since this is a hot topic, such an approach could be very counterproductive for the recognition of the entire scoring system by stakeholders and the whole society.

Therefore, **the EWG concludes that this important criterion, particularly sensitive for consumers, would not be included in the final scoring based on system 1**.

3.2.5 Unwanted landings and discards (other than ETP species)

What applies for ETP and sensitive species does not necessarily apply to unwanted catches, which usually refer to broader species categories and which catch quantities depend on the gear selectivity. Mainly due to time constraints, the EWG was not able to define a consensual approach to strictly score the importance of unwanted landing and discards associated to a given fish product. Three options were nevertheless identified, which require further investigations.

Option 1 would be a very simple and coarse rating, only defined by gear type using the 7 gear types included in the current mandatory information. Such scoring could be: -B- for pots and traps; -C- for hooks and lines (as some of them may induce non-negligible bycatches), -D- for seines, gillnets and similar nets, surrounding nets and life nets, dredges; and -E- for trawls, usually considered as poorly selective. According, to the general above-mentioned principle (see § 2.3), such a coarse scoring system should not allow a given product to get the highest scores (A or A+), as considering the gear type only does not warranty the absence of unwanted species, and even less the absence of unwanted catches due to the TACs or size regulation. However, some experts do not consider this option to be permissible as information about the caught species is mandatory (e.g. herring or cod). This can then be used to determine the type of trawl (pelagic or demersal). An undifferentiated evaluation of trawls with score E is very misleading, as pelagic trawls can be very selective (see also Option 2).

Option 2 would consider not only the gear type but also the targeted species that may help to distinguish very different gears within a gear category. This notably applies to the trawl category that includes bottom trawls as well as pelagic trawls. A pelagic species (tuna-like, small pelagics, etc.) caught by a "trawl" (with regard to the mandatory information on gear categories) are very likely caught by a "pelagic trawl". As the latter has an overall level of bycatch usually much lower than a bottom trawl, this should improve the rating of the related product. This also applies to

seines with demersal seines much less selective than pelagic seines. Thus, a preliminary analysis should be conducted crossing gear types and species, in order i) to estimate the more specific gear type (see the next paragraph where this approach is also discussed), and ii) to evaluate the feasibility and potential of such a scoring of unwanted catch levels.

Option 3 would attempt to consider not only the level of unwanted catches related to unwanted species, but also unwanted catches due to TACs or size regulation. This aspect is clearly area and stock dependent. A still-basic approach may try to cross gear types and fishing area (FAO or ICES and CGFM areas) to evaluate within each area the most impacting gears in terms of unwanted catches. Such an analysis should consider information from the FAO by-catch database. In European waters, the combination of various resources such as the recent first Workshop on Fish of Conservation and Bycatch Relevance (ICES-WKCOFIBYC, held in October 2020) as well as the result of European research projects such as Discardless or Gearing Up could help providing a reasonable comparison of gear selectivity.

The three options should be further explored (for instance in the frame of an ad-hoc contract, or by entrusting the development of the whole scoring system to a dedicated team; see §6.4) and compared to a more robust system based on more detailed information on the specific gear used and the precise fishing area or stock the product comes from (see system 2 in §3.3.4).

3.2.6 Impacts on the seabed

Under system 1, the goal is that producers should have a simple table associating the gear type to a given impact on benthic marine habitats.

The impact of fishing gears on the physical structure of habitats of the seafloor can be categorised using a simple method based on three levels (high, medium, low; or traffic light) following a simplified version of the procedure reported in Morgan and Chuenpagdee (2003).

Therefore, according to these authors, and more generally according to the current scientific literature available on the topic, the EWG suggests the following Table 3.2 of scoring the potential impact on the physical structure of benthic marine habitats of the gear categories listed in the Annex 3 of the CMO Regulation.

Table 3.2 - Gear types (as defined in Annex 3 of the CMO regulation) and level of their potential impact on the seabed

Gear type	**Potential Impact on the seafloor**
Hook & Line	Low
Seines, Gillnets and similar nets, Surrounding nets and lift nets, Pots & Traps	Medium
Dredges, Trawls	High

It should be emphasized that some gear types are aggregating detailed gears which all have rather similar impacts on the seafloor (Table 3.2). That is for instance the case for hook & line (whose impact is low), for seines and surrounding or lift nets (medium) and for dredges (high). In contrast, gillnets may have contrasting impacts on the seabed depending if they are in contact (such as set gillnets), thus exhibiting a medium impact, or not (such as Driftnet, which has low or no impact on the seafloor).

The most heterogeneous gear category is trawls, as it aggregates bottom trawls (with high impacts) and pelagic trawls (low impacts). In fact, **the EWG considers that the grouping of such very different gears targeting very different species does not make sense and deserves to be corrected in further EU regulations**.

Table 3.3 – Potential impact on the seafloor of detailed gears (as defined in Annex 3 of the CMO regulation)

Gear type	Detailed gear	Gear code	Potential Impact on the seafloor
Seines	Beach seine	SB	Medium
	Danish seine	SDN	Medium
	Scottish seine	SSC	Medium
	Pair seine	SPR	Medium
Trawls	Beam trawl	TBB	High
	Bottom otter trawl	OTB	High
	Bottom pair trawl	PTB	High
	Midwater pair trawl	OTM	Medium
	Pelagic pair trawl	PTM	Low
	Otter twin trawl	OTT	High
Gillnet and similar nets	Set (anchored) gillnets	GNS	Medium
	Driftnet	GND	Low
	Encircling gillnets	GNC	Low
	Trammel nets	GTR	Low
	Combined trammel and gillnets	GTN	Low
Surrounding nets and lift nets	Purse seine	PS	Medium
	Lampara nets	LA	Medium
	Boat operated lift nets	LNB	Medium
	Shore-opened stationary lift nets	LNS	Medium
Hooks and lines	Handlines and pole lines (hand operated)	LHP	Low
	Handlines and pole lines (mechanised)	LHM	Low
	Set longlines	LLS	Low
	Longlines (drifting)	LLD	Low
	Troll lines	LTL	Low
Dredges	Boat dredges	DRB	High
	Hand dredges used on board a vessel	DRH	High
	Mechanised dredges including suction dredges	HDM	High
Pots and traps	Pots (traps)	FPO	Low

In many cases, a given species can be associated with its typical habitat (e.g. groupers may be associated with hard substrates) and this information could be used to refine the impact score of the related fishing gears. Consequently, each species listed in Annex 2 of the CMO regulation should be associated with a likely type of habitat and, in turn, to a sensitivity category. This classification could be defined, for example through an ad-hoc contract using the scientific literature (including Fishbase and SeaLifeBase), and make available tables by type of gear and by species to all producers and importers. In practice, it is likely that sensitivity can be defined by categories of species. The following table 3.4 illustrates the concept.

Table 3.4 - Example of sensitivity scores associated with a given species (or category of species) and its associated habitat.

Species	Habitats	Habitat sensitivity
Pelagic species	Water column	Low
Flatfish	Sediment	Medium
Groupers	Hard substrata	High
etc…	…	…

In this way, it would be easy to combine the scores of gear impact and seabed habitat sensitivity by means of a qualitative scoring (low, medium, high).

Table 3.5 - Example of combinations between the potential impact of a gear type and the habitat sensitivity associated with a given species (or category of species).

Gear type	Species group	Habitats	Gear impact	Species sensitivity
Longline	Pelagic species	Water column	Low	Low
Set nets	Flatfish	Sediment	Medium	Medium
Trawls	Flatfish	Sediment	High	Medium
Trawls	Groupers	Hard substrata	High	High

More generally, the combination of the two variables "Gear potential impact on the seabed" and "Habitat sensitivity" could be summarized in the following Table 3.6, by means of five levels score, thus defining the **final scoring of the criterion "Impacts on the seabed"**.

Table 3.6 – An example of possible score of the criterion impact on the seafloor under the simple system 1, based on the combination between the potential impact score defined by type of gear (see Table 3.2) and the habitat sensitivity defined by species (or category of species).

Gear potential impact	Species sensitivity	Combined impacts on seabed	Criterion score
low	low	very low	**A**
low	medium	low	**B**
low	high	Medium	**C**
medium	medium	Medium	**C**
medium	high	High	**D**
high	Medium	High	**D**
high	high	very high	**E**

It should be noted that in such a combination under the simple system 1, a score equal to "A" can logically be attributed to some products regarding the criterion "Impacts on the seabed". This relates for instance to pelagic species caught with Hooks and lines, whose impact on the seabed can be considered as very low with a high confidence.

Conversely, relatively underestimated scores could be due to the uncertainty that remains in the approach defined here, and in particular in the definition of fairly broad habitat categories of the associated species. This particularly applies to the "sediment" habitat, which aggregates all types of sediment, while very different sensitivities can be observed for example between gravel (low), sand (medium) and clay (high) (Hiddink et al. 2020; Mazor et al. 2020). This clear limit justifies moving to system 2 that should allow a more precise and robust scoring of the "Impacts on the seabed" criterion, with better scores for certain products such as those caught on gravel.

3.2.7 Impact on marine food webs

Trophic considerations are little accounted for in the current fisheries management regime. In particular, when advising on fishing mortality and maximum catches, only the productivity and biomass of the assessed stock are considered without any reference to the indirect impacts induced on prey, predators or competitors of the species of interest.

In System 1, no link can be established between a given fish product and a specific stock. Therefore, it is not possible to assess the impact of fishing on the biomass of the stock as a proxy of an impact on the whole food web (see §3.1.6).

As stated before, simple indicators such as the trophic level of the fish product, which indicates its position within the food web (Pauly and Christensen, 2000), would be inappropriate for a scoring approach as no clear evidence exists whether harvesting a high trophic level organism is good or bad for the food web (Hornborg et al. 2013). Depending on the gear/métier, the fishing activity may also impact the food web through mortality of other non-targeted species or groups and therefore the food web (e.g. high mortality of benthos). This is assumed to be already covered through the discards and seabed indicators.

As a conclusion, **the EWG considers that scoring the criterion "Impact on marine food webs" would not be feasible within system 1**.

3.2.8 Carbon footprint

Fuel use dominates and is a good indicator of the total greenhouse gas (GHG) emissions of fisheries (Parker et al. 2018; Ziegler et al. 2016). In fact, the GHG emissions is a function of the volume of fuel combusted, of the density and carbon content of the fuel and of the fraction of carbon that is oxidized to CO_2 (EPA, 2016).

Although additional upstream processes associated with fishing, including vessel construction and maintenance and gear manufacturing, also consume energy and produce emissions - when viewed in the context of total life cycle ('cradle to grave') emissions, including post-landing activities- vessel fuel use remains a primary source of emissions from seafood supply chains (Parker, 2012; Vázquez-Rowe et al., 2012; Ziegler et al. 2016, Parker et al. 2018). This except the cases where airfreighting is involved (Ziegler et al. 2016; Parker et al. 2020).

Because of limited specific data under system 1, producers may have the possibility to score both the fuel use intensity/emissions based on gear type, which has a marked influence on fuel consumption rates, using a very simple system based on three-level categories (High, Medium, Low fuel use and GHG emissions). However, the EWG underlines that fuel consumption depends largely on the detailed gear and the fishing practices, which are both (at least partially) linked to the targeted species (Nijdam et al. 2012, Parker and Tyedmers 2015, Parker et al. 2018, Ziegler et al. 2016). As an example, the pelagic trawling targeting herring requires much less fuel than the bottom trawling of shrimp, which may score different from bottom trawling targeting gadoids.

Therefore, a two-dimensional system could be defined outlining tables/matrices of the energy profile of the main gear types in combination with target species or species groups. Like for the seabed above-mentioned criterion, **a scoring table by gear type and species group** could be developed by ad-hoc experts, defining a carbon footprint rating based on published data and sources (Parker and Tyedmers 2015, Parker et al.2018). The EWG notes that the species grouping for the carbon footprint should use the species list defined in Annex 2 of the CMO regulation and will likely not be the same than for assessing the seabed impacts.

3.2.9 Waste and pollution

Plastic litter due to lost fishing gear, which is a major waste at sea and a major pollutant from fishing vessels, should and could be considered under system 1, because basic information on plastic use is available by gear, notably in the report from FranceAgriMer (2020). This report considers different French regions including the Mediterranean and North-East Atlantic areas and the overseas islands. Since the loss of plastic in the environment is likely a function of plastic quantity and fishing practice, the *plastic use* instead of the *plastic litter* lost in the marine environment (plastic pollution) alone could be a simple proxy of this sustainability criteria.

Therefore, under system 1 a preliminary analysis should try to establish **a simple table with basic information on plastic use to each of the seven gear types specified in the CMO regulation** (seines, trawls, gillnets and similar nets, surrounding nets and life nets, hooks and lines, dredges, pots and traps) similarly to what was done in FranceAgriMer (2020), which estimated - based on bibliographic review and questionnaires to stakeholders - the plastic use by fishing métier.

The EWG group noted however that the FranceAgrimerMer approach is based by métier, which is generally defined by the combination of a precise fishing gear, a precise fishing area and the main target species (which do not necessarily include the studied product on the market). Thus, the EWG was not able to determine if a rating of plastic use at the gear level might be informative and reliable enough to be considered in the final sustainability scoring. A preliminary analysis should check the variability of plastic use within the different métiers of a single gear and analyse how mandatory information on area, species and gear could be combined if needed, in order to define 'pseudo-métiers', a more appropriate level to rate plastic use and subsequent litter.

In conclusion for system 1, only plastic use in fishing operations would be considered at least by gear, possibly combined with species and areas. Although the French fish production system covers a wide spectrum of areas and practices for the EU area including the overseas territories, complementary information is likely needed at least for a use at larger scale (i.e. for global imports).

3.2.10 General advantages / disadvantages of system 1

The general advantage of System 1 is the simplicity and immediacy of the scoring system for sustainability criteria that can be considered (i.e. not all the criteria initially considered as important) (Table 3.7). For a few of these usable criteria, the scoring could directly be derived from the mandatory information. This is especially the case for the "Fishing pressure" and "impact on the seabed" criteria, for which the above-mentioned approaches could likely be used in the short term, after a validation test (possibly carried out in the frame of an ad-hoc contract).

For other criteria, the approach needs to be further developed. This is particularly the case for the criteria "Unwanted catch", "Carbon footprint" and "Waste and pollution", for which the most relevant grouping of species and the crossing (if applicable) with the fishing gear and possibly FAO fishing area needs to be defined and tested, before scoring can be implemented on the basis of a risk assessment by category. As for the "Fisheries management" criterion, a scoring approach at the RFMO level must be developed and its application conditions specified.

The next steps required for the implementation of the scoring system 1 are detailed in §6.4. Such an approach should lead in the short to medium term to the establishment of scoring tables by criteria (for those that can be defined by the mandatory information), allowing producers and importers to determine a first final sustainability score of any product.

Table 3.7 – Summary of criteria and scoring approaches of the sustainability of fished product in system 1 based on mandatory information only

Criteria	Quality of the scoring	Scoring approach and Indicators
Fishing pressure	Poor to medium	. Risk-based approach using the percentage of overfished stocks by FAO area and ICES or Mediterranean division. . Risk-based approach using vulnerability index per species
Fisheries management	Very poor and maybe not feasible	. Risk-based approach using a scoring of RFMOs performances, in relation to FAO areas (would still need to be developed)
Impact on ETP and sensitive species	No assessment	-
Unwanted landings and discards (other than ETP species)	Poor	. Risk-based approach by gear type and species or species group (would still need to be developed)
Impacts on the seabed	Poor to medium	. Risk-based approach by gear type and species or species group
Impact on marine food webs	No assessment	-
Carbon footprint	Poor	. Risk-based approach by gear type, or preferably by gear type and species group (would still need to be developed)
Waste and pollution	Poor	. Risk-based approach possibly by gear, but preferably by pseudo-métier (would still need to be developed based on gear types, FAO areas and species grouping)

The main and obvious disadvantage of system 1 is the "crudeness" of the resolution that will lead to some level of error in the assessment. Some good performers will be scored badly due to average low performance of the group they are part, while some bad performers will benefit from an average better score achieved by others.

Therefore, **the EWG considers that such a coarse scoring system should not be implemented until two preliminary stages have been completed.**

1. An intensive evaluation test phase must be carried out, rendering possible the assessment of the feasibility and reliability of the scoring of each criterion (see §6.4.3). The EWG insists that the suggested approach is completely new and has never been implemented anywhere. Any implementation must therefore be considered with caution and likely step by step.

2. The possibility of switching from System 1 to System 2 should be offered to all producers and importers, which gives them the possibility to avoid - if justified - a low and unfair rating. More generally as it is incentivized by the system, they should all be encouraged to provide additional voluntary information allowing their products to be rated on the basis of the more reliable and potentially more favourable system 2. This incidentally justifies that the best possible final score under system 1 has to be limited (mostly from E to B, except for the impacts on the seabed), while system 2 would allow using all grades (e.g. from E to A+). Opening up the possibility for producers to provide additional information also leads to a need for clear guidelines for the collection of these data and that some verification procedure on data quality needs to be established.

Importantly, **the coexistence of the two rating systems, including the simple system 1 presented above, is a powerful incentive for all players in the fishing industry to make**

efforts to collect and provide the additional information needed to better assess the sustainability of their products.

3.3 A more reliable scoring based on key additional data (System 2)

System 2 relies on the idea that producers or importers will be able to voluntarily provide a few key additional data, based on a clear guidance allowing this information to be controlled. A relatively easy-to-set expert system should be built to derive the score of each criterion from this additional information. For specific criterion (e.g. fishing pressure), system 2 also implies to set up and maintain a database aggregating straightforward tables associating the provided information to values of indicators used in the scoring (e.g. stock identity to fishing pressure). The required data and associated indicators are defined in the following sections for each criterion.

3.3.1 Fishing pressure

- Required data

In order to provide a stock-based rating, the additional required information (on top of mandatory information) is "**the fishing area, at a scale allowing to determine the stock identity"**. (species specific fishing area[15]). This obviously assumes that the identity of the stock itself has been previously defined. A preliminary work thus consists in determining the list of stocks from which the fishery products placed on the European market originate and, for each of them, identifying the associated fishing zones. This could be done step by step, starting with the easiest cases, and especially with the species representing a large volume of products on the market and for which the stock is well documented (a list with species specific fishing areas exists already for the German marked). In a second step, the database can be refined with the lower volume/less documented stocks with the final objective of including all stocks that are evaluated either by international or local well identified scientific bodies. The remaining **products**, i.e. those **which cannot be associated to an identified and assessed stock, will not be allowed to switch from system 1 to system 2 for the fishing pressure criterion**. This approach therefore represents a key incentive for all stakeholders, including local or national entities, to provide reliable data on their stock status for avoiding a decrease of market competitiveness (virtuous cycle: reaching system 2 means greater product scoring reliability, sustainability and value).

Regarding products fished in European waters, the required information is the fishing area at the scale of the ICES division in the North-East Atlantic and at the scale of the GSA (geographical sub-area) in the Mediterranean Sea. This information spatial gridding allows identifying if the product originates from a stock assessed by ICES and by CGPM or STECF, respectively. In practice, Article 38 of the CMO Regulation specifies that in the Northeast Atlantic (FAO Fishing Area 27) and the Mediterranean and Black Sea (FAO Fishing Area 37), the sub-area or division listed in the FAO fishing areas has to be provided. This implies that the fisheries ICES division (equivalent to FAO sub-areas) is already compulsory information according to the CMO regulation, whereas only the Mediterranean sub-basin (group of GSAs) data are compulsory. Therefore, the specific GSA where the product has been fished should be an additional voluntary information provided by producers (and rather easy to control). Mandatory FAO large area data should also be sufficient to identify stocks in the case of tuna species, especially (but not only) those exploited by European distant fleets.

For specific European resources, it will be necessary to gather even more detailed information. This is the case, for example, for Nephrops (whose stock identities are clearly defined by ICES, using statistical rectangles), but also for very coastal species, such as scallops. These very coastal stocks are under the jurisdiction of the Member States and can be regularly assessed by national or

[15] Such a list of species specific fishing areas is already available and voluntary used by the German fishing industry. This was necessary to make the website https://www.fischbestaende-online.de/ useful. The list includes species with their stocks relevant for the German marked from all over the world. It is in German but might easily be translated and extended and used as a basis for further work. It is available here https://www.fischbestaende-online.de/fileadmin/user_upload/pdfs/Genauere_Fanggebietskennzeichnung_Stand_23_Juni_2020.pdf

regional research institutes, at least for some of them. Therefore, an additional list of coastal stocks, clearly defined and regularly assessed, should be identified on a national basis.

With regard to products imported into the EU, a first list of regularly assessed stocks can be easily defined by grouping together information from all RFMOs. International databases such as Firms-FAO and RAM-Legacy should also be taken into account. Again, stocks that are assessed at the national level should ideally be included in the list of reference stocks. This will however only be useful if the associated stock assessments are available and verifiable. Therefore, the EWG 20-05 suggests that **only the stocks clearly identified in reliable and easily accessible international databases should be considered eligible to move from System 1 to System 2**.

From the reference list of assessed stocks, a European database needs to be built and then regularly updated. This database will register for each stock the values of the indicators (described below) that allow the effective scoring of the fishing pressure criterion. In line with the objective of assessing a level of fishing pressure more than the immediate and potentially variable status of the stock (see § 3.1.1), the indicators should be averaged over the recent period. Accordingly, the database should not necessarily be updated annually (but, for example, every 3 years). However, modern tools available to connect heterogeneous international databases should probably largely facilitate an automatic and immediate update, at least with some RFMOs or international bodies (starting with ICES and GFCM). A partnership with the global Firms-FAO database could also be considered.

- Indicators and scoring

According to the MSY management strategy, the EWG suggests to use, as the main indicator of the fishing pressure sustainability, the fishing mortalities ratio F / Fmsy, where an average F over five years is used (or over the last 3 available values for stocks assessed every two years).

The EWG was not able due to time constraints to suggest a precise rating associated with this indicator. As an example, two possible ratings are provided in Table 3.8, noting however that further investigations are needed to determine the most appropriate rating. In particular, the limits of each grade should be defined after carefully analyzing if the scoring is consistent as regards to the distribution of European fish products between the scores A, B, C, etc. A verification test could easily be carried out using the landings from ICES stock assessments.

Table 3.8 – Examples of possible ratings of the fishing pressure indicator based on quantitative stock assessments, under the scoring system 2

Rating	**A+**	**A**	**B**	**C**	**D**	**E**
Rating based on F limits used by ICES	F<Flow	F<Fmsy	F<Fupper	F<Fpa	F<Flim	F>Flim
Rating based on the ratio F/Fmsy	<0,9	<1	<1.1	<1.4	<2.0	>2

This indicator can be calculated provided that a quantitative assessment have been conducted over the last 5 years. This is especially the case in Europe for the NE Atlantic stocks that fall under ICES categories 1 and 2. These stocks are also those where the stock assessment is usually considered the more reliable.

Conversely for some other stocks, only qualitative assessment or Fmsy proxies are available allowing only to determine if the stock is overexploited or not (no quantitative F as above). The reliability of such assessment can be highly variable from one case to the other. In ICES for instance, but also in many RFMOs, clear rules and procedures have been defined and the diagnosis on the stock status can be considered as "rather reliable", especially if it appears to be consistent over all the recent years (absence of high variabilities). In such a case, a scoring (although

excluding A+) could be derived from the diagnoses established over the last five years. Table 3.9 provides a scoring as an example of what could be envisaged. Such an approach should evidently be further evaluated before any practical implementation.

Table 3.9 – Examples of possible rating of the fishing pressure indicator based on qualitative assessment or Fmsy proxy provided by international scientific bodies under the scoring system 2

	A	B	C	D	E
F/Fmsy < 1	Each of the last 5 years	4 times in the last 5 years (including the last one?)	3 times in the last 5 years (including the last one?)	Twice in the last 5 years	Less than twice in the last 5 years

These scores should probably be lowered if the assessment is based on poorly defined methods or data, or is provided with delay (for instance more than 2 years… But less than 5 years, otherwise the assessment should be considered as obsolete, and the product will be scored using system 1).

3.3.2 Fisheries management

- Required data

The additional required data in system 2 relative to system 1, in order to set a more reliable score of the fisheries management criterion, is again **the precise fishing area**. Similarly to the fishing pressure criterion, the fishing area allows the original stock of the product to be defined using the same reference list of stocks. As an additional information, the **body in charge of the stocks assessment** will be recorded in the associated database (including the two areas of management for the EU: the NE Atlantic and the Mediterranean and Black Seas). This implies that once more, the scoring of the criterion based on system 2 will be restricted to product coming from stocks registered in the reference list of assessed stocks.

- Indicators and scoring

Like system 1 system, 2 is based on the idea that a case by case analysis of the efficiency of the fisheries management (such as the ones using Management strategies evaluation (MSE) frameworks) cannot be conducted for every products of the market. Therefore, scoring the fisheries management remains a challenging task. As explained in paragraph 3.1.2, a proxies-based approach could be envisaged (although still to be precisely defined and tested) crossing two types of information: on one hand a rating defined at the stock level, according to the management tools which have legally to apply to the stock and, on the other hand, a rating defined at the RFMO (Regional fisheries management organization) or Management body level, which aims at capturing the management efficiency using a risk-based approach.

1. Regarding the stock level, **management rules categories would have to be preliminarily defined** on the basis that the type of rules defining the implemented tools to manage fisheries and that some tools are considered as more powerful than others to ensure a sustainable management. These management rules categories could therefore be defined on the basis of general criteria used, such as the harvest control rules (HCR) in place, the presence of catch or fishing effort limits, the applicable technical measures, etc.

For example, one can imagine that the highest ranked category would refer to the situations where:

- A precautionary Harvest control rule is clearly defined in the local regulations referring to an ecosystem objective beyond MSY,
- A catch regulation is in place through TACs, which must legally be established in accordance with the above-mentioned HCR and based on scientific advice.

. Technical measures have been adopted, in particular to reduce the impact on stocks thanks to an adapted size selectivity and to minimizing the impacts on sensitive habitats or by-catch species.

…

Once the management rules categories will be defined, each stock included in the reference list (or at least those that claim to benefit from a rating of system 2 for the fisheries management criterion) should be classified in a given category on the basis of the dependent regulation. This classification will define **a score intended to be registered in the EU database associated to the reference list**. Such a score is expected to be rather stable over time, changing only in case of new regulations. It should be fairly easy to set it up for European stocks. In contrast, it could be much more complicated and time consuming for other stocks, therefore potentially limiting the System 2 scoring of the Management criterion to areas or countries where the required information is readily available.

From such a system, it is to be expected that European stocks in the North-East Atlantic managed on the basis of the best CFP standards (MSY approach, TAC regulation, landing obligation, well defined Minimum conservation reference sizes (MCRS), etc.) will get an A score, and likely not an A+ recognizing that other countries around the world have adopted more conservative or ecosystem-based rules such as MEY (Maximum economic yield), larger MCRS than the size of first fecundity, etc.

It should be noted that such a classification of stocks included in the Management reference list would be made on the basis of the implemented local regulations regardless of the enforcement or effectiveness of that regulation. Indeed, the assessment of enforcement and effectiveness at the level of stocks and for all products imported in the EU would manifestly be unfeasible. Therefore, these important aspects will be taken into account in a risk-based approach conducted at RFMO level (or equivalent management body) as explained below.

2. The rating of the management performances in system 2 would be defined for each management body based on a risk-based approach like in system 1 (see paragraph 3.2.3). The advantage for System 2 is however that the link between a given fish product and the associated management body would be directly highlighted and available in the EU database associated to the reference list of assessed stocks. In addition, system 2 only considers stocks clearly identified in reliable and easily accessible international databases, thus limiting by far the number of management bodies which have to be rated.

But the most significant difference is that some indicators of the management performances listed in system 1 are implicitly considered in the rating described above at the stock level (e.g. management tools, ecosystem-based rules…). The rating should therefore be much easier in system 2 mainly taking into account three aspects: the **control and compliance** with management rules, the implemented **data collection** and the enforcement of a **participatory management** system (including co-management).

Then, **the two scorings of management rules categories and management performances** (points 1 and 2 above) **should be combined**. Because sustainable management can be expected only when both an appropriate regulation at the stock level and an efficient management (enforcement, data collection, etc.) are applied, the combined scoring should be defined as stringent (see table 3.10).

Table 3.10 – Example of final score for the Fishing management criterion, combining a stock-based score depending on management rules categories, and an 'RFMO-based' score assessing management performances (Scoring system 2)

		Stock-based score according to management categories					
		A+	A	B	C	D	E
Performance of the management body (EU, RFMO, country …)	A+	A+	A	B	C	D	E
	A	A	A	B	C	D	E
	B	B	B	C	D	D	E
	C	C	C	D	D	E	E
	D	D	D	D	E	E	E
	E	E	E	E	E	E	E

In conclusion, the definition of an informative notation of the fisheries management criterion appears to be feasible in system 2, while it was doubtful in system 1. It requires additional work to define the management categories classifying all the assessed stocks of the reference list and to assess the performance of each management body.

3.3.3 Impact on ETP and sensitive species

Scoring a product according to its underlying impacts on ETP and sensitive species appeared impossible in system 1 and still remains difficult in system 2. The EWG suggests that a feasibility analysis be carried out by a group of experts appointed for this purpose in order to test the above described approach. This approach combines an analysis based on risks at the scale of a pseudo-métier with a management score established at the level of each RFMO or equivalent body.

- Required data

The impacts on ETP and sensitive species strongly depend on the used fishing gear and on the targeted species. Since the species is already a mandatory information on the market, the key additional required data for this criterion is therefore **the precise fishing gear**. This data should be provided on a voluntary basis according to the list defined in Annex 3 of the CMO regulation by all producers and importers who expect to benefit from a good score under system 2.

In addition to the fishing gear, the producers and importers will have to provide information to determine **the body in charge of fisheries management** for the species from which the product originates. This information can be the management body itself or the fishing area (based on FAO sub-areas) from which the management body will be deduced.

- Scoring approach

Similarly to the fisheries management criterion, the scoring of the impact on ETP and sensitive species will combine a two-scale approach.

1. A risk-based analysis should be carried out in order to define a score of impact (from E to A+) by pseudo-métier. Therefore, **a preliminary step is to define the most appropriate list of pseudo-métiers, each of them defined by the combination of a species or group of species and a gear or group of gears**. Since fishing practices and accidental catches of a given gear targeting a given species may depend on the area, the pseudo-métiers could also be defined at the scale of large FAO areas and, if necessary, at a finer scale. Note that in such an approach, pseudo-métiers will be defined with reference to a single targeted species. This is because pseudo-métiers are currently derived by a given product and thus associated to a given species, with no information related to the fishing selectivity and associated species.

In the framework of the criterion related to ETP and sensitive species, pseudo-métiers should be defined in order to aggregate fishing operations that have a similar or close impact. Similarity could

be analyzed based on the accidental catch rates of each ETP species expressed in numbers or tons (depending on the ETP species) by ton of landings of the targeted species. Pseudo-métiers could ideally be identified through a statistical analysis, provided the observations are available regarding accidental catches at the scale of statistical units, i.e. the detailed gears and fishing areas or sub-areas for the given targeted species.

Unfortunately, such data is unlikely to exist with sufficient coverage representative of all gears and target species. The analysis could consequently be based on another data sources relating to the accidental catch reporting that is mandatory in some areas and / or RFMOs. A derived dataset should be constructed bringing together all available reports in the attempt to associate each accidental catch with a targeted species, gear and fishing area.

The EWG was not sure that even the latter approach would be feasible. If so, pseudo-métiers should be solely defined on the basis of expert knowledge. This could constitute a first step before more in-depth analyzes where a group of experts is mandated to create an extended matrix on gear types, fishing areas, targeted species and possible interactions with ETP species. It is likely that the pseudo-métiers will only attempt to identify the most critical situations, flagging the most controversial gear / fishing areas / target species combinations (all sensitivity species combined, or starting with the most critical ones). Conversely, pseudo-métiers that are documented or known to have no impact on ETP or sensitive species could obtain a good empirical score.

The mitigation measures that have been implemented could lead to an improvement of the previous rating according to the pseudo-métiers. The effectiveness of such mitigation measures are however impossible to assess based on the self-declarations of producers and importers. This aspect must therefore be taken into account in the scoring presented below.

2. The rating at the pseudo-métier level will be combined with- (and therefore mitigated by-) a second rating linked to **the performance of the body in charge of fisheries management**. Here, performance will be assessed against the ability of the management body to promote and implement **an effective conservation policy for ETP and sensitive species**.

Such a rating, with a 6 levels grade from E to A+, should be rather easy to determine for RFMOs, analyzing their reporting and possibly the independent auditions they are subject to. This scoring should take into account three aspects: the consideration of **specific targets and rules** dedicated to the conservation of ETP and sensitive species, the **control and compliance** with management rules specifically dedicated to these conservation objectives and the specific associated **data collection** that is implemented.

The two scores will be combined in the same way as the previous criterion (see Table 3.10), this time however crossing a métier-based score measuring the potential impacts on ETP species and a RFMO-based score measuring the performance of the management body for the conservation of marine biodiversity. For a given fish product that is characterized by its fishing gear and fishing area, **this final score is a measure of the risk that the product was caught in association with ETP species**. In other words, it is a measure of the risk that the capture of the product is responsible for an impact on ETP species.

Ultimately, the EWG is unable to ensure that a risk-based approach using pseudo-trades based only on gear, fishing areas and target species will be sufficient to provide an informative and reliable scoring of the impacts on ETP and sensitive species (or at least a sufficiently reliable scoring to be considered as informative). The additional accounting of the performance of the management system should however improve the quality of the rating.

The EWG stresses that this criterion is intended to reflect or summarize the capacity of the underlying fishery to protect marine biodiversity. Even if scoring seems difficult at the moment, this criterion should therefore be considered as a top priority and the EWG strongly encourages DG MARE to initiate further investigations on the topic.

- Costs/benefits – Iterative approach

Compiling data on ETP species occurrence in order to define pseudo-métiers will be a fairly large task to carry out. Once a system is set up, it will need regular updates on information regarding

the status and occurrence of sensitive and ETP species. This is related to e.g. IUCN updates on the revision of protected species lists and more often updates on the fishing regulations.

The system could start with a limited number of species (the most vulnerable/threatened) that can be expanded later. Several ETP & sensitive lists already exist such as the ones covered by Directive 2009/147/EC, the species whose protection is necessary to achieve good environmental status under Directive 2008/56/EC and the Stock at Risk list from the Balance Indicator Guidelines (COM 2014, 545 final) that can support the implementation of a broader database covering all species group at a worldwide scale.

One option could be to set this database up as a Wiki system where information can be added by various experts and moderated by a small team of core experts and then reviewed on a regular basis (e.g. every 2 or 3 years) to identify the most controversial pseudo-métiers.

3.3.4 Unwanted landings and discards (other than ETP species)

This criterion could be scored using the same approach as the previous one, crossing **two scores, one based on a risk-analysis at the scale of pseudo-métiers and the other measuring the management body performances**. In that case, pseudo-métiers need to be defined according to unwanted catch rates, while management performances should refer to the specific issue of minimizing unwanted catches. This implies that the pseudo-métiers and the RFMOs scores will likely differ from those used to score the previous criterion on ETP species conservation.

The pseudo-métiers definition will of course consider the used fishing gear. But several other factors may have a significant impact: the targeted species, vessels length and mesh or hook size. A preliminary statistical analysis should therefore be carried out to determine the most significant factors. In practice, at least as a first step, a test could be conducted using ICES data on catch, landings and discards by fleet segment (thus accounting for gear and vessel length). Additional data would need to be compiled at national level to test factors such the mesh size or targeted species. This approach should also consider the outputs of European research programs dedicated to the topic, such as Discardless. Finally, this European approach should be expanded to the global scale, especially scrutinizing FAO's and RFMO's scientific and technical reports.

A clear difficulty in such an approach is that catch data may be biased as the information on discards can be sensitive. In addition, it is likely that IUU fisheries are responsible for massive discards. The traceability of fish products in the EU market should however ensure the exclusion of products originating from IUU fisheries, making this issue not relevant for our scoring approach in the EU.

The concept of what is unwanted and possibly discarded will also differ, depending on the fishing area. For example, Asian trawl fisheries might be very unselective, but produce no discards as the entire catch will be landed and used, so defined as 'wanted'. The unselective nature of the fishery should in this case not be rewarded for having no discards.

As regard to the scoring of RFMOs or fisheries management bodies, it should now take into account: the existence of **specific targets and rules** dedicated to the reduction of unwanted catches (therefore improving fisheries selectivity), the **control and compliance** with management rules specifically dedicated to this objective and the implementation of a **dedicated data collection**.

Eventually, defining and scoring the sustainability of pseudo-métier categories related either to the unwanted catch issue or to the protection of ETP species issue is a difficult task which requires a substantial work (to compile the appropriate data) and a sound scientific expertise in the field. At the same time, scoring the performances of all RFMOs according to these two topics will be time-consuming. The EWG therefore considers this task could justify a preparatory work by ad-hoc contracts or by a dedicated team and a specific EWG meeting.

3.3.5 Impacts on the seabed

In system 1, the scoring of the criterion "Impact on the seabed" was based on the mandatory information provided for the gear type and species. The reliability of the scoring will be greatly

improved in system 2 by adding more variables collected on a voluntary basis. This could be done considering several levels of complexity in a step by step approach.

- Step 1

The first step would be to use **the detailed fishing gear** as a key additional and voluntary information. It allows to define a more robust scoring of the gear, which has been presented in Table 3.3. As in system 1, the scoring of the species sensitivity will be defined by the sensitivity of its habitat (see Table 3.4) using the list of species available in the Annex II of the CMO Regulation. In case of imported products fished using gears that are not included in that list, the FAO International Standard Statistical Classification of Fishing Gear (ISSCFG) should be used (https://ec.europa.eu/fisheries/cfp/control/codes/).

The following Table 3.11 below illustrates how the two scores could be combined. It has to be considered as a very preliminary suggestion, which has not been thoroughly discussed by the EWG and thus needs to be further investigated and tested on real data (e.g. national catch statistics by detailed gear).

Table 3.11 – An example of possible scoring (under system 2) of the impact on the seabed, combining the fishing gear potential impact and the species/habitat sensitivity (combinations in brackets are considered less frequent)

			Species sensitivity score (in relation to habitat)		
			Low	Medium	High
Fishing gear potential impact	Pelagic trawl, Driftnets, Hooks and lines	A	**A+**	**A**	**(C)**
	Seines, Set nets & lift nets, Pots and traps	C	**A**	**B**	**C**
	Bottom trawls, Dredges	E	**(C)**	**D**	**E**

- Step 2

This improvement does not completely solve the main issue of such a scoring. Indeed, the impact on the sea floor strongly depends on the habitat type, which has a finer scale than the one deduced from the species preferences. A higher level of complexity should thus be investigated based on a more **granular information on habitats**.

In such a system, producers or importers who consider that the scoring described above leads to an unfair score of their products (because they have been fished on low sensitive habitats) should be given the possibility to specify on which habitat the product has been caught. This additional and voluntary information should refer to the EUNIS classification of habitats (https://www.eea.europa.eu/data-and-maps/data/eunis-habitat-classification). Due to the complexity of this classification, it would be advisable to focus on "habitat level 2", which includes a total of eight habitats: 1) Littoral rock and other hard substrata; 2) Littoral sediment; 3) Infralittoral rock and other hard substrata; 4) Circalittoral rock and other hard substrata; 5) Sublittoral sediment; 6) Deep-sea bed; 7) Pelagic water column; 8) Ice-associated marine habitats.

In a second step, the impact of each gear should be scored against each habitat. When a producer will search for a combination of species and fishing gear, an expert system should therefore be able to show all the habitats where this species could be found and evidence the impact of this gear on all types of habitat (e.g. by means of a traffic light visualization, or with numbers).

The expert system could be developed by a dedicated team following the rationale described in Morgan and Chuenpagdee (2003). The impacts scoring by gear and habitat (and possibly target species) would be validated by a network of scientists, selected because of their familiarity with different fishing gears and their knowledge of habitat damage caused by these gears.

The practical enforcement of such a system would likely be extremely difficult, especially for importers who usually have no idea where the product is exactly coming from, and even for producers who are not familiar with the EUNIS list of habitats. In addition, the controllability of voluntary declarations on habitats of fishing is an obvious limit. Therefore, the system could only be envisaged in situations where a system of precise voluntary declarations could be set up, associating the product with a habitat and a precise location of fishing (for instance at the 0.5°x1° scale used in the EU Data Collection Framework). In parallel, a habitat mapping would allow to control the likelihood of declarations.

In conclusion, the EWG advices to adopt a two steps approach, starting only with the fishing gear information, but analysing at the same time the feasibility of a more reliable scoring system based on habitat. This analysis could especially (and rather easily) be carried out in the context of European fisheries where habitat maps are available and the precise location of fishing operations already registered.

3.3.6 Impact on marine food webs

- Using B/Bo as a proxy indicator

As explained in paragraph 3.1.6, the EWG advices to use the relative abundance of the stock as a proxy of the impact on the food web, assuming that changes in biomass can spread to prey and predators and finally to all the food chain. In other words, the decrease in biomass at a given trophic level is considered as a disturbance likely to impact the entire food web.

This impact could be assessed using, as a proxy, the biomass ratio B / Bo where an average stock biomass B over five years is used (or over the last 3 available values for stocks assessed every two years) and where Bo refers to the biomass without fishing as is can be estimated by biomass-per-recruit models.

Some authors suggest that ecosystem-based objectives should lead to maintain the B/Bo ratio above a minimum biological threshold of 0.5, while the target value should be around 0.6 or 0.7 (Froese et al. 2017). They also showed that such limits and targets could be reached with no or very limited losses in the catch by increasing the length at first catch.

The EWG was not in the position to define a precise scoring associated with this indicator. As an example, possible scores are mentioned in Table 3.12, which needs to be further investigated and tested. In particular, the outputs of ICES stock assessments could be considered to analyze the feasibility of this approach and to identify the most appropriate rating.

Table 3.12 – Examples of possible ratings of the impact on food web proxy indicator under system 2 (to be investigated and tested).

B/Bo biomass ratio	>0.7	>0.5	>0.4	>0.3	>0.2	<0.2
Rating	**A+**	**A**	**B**	**C**	**D**	**E**

Setting up such a scoring supposes that the product can be linked to the originating stocks, i.e. what can be done based on the precise **fishing area** and using the above-mentioned reference list of assessed stocks (see § 3.3.1). An additional difficulty is that the B/Bo ratio needs to be known and thus has to be readily available (e.g. registered in international database aggregating the outputs of stock assessments).

As a consequence, the scoring of the criterion 'Impact on the food web', which was not feasible under system 1, will be reserved to the fish products for which the required information are publicly available. This will incentivise the EU and other management bodies to make routinely accessible the B/Bo indicators for all assessed stocks, what would definitively be a good practice and a great improvement to monitor the sustainability of fisheries.

- Beyond B/Bo

The EWG notes that the B/Bo ratio is an insufficient indicator to assess all the fishing impacts on the marine food webs. In the medium term, it should be envisaged to develop a database of operational food web models, rendering possible to assess for instance whether the fishing pressure applied to a species or group of species is at risk of creating a food shortage for top-predators (large fish, mammals, birds), or of altering the stability of the food web.

Corresponding indicators may be: (1) productivity or biomass of selected top predators and (2) food web stability indicators such as redundancy or total system throughput (e.g. Heymans et al, 2014, Rooney and McCann, 2012). Those indicators are for instance already available in EcoBase, a repository devoted to all published Ecopath models (https://sirs.agrocampus-ouest.fr/EcoBase/)

Linking fish products to the appropriate model-based indicator would however need substantial additional developments. In addition, for those indicators, the definition of absolute threshold values relevant across food webs and models to define low, medium, high risks would require a lot of exploratory and standardisation work. This approach can thus only be a medium to long term perspective.

3.3.7 Carbon footprint

As previously indicated, the carbon footprint of fishery products could be scored on the basis of the Fuel used intensity (FUI, expressed in litres per landed tonne). Two options can be considered.

Option 1 would be based on direct declarations provided by fishers (including the method) of their three-year average FUI in litres per landed tonne (at least in the form of ranges, according to the final scoring). As with the declaration of habitats, this would require the establishment of a certification system to ensure the control and traceability of the product. According to the FUI, the rating could be based on Table 3.13.

Table 3.13 – Example of ratings of the carbon footprint criterion under system 2, from the Fuel used intensity (FUI)

FUI (in liters per landed ton)	<80	80-110	110-200	200-500	500-2000	>2000
Rating	**A+**	**A**	**B**	**C**	**D**	**E**

Option 2 would be to deduce the FUI from GHG emissions estimated by models such as those presented by Bastardie et al. (2010, 2013) and Tyedmers (2001). In such an approach, GHG emissions are predicted from fisheries characteristics such as the fishing gear, mesh size, vessels length or gross tonnage, horsepower, etc. Therefore, a literature review and possibly a test analysis should be conducted first in order to identify in the specific context of scoring fish products the most appropriate model and its associated input parameters. GHG emissions rates, by unit of fishing effort, could also be sourced from global databases and publications (Parker et al., 2015 and 2018). This analysis should among others determine the minimum key information that producers and importers should provide on a voluntary basis to allow the FUI estimation of their products.

The main advantage of option 2 would be to avoid any certification system (costly to implement and control). A potentially strong limit of this option is however that current modelling approaches are estimating GHG emissions and the FUI from data related to the fishing effort. Unfortunately, linking a given fish product to an associated fishing effort is difficult, while it is less precise to use an effort-based model than direct data on FUI (Ziegler et al. 2019). In consequence, the previously-mentioned literature review should also analyse the feasibility of option 2.

3.3.8 Waste and pollution

In a first step, the scoring of the criterion 'Waste and pollution' could be greatly improved compared to system 1 using a similar approach to the one described above for the 'Unwanted catch' criterion.

Still using the plastic use in fishing operation in place of the effective pollution at sea, the system 2 will cross: i) a risk-based scoring carried out at the scale of 'plastic-oriented' pseudo-métier (crossing fishing gear, fishing area and target species) and ii) an RFMO or body-based rating of the management performances (rules dedicated to pollutions reduction, compliance, specific data collection, …).

Because limited observations and knowledge are yet available related to the plastic use and discard by fishing vessels, the main difficulty of such an approach will likely be to define appropriate pseudo-métiers (i.e. combinations of fishing gears/fishing areas/ and target species characterised by a quantifiable and homogeneous rate of plastic use). In particular, it is likely that plastic use and discard rates strongly differ according to fishing practices or fleet segments.

Therefore, in a further step, producers may provide more information on the fishing gear characteristics (gear and mesh sizes, etc.) and key element of their fishing practices that could be of importance to better estimate the amount of plastic that is used and can be dropped at sea from fishing operations. Furthermore, for some passive gears such as trammel net, the number of hours the gear stays at sea may be also considered as a measure of "loss risk" at sea. This is especially the case of some trammel nets targeting spiny lobster stay for many days at sea. Based on that data, experts could assess the rate loss of plastics at sea (contributing to marine litter) from the fishers' declarations.

Other elements of the marine litter coming from fishing vessels (e.g. iron chains) may be self-declared by producers provided a specific regulation or data collection program exists and allows for control. This would provide a wider view on marine litter issues.

Finally, in a medium to long term perspective, a working group of interdisciplinary experts (not only "fisheries experts" but also toxicologists and chemists) could elaborate the necessary information to estimate the environmental impact of each pseudo-métier considering:

(a) the degradation rates of each plastic lost at sea, which depends on many factors including water temperature, PH and type () of each plastic main litter (composition and structure, conventional/biodegradable plastics, etc.)

(b) the environment where the litter will be deposited (floating litter/pelagic environment; seafloor litter/benthic habitats; micro-litter, etc.)

(c) the physical and chemical risks derived from plastics, including the release of dioxins, phthalates, vinyl chloride, ethylene dichloride, lead, cadmium and other toxic chemicals. For the plastics that are most used in fisheries, it seems that phthalates, Alkylphenol, bisphenol A (BPA) may be the major problem (FranceAgriMer, 2020). These risks could be grouped in two categories:

(i) risks to the health of the environment (e.g. sessile organisms and coralligenous bottoms may have their growth compromised by the abrasive action of lost fishing nets and lines; genetic toxicity in some organisms)

(ii) risks to human health (e.g. direct toxicity, carcinogenicity and endocrine disruption)

Particularly important is to gather information about the emerging issue of the microplastics and the adsorption by plastics of other toxic pollutants such as Persistent Organic Pollutants (POPs) including DDT and PCBs.

3.3.9 System 2 synthesis and data requirements

Obviously, system 2 gives much more information and more reliable scorings for all sustainability criteria, but is also much more data demanding than system 1. Table 3.14 summarizes additional information that is required for each criterion in order to move from one system to the other. Two key parameters, which are rather simple to collect and control at least for assessed stocks, would allow substantial progress for five criteria:

- The **detailed fishing area** the product is originating would allow identifying the related stock, at least for a still-to-define reference list of assessed stocks. This detailed information should especially allow scoring the 'Fishing pressure', 'Fisheries management' and 'Impact on marine food web' criteria (the latter by using a still-to-test B/Bo proxy indicator).

- At least as a first simple step, **the fishing gear** can be combined to the species in order to score the 'Impact on the seabed (step1)' criterion. The fishing gear should be defined accordingly to the second column "More detailed information on corresponding gears and codes" of Annex 3 of the CMO regulation (in accordance with Commission Regulation (EC) No 26/2004 and Commission Implementing Regulation (EU) No 404/2011)
- The combination of these two additional parameters**, i.e. the detailed fishing area and fishing gear**, with the targeted species should allow defining the pseudo-métiers (in association to a management body rating) that is used in the scoring of the 'Impact on ETP and sensitive species' and 'Waste and pollution (step 1)' criteria.

It should be noted that for most European stocks exploited in the North-East Atlantic, the detailed information required on the fishing area is the ICES division which is already a mandatory information according to article 38 of the CMO regulation. Elsewhere, detailed fishing areas should refer to the GSA in the Mediterranean Sea, while the FAO sub-area specification will be sufficient for most major international stocks. On the other hand, certain small stocks require finer scales such as the Fisheries Units (FUs) used for example by ICES for Norway lobster.

Some additional data would be required to score the remaining criteria or to improve the scoring reliability of some above-listed criteria. These are:

- **The mesh and hook sizes**, which is likely a key factor to define the pseudo-métiers used in the scoring of 'Unwanted landings and discards' (in association to a scoring of management bodies).
- Some (still to be defined) **fishing gears and vessels characteristics**, which will probably allow a much reliable scoring (i.e. step 2) of the 'Waste and pollution' criterion, as well as a potential scoring of the 'Carbon footprint'.
- Regarding this last 'Carbon footprint' criterion however, self-declarations by fishers of their **Fuel use intensity (FUI)** appeared to be the simplest current scoring method provided a certification system could be set up allowing monitoring and control.
- Finally, self-declaration related to the **habitat impacted by fishing** would be also crucial to get a more reliable scoring of the 'Impacts on the seabed (step2)' criterion.

Associated scoring approaches and indicators are also summarized in Table 3.14, while methods required to combine the scores of the eight criteria at the product level as well as next steps are discussed in the concluding part of the report.

Table 3.14 – Summary of criteria and scoring approaches of the sustainability of fished product in system 2 considering additional voluntary information are provided by producers or importers

Criteria	Additional information required	Scoring approaches and Indicators
Fishing pressure	Detailed fishing area (allowing to identify the stock the product is originating)	. Score based on the mean F/Fmsy ratio over the recent period
Fisheries management	Detailed fishing area (allowing to identify the stock the product is originating, and the associated management body)	. Stock-based rating using a classification into management rules categories defined by experts, . RFMO or body-based rating of the management performances (compliance, data collection, participative management…)
Impact on ETP and sensitive species	Sub-area of fishing and precise fishing gear	. Table of scoring or expert system, using a risk-based approach by 'ETP-oriented' pseudo-métier (defined by crossing gear, area and targeted species) . RFMO or body-based rating of the management performances (conservation rules, compliance, specific data collection, etc.)
Unwanted landings and discards (other than ETP species)	Sub-area of fishing and precise fishing gear, including mesh or hook size	. Table of scoring or expert system, using a risk-based approach by 'unwanted catch-oriented' pseudo-métier (defined by crossing gear, mesh-size, area and targeted species) . RFMO or body-based rating of the management performances (unwanted catch rules, compliance, specific data collection, etc.)
Impacts on the seabed	. Step 1: Fishing gear . Step 2: Fishers' declarations on habitats and precise localisation of fishing	. Table of scoring or expert system, using a risk-based approach by fishing gear and species (and associated habitats) . Feasibility of a more reliable scoring system (step 2) directly based on habitats should be investigated
Impact on marine food webs	Detailed fishing area (allowing to identify the stock the product is originating and the associated management body)	. Score based on the current/unfished ratio of stock biomass of the stock the product is originating (beyond Bmsy using B/Bo as a proxy of indirect impacts on prey and predators)
Carbon footprint	. Fishers' declarations on their Fuel used intensity (FUI). . or (if feasible): input factors of FUI models, including characteristics of fishing gears and vessels, targeted species, etc.	. Table of scoring based on FUI declaration (option 1) or FUI estimated from models (option 2) using as inputs still to be defined parameters such as gear, area, species (of the product), vessel length or gross tonnage, mesh size, etc.
Waste and pollution	. Step 1: Sub-area of fishing and fishing gear . Step 2: additional parameters gears and vessels	. Table of scoring or expert system, using a risk-based approach by 'plastic use-oriented' pseudo-métier (defined by crossing gear, area and targeted species, in step 1, and possibly additional factors in step 2) . RFMO or body-based rating of the management performances (plastic use rules, compliance, specific data collection, etc.) In the medium or long term, other indicators could consider: the loss rate of plastics at sea, other components of the marine litter coming from fishing vessels (e.g. iron chains), etc.

4 CRITERIA AND INDICATORS OF SUSTAINABILITY FOR PRODUCTS FROM AQUACULTURE

4.1 Selection and definition of criteria

4.1.1 Focusing on the environmental dimension

The expert working subgroup on aquaculture started out working from a compilation of sustainability criteria that had been identified prior to the meeting (see § 1.2). The results are organized in eight criteria, hereafter referred to as sustainability dimensions: animal welfare, environmental, social-labour, social-community, life cycle, economy, strategy and governance, stakeholder engagement. As life cycle criteria and indicators are indeed intended to reflect environmental impacts, these were grouped with the other environmental criteria. Based on the priorities expressed in the ToRs of EWG 20-05, focus on identifying sustainability criteria and indicators for aquaculture was placed on the environmental dimension of sustainability. Social sustainability was dealt with in a separate sub-group for both fisheries and aquaculture.

The fact that no criteria were identified for the dimensions 'animal welfare', 'strategy and governance' and 'stakeholder engagement' does not reflect the view of the sub-group that these are less important. Their current exclusion is only due to time limitations. Data availability drove the choice to only focus on environmental aspects in the initial development of these sustainability criteria for the EU marketing standards.

Animal welfare is a highly relevant area for sustainability, which is often linked to environmental aspects, but sometimes considered as an independent dimension of the sustainability (See for instance the ad-hoc contract reports). In any case, society's expectations are very high on this subject today, and **the EWG therefore considers it desirable to add animal welfare in the next iteration of the system to be developed**.

There is no EU-wide compulsory system of labelling of animal welfare (except for table eggs) at present, but there are initiatives to develop a harmonised EU-wide label. Currently, the Council Directive 98/58/EC lays down minimum standards for the protection of animals bred or kept for farming purposes (including fish), whereas the EU organic farming rules encourage a higher standard of animal welfare. A fish sub-group under the EC established 'EU Platform on Animal Welfare' recently proposed guidelines concerning water quality and handling of farmed fish. In addition, there are existing recommendations of the World Organisation for Animal Health on welfare of farmed fish during transport and welfare aspects of stunning and killing of farmed fish. Ideally, an integrated assessment covering environmental, behavioural physical and physiological aspects would be implemented, thereby including also shellfish.

"Strategy and governance" and "stakeholder engagement" are also highly important dimensions that are partly linked to the environmental criteria proposed by the group.

4.1.2 Selecting 12 criteria

The eight sustainability dimensions consisted of a total of 64 criteria, 20 of which were related to the environmental and life cycle dimensions. These were narrowed down to 12 that were finally suggested for inclusion, based on their importance and relevance. In cases when criteria were found to be overlapping, the criterion with the largest potential to be scored was selected. The exclusion of criteria was conducted either under the consideration that these were not central for providing a coarse but more representative picture of the sustainability of a product (not to say they were not important). These excluded criteria were "predator control, protection of wild populations: stocking, biosecurity, GMOs". A more representative criteria is "protection of wild populations: alien species, feed general, prevention of pathogen transfer to surrounding ecosystem). The criterion "protection of wild populations: therapeutic treatments" was replaced by "protection of humans: therapeutic treatments" as the use of antimicrobials in aquaculture and the contribution to spreading

antimicrobial resistance was particularly considered to be a key environmental aspect of aquaculture.

The selected criteria are described below. The order in which they are presented follows the order in the work implemented in the specific contracts prior to the meeting. This order was used as a starting point for the prioritization and development of indicators and scoring systems. The selected criteria were subsequently assessed in terms of priority (in relation to each other) and in terms of feasibility to identify indicators that can be scored and verified.

Table 4.1 - The selected criteria for aquaculture products and their priorities and feasibility. The priorities and feasibility were given from three different perspectives by the aquaculture subgroup prior to defining the different systems according to which the criteria can be scored (Producer: how easily it can be understood by the producer, Data: how available is the data used to score an indicator and Verification: how easily it can be verified)

Criteria	Priority (A=high)	Feasibility Producer	Feasibility Data	Feasibility Verification
Effluent management: emissions (in water)	A	B	B	B
Protection of wild populations: escapees	A	D	D	D
Protection of humans: therapeutic treatments	A	A	A	A
Feed: source of marine raw materials	A	B	B	B
Feed: source of agricultural ingredients	A	B	B	B
Solid waste management	B	B	B	C
Interaction with critical habitats and species	A	D	D	D
Non-therapeutic chemical inputs	B	A	B	B
Environmental assessment	A	D	D	C
Area-based management	A	D	D	C
Energy use (on farm, all types)	C	A	A	A
Carbon footprint (farmgate)	A	A	C	C

4.1.3 Defining the different production systems

The actual sustainability analysis of a certain production system is observed in the relevant context of the operation, being country, species, production system and particular attention was given to the fact whether the system is a system using feed or not.

It is important however to present the definitions of the different production systems that support the rationale and the development of criteria and respective indicators. Those definitions were based on FAO documentation (Baluyu 1989) as the following:

- **Non-fed extensive systems** can comprehend seaweed culture, coastal bivalve culture (e.g.: mussels, oyster, clams and cockles), coastal fishponds (mullets, milkfish, shrimps, tilapias) and also pen and cage culture in eutrophic waters and/or rich benthos (carps, catfish, milkfish and tilapias).

- **Fed extensive systems** can comprehend coastal fishponds (e.g. mullets, milkfish, tilapias) and also pen and cage culture in eutrophic waters and/or rich benthos (carps, catfish, milkfish and tilapias). Anyway, the volumes of feed used have to be considered to be very low.
- **Semi-intensive systems** are production systems that include fresh and brackish water pond (shrimps and prawns, carps, catfish, milkfish, mullets and tilapias). In addition, integrated agriculture-aquaculture (rice-fish; livestock/poultry-fish; vegetables - fish and all combinations of these) can be considered as semi-intensive systems. Moreover, sewage-fish cultures, which include waste treatment ponds, latrine wastes and septage used as pond inputs and fish cages in wastewater channels are considered by FAO as semi-extensive systems. Last but not least, cage and pen cultures, especially in eutrophic waters or on rich benthos (carps, catfish, milkfish, tilapias) are also considered as semi-intensive culture systems.
- **Intensive systems** are culture systems where FAO includes freshwater, brackish water and marine ponds (shrimps; fish, especially carnivores - catfish, snakeheads, groupers, sea bass, etc.). Other intensive systems include freshwater, brackish water and marine cage and pen culture (finfish, especially carnivores -groupers, sea bass, etc. - but also some omnivores such as common carp). Moreover, other production systems like raceways, silos, tanks, etc. can be considered as intensive.
- **Intermediate forms of production systems** (comprising both aquaculture & fisheries operations, for instance when aquaculture is done for stock enhancement)

In the case of European products, the production system can be easily identified according to the EU DCF and EUMAP classification systems (Table 4.1). **A very important step in developing a rating system would be to adopt and probably adapt this classification as a globally usable categorization of aquaculture production technologies. Accordingly, the production system the farmed fish originates should be considered as mandatory information for all imported aquaculture products, just like fishing gear for fishing.** It could then be used in the same way as a basis for rating farmed products.

Such a categorisation would have to be developed under an ad hoc contract in collaboration with stakeholders and scientists to ensure that it is both practical and fulfils its goals. If the production method was provided as mandatory information for products from farming, this would be a major step forward in terms of transparency on sustainability of farmed seafood, especially if combined with **a table of performance of production technologies with regard to the various sustainability dimensions**.

Table 4.2 - Aquaculture production systems definitions according to EUMAP from EC 2016/1251 that could be evaluated for use as the basis of a required labelling of production methods and be used in the rating of several of the sustainability criteria for aquaculture that are closely linked to production technology (e.g. energy use and effluent management of aquatic emissions).

Main species	Technology	Main species	Technology	Main species	Technology
Salmon	Ponds	Sturgeon (eggs)	enclosures and pens	Crustaceans	On-bottom
Salmon	Tanks and race-ways	Sturgeon (eggs)	Recirculation systems	Crustaceans	Other
Salmon	enclosures and pens	Sturgeon (eggs)	Other methods	Other molluscs	Ponds
Salmon	Recirculation systems	Sturgeon (eggs)	Cages	Other molluscs	Tanks and race-ways
Salmon	Other methods	Sturgeon (eggs)	Polyculture	Other molluscs	enclosures and pens
Salmon	Cages	Sturgeon (eggs)	Hatcheries & nurseries	Other molluscs	Recirculation systems
Salmon	Polyculture	Other freshwater fish	Ponds	Other molluscs	Other methods
Salmon	Hatcheries & nurseries	Other freshwater fish	Tanks and race-ways	Other molluscs	Cages
Trout	Ponds	Other freshwater fish	enclosures and pens	Other molluscs	Polyculture
Trout	Tanks and race-ways	Other freshwater fish	Recirculation systems	Other molluscs	Hatcheries & nurseries
Trout	enclosures and pens	Other freshwater fish	Other methods	Other molluscs	Rafts
Trout	Recirculation systems	Other freshwater fish	Cages	Other molluscs	Longline

Trout	Other methods	Other freshwater fish	Polyculture	Other molluscs	On-bottom
Trout	Cages	Other freshwater fish	Hatcheries & nurseries	Other molluscs	Other
Trout	Polyculture	Other marine fish	Ponds	Multispecies	Ponds
Trout	Hatcheries & nurseries	Other marine fish	Tanks and race-ways	Multispecies	Tanks and race-ways
Sea bass & Sea bream	Ponds	Other marine fish	enclosures and pens	Multispecies	enclosures and pens
Sea bass & Sea bream	Tanks and race-ways	Other marine fish	Recirculation systems	Multispecies	Recirculation systems
Sea bass & Sea bream	enclosures and pens	Other marine fish	Other methods	Multispecies	Other methods
Sea bass & Sea bream	Recirculation systems	Other marine fish	Cages	Multispecies	Cages
Sea bass & Sea bream	Other methods	Other marine fish	Polyculture	Multispecies	Polyculture
Sea bass & Sea bream	Cages	Other marine fish	Hatcheries & nurseries	Multispecies	Hatcheries & nurseries
Sea bass & Sea bream	Polyculture	Mussel	Polyculture	Multispecies	Rafts
Sea bass & Sea bream	Hatcheries & nurseries	Mussel	Hatcheries & nurseries	Multispecies	Longline
Carp	Ponds	Mussel	Rafts	Multispecies	On-bottom
Carp	Tanks and race-ways	Mussel	Longline	Multispecies	Other
Carp	enclosures and pens	Mussel	On-bottom	Seaweeds	Ponds
Carp	Recirculation systems	Mussel	Other	Seaweeds	Tanks and race-ways
Carp	Other methods	Oyster	Polyculture	Seaweeds	enclosures and pens
Carp	Cages	Oyster	Hatcheries & nurseries	Seaweeds	Recirculation systems
Carp	Polyculture	Oyster	Rafts	Seaweeds	Other methods
Carp	Hatcheries & nurseries	Oyster	Longline	Seaweeds	Cages
Tuna	Ponds	Oyster	On-bottom	Seaweeds	Polyculture
Tuna	Tanks and race-ways	Oyster	Other	Seaweeds	Hatcheries & nurseries
Tuna	enclosures and pens	Clam	Polyculture	Seaweeds	Rafts
Tuna	Recirculation systems	Clam	Hatcheries & nurseries	Seaweeds	Longline
Tuna	Other methods	Clam	Rafts	Seaweeds	On-bottom
Tuna	Cages	Clam	Longline	Seaweeds	Other
Tuna	Polyculture	Clam	On-bottom	Other aquatic animals	Ponds
Tuna	Hatcheries & nurseries	Clam	Other	Other aquatic animals	Tanks and race-ways
Eel	Ponds	Crustaceans	Ponds	Other aquatic animals	enclosures and pens
Eel	Tanks and race-ways	Crustaceans	Tanks and race-ways	Other aquatic animals	Recirculation systems
Eel	enclosures and pens	Crustaceans	enclosures and pens	Other aquatic animals	Other methods
Eel	Recirculation systems	Crustaceans	Recirculation systems	Other aquatic animals	Cages
Eel	Other methods	Crustaceans	Other methods	Other aquatic animals	Polyculture
Eel	Cages	Crustaceans	Cages	Other aquatic animals	Hatcheries & nurseries
Eel	Polyculture	Crustaceans	Polyculture	Other aquatic animals	Rafts
Eel	Hatcheries & nurseries	Crustaceans	Hatcheries & nurseries	Other aquatic animals	Longline
Sturgeon (eggs)	Ponds	Crustaceans	Rafts	Other aquatic animals	On-bottom
Sturgeon (eggs)	Tanks and race-ways	Crustaceans	Longline	Other aquatic animals	Other

Finally, it should be noted that besides the above-mentioned clearly distinguishable types of aquaculture production systems, further intermediate forms of production systems representing a combination of aquaculture and fisheries operations.

Different aquaculture production systems can be considered in this context: in general Aquaculture/Fishery production systems depend upon:

(1) Wild catch of broodstock – to produce farm site stock (e.g. shrimp production)
(2) Wild catch of larvae/ juveniles – to be stocked for grow out (e.g. tuna production)
(3) Wild catch of seed (e.g. semi-passive mussel production)
(4) Wild catch for maintaining the genetic pool of the broodstock (applicable to many species)
(5) Use of wild-caught fish as feed ingredient in aquaculture feed
(6) Use of farmed fish as bait fish in fishery
(7) Use of farmed fish for restocking in fisheries
(8) Use of farmed fish to treat parasites of other farmed fish (e.g. sea lice)
and (9) Others

It has to be highlighted that this specific category of intermediate forms of production systems was not covered by the EWG in detail due to a lack of time and capacity. Accordingly, that type of production systems is going to require additional focus by both fishery and aquaculture experts during the next steps that will be taken.

4.1.4 Criteria definition

- Effluent management: emissions (in water)

Effluent management covers the wide range of emissions produced by the production system. The amount of effluents generated by aquaculture can be high for intensive and open production systems and is of environmental and public concern. The production of emissions (dissolved matter or particular matter) presently relates to the management system to control and processing them.

The feasibility to rate the criteria varies depending on the available information per species and production system.

- Protection of wild populations (escapees)

Escapees of individuals presents a sustainability challenge. Escapees can be alien species, as in foreign to the current ecosystem in which they are produced, or selected farm strains, including Genetically Modified Organism (GMO) salmon. Escapees often lead to ecological interactions or cross-breeding with wild strains with potential negative impacts on e.g. survival and genetic composition of wild populations. Escapees are in many countries strictly regulated, but do still occur and are of environmental and public concern, although the impacts for different species are not fully examined yet.

It should be noted that escapees as a threat is case specific. For example, for the production of rainbow trout this is recognized as not relevant whereas for the production of white shrimp it would be very important. In nearly all regulatory frameworks worldwide there are strict requirements for managing the risk of escapees and a requirement to report on escapees. The issue is however still quite widely debated with, on the one hand, evidence of -for example- cross-breeding for river trout and, on the other hand, a discussion on the actual negative impact on the ecosystem of escapees.

- Protection of humans: therapeutic treatments

There is a wide proliferated use of chemicals in some aquaculture production systems. These can range from e.g. anti-fouling agents in cage systems to the use of anti-microbial treatments and hormones.

The use of anti-microbials and other chemicals in the production of food for human consumption is especially an important issue. In addition, the risk of leaching out of the used chemicals into the natural ecosystem is a recognised risk.

- Feed

In those systems in which feed is being used, feed production is a major production input in terms of environmental impacts. Additionally, feed accounts often for the highest share of production costs for the producer (40-60%), but also contributes significantly to the products' carbon footprint. The latter is dependent on both the amount used and the feed composition and thereby on the sourcing of crop and in some cases marine feed inputs.

Two dimensions need to be analysed when considering the environmental impact of the feed uses in aquaculture. On the one hand, the raw materials used to make the feed (animal or agricultural origin) and the way to produce them (sustainable or not sustainable productions). On the other hand, the direct emission of pollutants into the natural environment during the farming process as a result of excess feeding.

Establishing the sustainability of the used feed is a complex exercise. It entails among others establishing the sustainability of the used animal protein in the feed (fish meal and oil or animal by-product derived inputs). In addition, it relates to the establishment of the sustainability of vegetable inputs such as soy and palm oil and GMO-based feed inputs.

The sustainability of aquaculture feed by itself is or should be captured by other marketing standards referring to agriculture products. Hence, it is suggested that the feed that is used for aquaculture should have its own sustainability criteria, which should be established by the feed producers and communicated to the aquaculture producers. The aquaculture producers, in turn, have to ascertain the sustainability level of the used feed by asking for this information from their supplier.

Luna et al (2019), in their work about the integration of environmental sustainability and product quality criteria in the decision-making process for feeding strategies in seabream aquaculture companies, highlight the lack of inclusion of feed contamination and waste indicators in aquaculture organic labelling and production regulations. They also enhance how this lack affects the results of these production practices in terms of sustainability assessment. Feed that was observed to be marketed for organic production has in many cases this consideration because it originates from a sustainable fishery. The efficiency in the use of fish or waste and pollutants generated per kg is however significantly worse than those of other non-certificated feed alternatives. This suggests that within the aquaculture industry, what is an environmentally sustainable production is not properly defined, which confuses both producers and consumers.

As for the use of marine ingredients (fish meal and oil) in aquaculture production, establishing the sustainability falls under the related standards for fisheries, which, in turn, need to be used by feed producers. As for the general use of feed, the aquaculture producers have therefore to ascertain the sustainability level of the used raw marine ingredients.

In addition, the EWG notes that some fisheries scientists consider that the use of wild fish to feed aquaculture production should be considered as an unsustainable practice, since fishery products should be reserved for human consumption in light of the growing demand and population.

The EWG concluded that measuring the impact of feed may consider two criteria. On the one hand, the sustainability of the used feed in terms of how it has been produced and eventually certified) and, on the other hand, the level of emissions that this feed generates based on its composition. The related indicators and scoring are presented in § 4.2.

- Solid waste management

Different types of waste are generated during aquaculture production. Typically, these are separated into biological and non-biological waste and into toxins (see also adhoc background information in annex II). In addition, plastics have recently been singled out as a separate category of waste. The importance of this is related to the reported impact of plastics on the marine

environment. Plastics are a major waste at sea and a major pollutant; lost fishing gear and the single-use plastic products account for 70% of marine litter (European Parliament, https://www.europarl.europa.eu/news/en/headlines/society/20181005STO15110/plastic-in-the-ocean-the-facts-effects-and-new-eu-rules). For further information on plastics, see the fishery section.

In aquaculture, plastic waste is generated crudely by two separate processes:

First, by the generation and inappropriate disposal of single use plastics such as feedbags, plastic containers and by transport/holding containers of e.g. larvae in plastic bags or polystyrene boxes. On the one hand the second part of the equation is how the waste is handled i.e. disposed of. Therefore, waste generation by species is linked to the country of production and its waste disposal mechanisms (availability and use).

Second, plastics/synthetics in infrastructure can be released (e.g. break away in a storm or be dumped inappropriately), which can physically damage habitats and species, be ingested, or can turn into ghost fishing devices. Examples could be the nylon socks from mussel farming, or nets, buoys, ropes from cage farming. This is thus both about the generation of plastic waste as well as the handling/management and disposal of waste.

The different types of plastics of concern are listed in the fishery section of the report.

A detailed analysis to study and compile which production types would typically generate which types of waste and which countries ensure what level of disposal is needed.

The EWG considers that this is a preliminary description of where waste is produced, clearly stating that this is an issue for drinking water reservoirs as well as the marine environment, predominantly in Asia where the majority of aquaculture farming occurs.

Hence, in terms of sustainability assessment this criterion evolves around the amount of produced waste and its management. For example, is waste being properly collected and is the waste being recycled, reused, repurposed and in general being reduced? It should be noted that the system of waste collection and waste management is case specific: there is a difference between a situation in which no such system is available and the case where the system is available but not (properly) used.

- Interaction with critical habitats and species

Aquaculture farms interact with their environment. This is of course more significant for open production facilities such as cages and ponds than for closed systems such as recirculation systems. This interaction becomes more critical when the farms are operating in, or in close vicinity to marine protected areas (MPAs).

A distinction could however be made for mussel farms, which contribute to water quality and do not conflict with the requirements of the MPAs. In this case their presence can be compared to an additional environmental service for MPAs.

The production systems that especially operate in mangrove areas face the dilemma of impacting these habitats. Moreover, through the grandfathering principle in which a farm was established way before the protected area was established, it is difficult to provide a universal ranking of this aspect.

Yet the interaction of the farm with protected and/or sensitive areas and/or threatened species has to be assessed to establish its sustainability.

- Non-therapeutic chemical inputs

A clear example of the use of non-therapeutic chemicals is the use of anti-fouling agents in cage and net cultures to restrict on-growth. Whether these chemicals are used or not is part of the sustainability analysis. The score of the use of a particular substance is influenced by the availability of less harmful alternatives. Yet the available alternatives need to be evaluated against the chemical used not only in terms of environmental impact but also in economic efficiency and effectiveness terms.

- Environmental Impact Assessment (EIA)

An Environmental Impact Assessment (EIA) is compulsory in the EU for activities to become licenced. As such, an EIA would generally multiples the sustainability criteria presented here. Hence the possession of an EIA-based license for the farm is in itself a sustainability indicator as well as a proxy for other sustainability criteria.

For non-EU areas, the question can be raised whether a similar licensing system is in place. The FAO Sustainable Aquaculture Guidelines could be a guide line in this regard. Guideline can also be based on the GFCM / FAO tool about the Allocated Zone for Aquaculture (AZA). Several countries in the Mediterranean and Black Seas have adopted the GFCM / FAO guideline for AZAs[16] to define areas intended for aquaculture. This is also an indicator of not only environmental but also economic and social sustainability. Furthermore, it is an indicator to understand how aquaculture integrates the anthropic system and the other economic activities that could indirectly compromise the sustainability of aquaculture (for example commercial shipping, tourism, industrial districts with their discharges into the sea etc...).

In any circumstance, the wider governance system has obviously to be taken into consideration, focusing on the licensing part but, moreover, on the control and enforcement of the system.

- Area-based management

Whereas the criteria above for Environmental (impact) Assessment sometimes only relates to the individual farm, there has been a growing understanding over the last years that this is insufficient and that the carrying capacity of the environment can only be judged by taking the area, and the cumulative impacts within that area, into account, similarly to what is done for fisheries.

There are examples where aquaculture activities are already managed on an area/spatial scale, such as the Bay management practice of Ireland and the *vario* management in Chile, where salmon growers work together in the management of the area. Area-based approaches relate to all applicable indicators. Although the focus is typically on biosecurity, it should at least be expanded to the three challenge areas identified within the FAO guidance.

Sustainable Fisheries Partnership (SFP) has produced a report (in partnership with Conservation International, and the University of California Santa Barbara's Sustainable Fisheries Group) on ways to address the cumulative impacts based on the ecosystem approach to aquaculture (EAA) developed by the Food and Agriculture Organization (FAO) (SFP 2018, FAO 2010, Aguilar-Manjarrez et al. 2017, Telfer et al. 2009). They focus on three main challenges of cumulative impacts that the aquaculture industry is facing:

1) Spatial conflicts with other resources' users – e.g. access rights, impacts of habitat conversion on other users,

2) Exceeding carrying capacity of a waterbody – leading to negative environmental effects e.g. benthic impacts, loss of water quality,

3) Disease amplification and transmission – this can affect both aquaculture species and wild stocks.

Most regulatory requirements incorporate some level of area-based assessment and management in the marine planning and licensing system, although it is not fully enforced or not fully applied in licensing permits or different forms of production. For example, large areas such as hundreds of square kilometres of shrimp farming have entirely transformed/converted the environment; however, this does not initially appear as an environmental concern if impact assessments are only viewed at a farm level.

The criterion is evaluated from the inclusion of the "area/spatial approach" into environmental impact assessment and management, and whether or not this is effectively enforced for farming

[16] http://www.fao.org/gfcm/publications/studies-reviews/azatoolkit/en/

operations (e.g. conditions in farming permits). In other words, the area-based approach as part of the environmental impact assessment and corresponding management can be done as part of the marine planning/licencing system (the more common approach), or can be done by a producer or a group of producers.

There are a number of initiatives, organisations and universities working on this and additional more in-depth or country-related data availability could be generated via such organisations/universities. Two examples:

1) MIMECC was a Spanish project on carrying capacity models looking for the improvement of aquaculture production sustainability:

https://www.programapleamar.es/sites/default/files/mimeca.pdf

The general objective is to develop innovative measures applied to establish the carrying capacity in aquaculture that allows promoting an improvement in production management through sustainable planning. The project allows the establishment of the carrying capacity for semi-intensive production in ponds and intensive production in sea cages based in a multiplying factors approach. All this is carried out through the identification of the environmental, socio-economic and productive interactions that occur in the development of the activity, the identification and ranking of indicators and their integration into a carrying capacity model that allows dimensioning the sector in an adequate and sustainable way throughout the Mediterranean and South Atlantic coast in Spain.

Some general conclusions:

- The mathematical models existing to date have a large amount of inputs which makes it difficult to obtain data by part of administrations and companies.
- Predictive models based on multiplying factors that define the activity and the receiving environment at the environmental, social and economic are easy to apply but require participation from a large number of experts.
- Industry and management validation is crucial to success (sector tables and sector-administration coordination).

2) Supermarket supported area-based management and certification of aquaculture in Southeast Asia (SUPERSEAS)

https://www.wur.nl/en/project/Supermarket-supported-area-based-management-and-certification-of-aquaculture-in-Southeast-Asia-SUPERSEAS.htm

- Energy use (on farm)

Energy efficiency in future production systems will be critical. The use of energy in aquaculture production systems differs widely. Closed Recirculating aquaculture systems (RAS systems) and highly intensive farm systems require higher input of energy than more open and extensive production systems (Bohnes et al. 2019, Philis et al. 2019). It is foreseen that land-based aquaculture systems will become more important over time and that energy efficiency will become more important in the years to come, this aspect will gain importance in the future. Although the on-farm energy use will also be a small part of the assessment of the carbon footprint (see below), it is important to separately assess energy use in order to incentivize the energy efficiency. If renewable energy sources are used, high energy use on the farm could otherwise go invisible. In a fossil-free energy food system, energy efficiency will hence gain in significance as an important sustainability metric.

- Carbon footprint (farmgate)

Reducing greenhouse gas emissions (the carbon footprint) is an urgent responsibility of all sectors in order to reach global climate goals. The carbon footprint of aquaculture production ranges from production of the used inputs (feed with production of its multiple inputs, brood stock) to grow-out and is often dominated by feed production in systems using feed (Henriksson et al. 2012, Parker 2012). While post-harvest steps of the supply chain of farmed seafood can give substantial contributions to total emissions, these are left out here as they will be dealt with jointly for products

from fisheries and aquaculture. As mentioned above, a separate sustainability analysis of the used feed with regard to sustainable *sourcing* of marine and agricultural feed inputs is suggested. In this criterion, greenhouse gas emissions are assessed in terms of feed production and grow-out.

- Social

Next to the generic social sustainability indicators presented in this document (see § 5) such as labour conditions and particularly child and slave labour, there are specific social aspects related to aquaculture production. Especially land grabbing (for intensification of aquaculture) and the morality of the reduction of fish for feed[17] rather than food production are to be included.

4.2 From criteria to indicators, under a scoring system based on simple data only (system 1)

4.2.1 Defining system 1 for aquaculture

The mandatory information that would be available for aquaculture would only include species and country of origin. This limited scope of information does not allow for a proper evaluation of the sustainability aspects (within aquaculture production) as defined for the selected criteria in section 4.1. Information on species and country would only allow conclusions for very homogenous national aquaculture sectors in combination with respective production information such as national statistics. Atlantic salmon production in Norway would be close to an example for a homogenous industry, where an average (and range) can be identified to give a representative score (Winther et al. 2020).

However, even for this case, not all 12 selected criteria could be ranked according to a sustainability scoring as e.g. feed input would still differ between farms. In addition, a further (future) differentiation of farming systems to e.g. including also land-based systems would definitely prevent a distinction based on country and species, due to the large differences between open and closed production systems.

In order to implement an evaluation of sustainable aquaculture production, the EWG concluded that at least additional information on the aquaculture production system would be required. Despite the current data collection operated by national organisms, the information on the aquaculture production system is not regulated to be provided as mandatory information on product within the current EU Regulation framework. In contrast, "type of gear" is a mandatory additional information required for fishery products, which the EWG considers as more or less equivalent to the information on aquaculture production system. The EWG therefore considers that the aquaculture production system the products originates should be add on as mandatory information. **The following chapter assumes that System 1 includes this additional information**.

Initially, it is proposed to refer to the classification of production systems used by the EU for economic reporting under EUMAP (Table 4.2) and to investigate its feasibility for global application as well as identification of necessary modifications or additions. EUMAP represents an alignment of the segmentation with Eurostat segments and it contains the following farming techniques, which are included in the (Eurostat) statistical Regulation (EC) No 762/2008 on aquaculture; "ponds", "tanks and raceways", "enclosures and pens", "cages", "recirculation systems", "other methods" as well as "combined" and "hatcheries and nurseries". Note that this classification is based on the current EU aquaculture production systems, thus there are operational production systems outside of the EU that are not included, or which are aggregated under the same category due to their lower relevance in EU aquaculture. The EWG recommends to use this available classification system as a basic assessment in order to consider these production systems that are not mentioned. As a next step the EWG therefore suggests to add information on aquaculture production system as

[17] Establishing the sustainability of the reduction of fish is of course part of the fisheries sustainability discourse. Yet the basic principal whether animal protein should be used to produce food rather than feed is a specific aquaculture and wider animal husbandry sustainability issue.

mandatory. The classification of aquaculture production systems is proposed for this purpose as mentioned in section 4.1.

The two examples below were selected to illustrate the applicability of system 1.

Criterion "Non-therapeutic chemical inputs: antifouling"

- Any production system other than net cage farming does not use antifouling. Therefore, this criterion can be rated in the highest sustainability category ("lowest impact") under system 1 for all production systems other than net cage.

Criterion "Feed"

- For non-fed aquaculture species, as indicated within the production system information (e.g. extensive black tiger shrimp production), a sustainability (top performing) rating for feed is possible under system 1. In contrast, for fed aquaculture species, as indicated within the production system information (e.g. intensive Atlantic salmon production), a sustainability rating is not possible under system 1. In this case, the rating of sustainability would have to be realised under system 2, thereby taking into account the composition of feed and further information on the sourcing of crop and potentially marine feed inputs.

A summary of all selected criteria used in system 1 and 2 can be found in Annex A and is summarized in the section 4.4 (discussion paragraph). In addition, in order to facilitate the reader's understanding on the suggested methodology, few scoring examples for selected farms (according to species, country and production system) are also available in Annex A and summarized below (§ 4.4).

4.2.2 Effluent Management: emissions (in water)

Effluent management performance of a farm is known by the producer. A table of reference (e.g. rating total amount of nitrogen or phosphorous released per tonne of seafood produced) could therefore help the producer to rate its production. This scoring would be based on expert work (reference table) but without needing an expert evaluation on the farm to score the products.

The evaluation could be based on dissolved matter from point source pollution and/or diffuse pollution for water. For benthos, the evaluation could be based on particulate matter from point source pollution and/or diffuse pollution.

If information are available from generic system-based nutrient emission models, or literature, or based on regulatory framework in country per species and system of production, it can be score based on the list of production systems (e.g. FAO or EUMAP according to Table 4.2):

- classified into open and closed;
- classified into point source and/or diffuse, tabulated against scoring of pollution, as suggested in the literature.

The system of production classification can lead to a score as follows:

- Open versus closed production system: closed green, open red. However, some definitions are needed as not all the recirculating aquaculture system (RAS) are closed. So called flow-through systems (open RAS systems) could be rated yellow.
- Fed versus non-fed production system can be used as a proxy for intensity: non-fed green, fed red.
- A list of production systems (depending on how the definition is used) with adequate effluent treatment can be used for the scoring.
- If available, good score from EIA and area-based indicator would similarly lead to a good score.

Thus, the scoring of the effluent management can be done in the framework of system 1 (see Annex A for examples). It is important as the environmental impact link to the effluent management is essential for the consumers' point of view.

Such a system has however a clear limit since all the producers using a certain technology of the same country are categorized the same way, without being able to take into account differences in

performance between producers using the same technology. Ideally, this can also constitute an incentive for those who perform over average to provide information allowing to move to system 2, with the expectation of obtaining a better score.

4.2.3 Protection of wild populations: escapees

The evaluation of this criterion is based on the escapees of species, being either exotic or invasive. To be able to take into account this dimension, a list of native/exotic species need to be developed as available information from generic emission model, literature, or regulatory system (per species, country and system of production) may be not sufficient to score these criteria under system 1.

The only possibility to build a score in system 1 is by differentiating open from closed systems, with nuances regarding the system of production.

Guidance to build a score is as follows:

- Open versus closed production system: closed green, open red. However, more detailed definitions are needed as not all RAS are closed,
- Land-based versus open water-based production system: land-based = better score, open water = lower score,
- The species can be considered as a proxy for potential negative impact, based on a list of native/exotic and invasive species. E.g. Exotic (yellow?) and invasive/cross-breading (red?) in open systems. This is to be further analyzed.
- An indicator could take into account the risk of "genetic contamination" of wild populations of the same species, if a native species raised has been genetically modified, for instance to be asexual (i.e. sterilized to mitigate any impact of escapees from cages / tanks) or to change target growth, disease resistance, temperature tolerance, etc.

Relevance:

- In many regulatory frameworks, but not everywhere, there is strict regulation of escapees, therefore the criterion should introduce contrast.
- Species native/non-native/GMOs (bigger issue when native species that has been bred)

Limits:

- No scientific consensus about which species has a negative impact
- Linked to intensity level and production technology (open/closed)

4.2.4 Protection of humans: therapeutic treatments.

One of the major indicators for the protection of human is the therapeutic treatments such as the use of antimicrobials in animal-based food production. Data can referee to the list of critically important antimicrobials developed by the WHO (https://www.who.int/foodsafety/areas_work/antimicrobial-resistance/cia/en/). The available statistics on use per species and production system can be used to establish the scoring.

Guidance to build a score

- Fed versus non-fed production system (only grow-out?): non-fed full life cycle=green, non-fed grow-out= yellow, fed=red.
- By country: are all the microbial listed as critically important for human treatment banned and is this enforced? yes = yellow; no = red. The green score is not used, as a country-based scoring appears insufficient fort such an important criterion. It can be noted that, in some countries (including EU MS), few statistics are available to determine whether antimicrobials are responsibly used in very small amounts or not.
- Ideally the two criteria Production system and Country should be combined in order to define a final scoring.

Relevance:

- It is important for the consumers' point of view.
- Mitigating antimicrobial resistance is one of the most critical issues for future human health.

Limits:

- A generalized rating here would definitely be a problem for companies not using the substances listed in a country with a low level of control.

4.2.5 Feed: source of marine raw materials.

Indicators that can be used/built looking at:

- The use or non-used of feed in the system of production
- The list of species and classification of herbivores.

Guidance to build a score:

- If non-feed or without marine raw materials = green.
- If herbivorous species = green.
- If fed species, move to system 2. If feed containing marine ingredients is used, see fisheries section. However, **many experts in the groups consider that wild caught fish should be dedicated in priority to human food and thus feed considered as not sustainable**.

Relevance:

- Scoring for non-fed species only.

Limits:

- Strongly linked with fisheries management and criteria of sustainable fisheries.
- For herbivorous species, the scoring may be overestimated in green despite that some herbivores may also get marine ingredients.
- Impossible to score in system 1 regarding of what type of feed versus species and production system.
- It is impossible to evaluate the sustainability of the feed production, nor the impact on emissions.

4.2.6 Feed: source of agricultural ingredients.

Indicators that can be used/built looking at the:

- Use or non-used of feed.
- Feed dependency.

Guidance to build a score:

- If fed species, move to system 2.

Relevance:

- Scoring for non-feed species only.

Limits:

- The sustainability of the feed itself is up to the feed industry.
- Impossible to score in system 1 regarding what type of feed versus species and production system.

- It is impossible to evaluate the sustainability of feed production, nor the impact on emissions.

4.2.7 Solid waste management

Indicators that can be used/built:

- Depends of the waste disposal facilities per country.

Guidance to build a score

- Country legislation.
- If land-based higher score than if marine-based.
- The availability of facilities conditions the options of companies to carry out waste management.

Limits:

- It makes only a general statement and does not reflect the producer individual behaviour.
- It requires an analysis and comparison of the different legislations and infrastructures at country level. It cannot be evaluated directly in system 1.

4.2.8 Interaction with critical habitats and species

The geographical localisation of the farm is needed in order to be able to make an evaluation.

It requires indicators such as:

- Farm is not situated in protected area,
- Farm is not situated in area of high value for sensitive habitats or endangered or critically endangered species,
- The information available at the country scale is not sufficient to apply a relevant scoring.

Guidance to build a score:

- None.

Relevance and limits:

- Cannot be evaluate in system 1 framework.

4.2.9 Non-therapeutic chemical treatments

The use of non-therapeutic chemical input can be ranked by the type of production system, as a start for scoring.

Indeed, the use of non-therapeutic chemical treatments available at the producer level is linked to technology. Based on the list of production systems that use antifoulant and the EU database needed for EU organic certified operations (as organic implies non-use of chemical treatments), a score can be built:

- Use/ non-use of indicator; if EU organic certified or non-use = green.
- If use, move to system 2.

Relevance and limits:

- It is an increasing concern for consumers,
- It can only cover producers that are not using non-therapeutic chemical, like organics producers.

4.2.10 Environmental assessment

Indicators that can be used/built:

An EIA (environmental impact assessment) is carried out prior to issuing permits for farming, it is reviewed regularly and when changes occur (e.g. expansion). The regular monitoring outcome confirms that the implemented measures ensure low risk /EIA outcome/forecast. The EIA is followed.

The used data lead on the underway work of academics that study this dimension. By rating countries and production systems, it gives some indication on environmental assessment that can be other data than formal EIA. Those indicators could be used or any other country-level benchmark comparing the effectiveness of EIA as part of the regulatory framework and licensing system.

Guidance to build a score:

- Country rating still to be developed. If enforced by regulation and follows FAO guidance, a high score can be given. If enforced but does not follow FAO guidance, a medium score is given. If not enforced, a low score is given.

Relevance and limits:

- Environmental regulation is a source of competitive advantages / disadvantages for companies from different countries competing in the European market.
- Systems should highlight the differences between countries concerning environmental regulations.
- It can be done at the area level rather than at the farm level.
- If information not available, there is a need to move to system 2.

4.2.11 Area-based management

Indicators that can be used/built:

The used data can be based on academic analyses that study the underway work on this dimension. By rating countries and production systems, it gives some indication that can be other data than formal EIA. Those indicators could be used -or any other country-level benchmark- comparing the effectiveness of EIA as part of the regulatory framework and licensing system.

Guidance to build a score:

- Country rating still to be developed. If enforced by regulation and follows FAO guidance, a high score can be given. If enforced but does not follow FAO guidance, a medium score is given. If not enforced, a low score is given.

Relevance and limits:

- It can be done at the area level rather than at the farm level.

4.2.12 Energy use (on farm, all type)

This criterion evolves around the amount of energy used per unit produced only in the grow-out phase of aquaculture. The energy efficiency of the system could be assessed in a generic way by type of production system (using categorization of production systems, e.g. building on the EUMAP system presented in Table X) in combination with reviews of aquaculture LCAs or energy analyses (e.g. Henriksson et al. 2012, Hornborg & Ziegler 2014, Philis et al. 2019, Parker 2018, Bohnes et al. 2019). The energy use of post-harvest stages of the life cycle will often be covered by the criterion production-related carbon footprint in post-harvest (at least processing and distribution), applying to products from both fisheries and aquaculture. The energy use in feed production and other "upstream" processes will partly be covered by criterion 4.2.14 related to carbon footprint.

Indicators that can be used/built:

- If available information from literature in country per species/country/production system. It can be scored.

Guidance to build a score:

- It would require a table showing production system and the corresponding scores, which is still to be developed.

Relevance and limits:

- Differences in energy use according to production systems (intensive-extensive, offshore, recirculating, etc.).
- Production system can incorporate more than "pond/cage" e.g. fed.

4.2.13 Carbon footprint

The carbon footprint could be assessed in a generic way based on available literature and average values for different combinations of species and production technologies, but can also be based on more specific data/studies done for a production system.

Indicators that can be used/built:

- If information is available per species/country/production system from literature, the production can be scored.

Guidance to build a score:

- Table showing species, production system and corresponding scores (still to be developed).

Relevance and limits:

- Limited relevance if only the production is assessed, without taking into account post-harvest steps, especially for imported products (this will be handled jointly for products from fisheries and aquaculture).
- Post-harvest criteria are the only criteria for which end products are assessed and where a producer might end up with products getting different scores depending on the market (e.g. scoring lower if airfreighted).

4.2.14 General advantages / disadvantages of system 1

Advantages and disadvantages of system 1 (including production system as mandatory information):

Advantages:

- Simplicity: A system based on information easy to make available is simpler and faster.
- Lower cost: As no information collection and analysis systems need to be implemented.

Disadvantages:

- Incomplete evaluation: System 1 is not suitable to assure a proper and reliable evaluation of all the different sustainability criteria that were identified.
- Incomplete scope: the diversity of the aquaculture sector does not allow the implementation of system 1 for the whole sector for any criteria.
- Generalization: Since products are evaluated according to species, the country and the system of production, there is impossibility to identify / discriminate different levels of sustainability within the companies of an industry / country.

The EWG concluded that system 1 is not sufficient and cannot be implemented for the whole sector for any criteria. All the species and production systems as well as criteria that cannot be addressed properly by system 1 have to be categorized within system 2 allowing a more thorough evaluation of sustainability criteria.

4.3 A more reliable scoring based on key additional data (System 2)

4.3.1 Defining system 2 for farmed products

Due to the complexity of the aquaculture production sector, the information on species, country and production system are often not sufficient to draw conclusions on sustainability according to the selected criteria (section 4.1). Therefore, under system 2, a more substantiated data basis is required in order to allow a proper basis of evaluation that can be applied by a small team of scoring experts.

The criterion "Interactions with critical habitats and species" is a good example for a case that is not suitable to be rated under system 1. Here, additional information is required for the protected areas within each specific country. This could e.g. be covered by an evaluation of country-level compliance with international agreements for protected areas (such as Ramsar sites, see Annex A).

In other words, **System 2 requires the creation of a database, making available information for products from aquaculture**. The detailed required information for each indicator in this database is identified below.

In some cases, information at the country level will be sufficient (at least as a first step) and can thus be collected from national statistics and from the scientific literature, or derived from national regulations, or obtained through intergovernmental requests (on a voluntary basis, arguing this may allow each country to promote its sustainable aquaculture through a better scoring in system 2). **In other cases (i.e. for some and in fact most of the indicators), the information needs to be collected at the farm level. In that case, a declarative and voluntary system could be envisaged (for the producers who want to benefit from system 2**), provided a detailed guidance be preliminary defined that ensures a standardized and potentially verifiable information.

In this latter case where producer-specific data will be used for the ranking, a challenge will be to define how the provided information can be verified. If the scoring is e.g. done by answering questions in an application, which results in a "product report", some kind of document could be supplied to a database as a verification of any producer-specific data supplied/used (e.g. a calculation of the per tonne energy or a summary of electricity bills in the case of the energy used criterion).

Collecting data under system 2 will result in increased costs. To ensure the feasibility of data collection, it will be desirable to co-construct indicators that are important for sustainability, but that take into account the economy for countries and the benefits for farms.

The criteria in System 2 underpin a good dialogue with the productive communities.

One of the critical issues is related to the difference in social acceptability of aquaculture: this may lead to limitations to its development and, conversely, a great variability of data related to sustainability: an example would be the difference at EU Level of the time to obtain authorization or licence for a new aquaculture site.

A list of all criteria and the associated indicators used in system 2, as well as example of the scoring, can be found in Annex A and are summarized in the 4.3 discussion paragraph.

4.3.2 Effluent Management: emissions (in water)

Information on effluent management needs to be farm-specific and not only referred to a species/country average value as in system 1. Thus, using system 2 for scoring the effluent management criteria is much more relevant than in system 1 as it allows capturing farm heterogeneity across country/species. More information provided by producers and verified can be used to achieve a more accurate score.

4.3.3 Protection of wild populations: escapees

In cases where information is available from the generic system based on nutrient emission models, literature or based on regulatory framework per country, and per species and system of production, it could be scored in system 2.

In many regulatory frameworks, escapees is strictly regulated, but it may not be enough at the species/country/system of production level. Thus, additional information provided at the country level under system 2 should allow accurate scoring of the management of the escapees and moving score out of red (if justified).

4.3.4 Protection of humans: therapeutic treatments

In the framework of the system 2, specific data collection should allow to evaluate more accurately at the farm level the use of therapeutic chemical. Indeed, neither the legislation nor the analysis based on the species, country and system of production approach is sufficient to accurately reflect the heterogeneity across aquaculture farms.

4.3.5 Feed: source of marine raw materials

In order to be established as a relevant scoring, it is important to have more detailed information about the marine species in the composition of fish feeding. One important indicator should be on the exclusion of the use of threatened species in feeds, both as whole fish and as trimmings.

The limitations of system 2 are quite similar as the ones in system 1. The evaluation of the sustainability of the source of marine raw materials is strongly dependent on the sustainability of the relevant fisheries system producing the raw material.

4.3.6 Feed: source of agricultural ingredients

In order to establish a relevant scoring, it is important to have more detailed information about the source of agricultural ingredients in the composition of fish feeding. One important indicator should be on the exclusion of the critical ingredients (e.g. non-sustainable soy). This would require to develop information on risk crops as soy and oil palm. The internationally agreed moratoriums for such risk crops could currently be monitored, but it is unclear how data relating to a specific feed could be available. System 1 or 2 does not capture this currently.

The limitations of system 2 are quite similar as the ones in system 1. The evaluation of the sustainability of source of agricultural ingredients is strongly dependent on the feed supply chain sustainability. The opportunity to lean on existing certification of feed inputs could be considerated.

4.3.7 Solids waste management

To allow an accurate scoring representing the producer's individual implementation of waste management, specific data collection has still to be developed, either analyzing if and how local regulations could be used, or building a declarative appropriate system.

4.3.8 Interaction with critical habitats and species

As system 1 is not relevant for the evaluation of this criterion, we need as a starting point to evaluate the country-level compliance with international agreements on protected areas.

In a second more precise step, it can be evaluated if farms are not situated in protected areas, or in areas of high value for sensitive habitats or endangered or critically endangered species.

To do so, several sources can be used:

- habitat: Ramsar sites, list of critically sensitive areas to be developed (e.g. mangroves, rainforest)
- species: https://www.iucnredlist.org/, https://zeroextinction.org/
- habitat and species: https://rsis.ramsar.org/ris-search/?f%5B0%5D=threats_en_ss%3AAgriculture%20%26%20aquaculture (still to check how this can be used).

Depending of the data used, we can scoring as follow:

- If the farm is situated in protected area, a low score should apply.

- If the farm is situated in Ramsar site, a Ramsar guidance review will be needed. In that case, perhaps a low to medium score should apply.
- If the farm is not situated in a protected area but unknown level of enforcement, a medium score should apply.
- If the farm is not situated in a protected area and known good level of enforcement, a high score should apply.

The main limitation of this approach is that it requires an assessment at the farm level. Even if this could be envisaged based on rather simple information provided by producers, such an assessment will obviously have a cost and requires a methodology for data collection and verification.

4.3.9 Non-therapeutic chemical inputs

In the case where non-therapeutic chemical inputs are used; a specific data collection will be required to assess the scoring, either at the national level if detailed information is or can be made available, or at the farm level based on voluntary declarations (but in this latter case, control might be very difficult).

4.3.10 Environmental assessment

In the case of environmental assessment, the implementation is the same in system 2 than in system 1.

4.3.11 Area-based management

In the case of environmental assessment, the implementation is the same in system 2 than in system 1.

4.3.12 Energy use (on farm, all types)

Indicator: Total energy used on farm per tonne of product measured in MJ/tonne of produced live weight (system 2)

Guidance to scoring: Specific data would be collected to complete system 1. So when no specific information is available, the general rating based on species and production system only applies (system 1), resulting in one rating. When specific data on energy use is available, this can be used to score according to a scheme that still needs to be developed defining limits that allow to score the criterion between E and A+ (or red to green). The categories would be based on reviews of aquaculture LCA studies (e.g. Henriksson et al. 2012, Bohnes et al. 2019, Parker 2018, Philis et al. 2019) and aquaculture energy analyses (e.g. Hornborg and Ziegler 2014).

4.3.13 Carbon footprint

Indicator: Farm gate GHGs (e.g. kg CO_2e/kg live weight) either from own study or using simplified approach focusing on key inputs e.g. a feed footprint based on composition of major feed input groups (system 2).

Guidance to scoring in system 2: Table showing ranges in GHGs and corresponding scores (still to be developed).

So when no specific information is available, the general rating based on species and production system only applies (system 1), resulting in one rating. When specific data on greenhouse gas emissions is available, this can be used to score according to a scheme that still needs to be developed, on the basis e.g. the range X-Y kg CO_2e/kg at farmgate result in a green rating, U-V CO_2e/kg in yellow and S-T CO_2e/kg in red. The categories would be based on reviews of aquaculture LCA studies (e.g. Henriksson et al. 2012, Bohnes et al. 2019, Parker 2018, Philis et al. 2019).

Limitations: A challenge would be that different method choices applied in LCA studies undertaken by different actors- could potentially refer to or apply parts of the EU Product Environmental Footprint (PEF) standard for feed and seafood products.

4.4 Discussion on the scoring systems for farmed products

4.4.1 Summary and example of system 1 and 2

Table 4.3 summarises for each sustainability criterion, on one hand, the scientific basis of the rating under system 1 and, on the other hand, the additional data required to move to system 2. Note that under system 1 a rating has been suggested above for some criteria based on species, country and production system (as defined in Table 4.2), while a rating only based on this limited information will not be feasible for other criteria. In addition, even in the favourable situation, the rating of some criterion can be partial, only applying for instance to some production system, as illustrated in the following examples.

Table 4.3 – Scientific basis of rating under system 1 and additional data required to move to system 2

Criteria	Scientific basis of rating in System 1*	Additional data required in System 2
Effluents	Rating by production system (open/close, fed/non-fed, species, etc.). Based on generic emission model or literature and regulation by country	Specific data collected at the farm level (on effluent management)
Protection of wild populations: escapees	Rating by production system (open/close, land-based/open water based, native/exotic species, etc.)	Rating by country (and by species and production species), if available info from generic model/literature/regulatory system
Protection of humans: therapeutic treatments	Available statistics on use per species and production system can be used for the rating	Specific data collected at the farm level (on the use of therapeutic chemical)
Feed: source of marine raw materials	Used/non-used, feed dependency	Specific data collected at the farm level (on marine species composition of the feeding)
Feed: source of agricultural ingredients	Used/non-used, feed dependency	Specific data collected at the farm level (on risk crops)
Waste management	Waste disposal system per country	Specific data collected (still to be developed)
Interaction with critical habitats and species	This criterion will not be scored under system 1	Evaluate country-level compliance with international agreements related to protected areas
Non-therapeutic chemical inputs	Used/non-used (NB: in the EU organic implies non-used)	If therapeutic chemical used, specific data collected at the national or farm level
Environmental assessment	Country-level benchmark comparing the effectiveness of EIA of countries as part of the regulatory framework and licensing system	Same as in system 1
Area-based management	Country-level benchmark comparing the effectiveness of EIA of countries as part of the regulatory framework and licensing system including the carrying capacity/cumulative impact aspect	Same as in system 1
Energy use (on farm, all types)	Per production system/species based on LCA aquaculture reviews	Specific data collected at the farm level (on total energy used per produced tonne)

Carbon footprint (farm gate GHGs)	Production can be scored based on LCA aquaculture reviews per production system/species	Specific data collected at the farm level determining farm gate GHGs

* Based on species, country and production method

Four examples are presented in Fig.4.1 to illustrate how the suggested methodology can be applied. These examples do not represent an actual (correct or complete) evaluation of the chosen example. They should only be considerated as theoretical application of scoring under system 1 and 2. The scoring is based on an extended traffic light scoring system: red (highest impact – E), light red (higher impact – D), orange (high impact – C), yellow (medium impact – B), light green (low impact – A) and green (lowest impact A+).

Nota bene: This is an ongoing work, with a strong time constraint, and thus many dimensions have not been fully investigated. Additionally, with the criteria/indicators selected first and the systems developed towards the end of the process, the initial determination of feasibility per criteria/indicator would need to be revisited to ensure they are consistent with the described systems. Complementary work is needed to complete this analysis as well as to compile all the data and needed information to be able to actually produce a valid score.

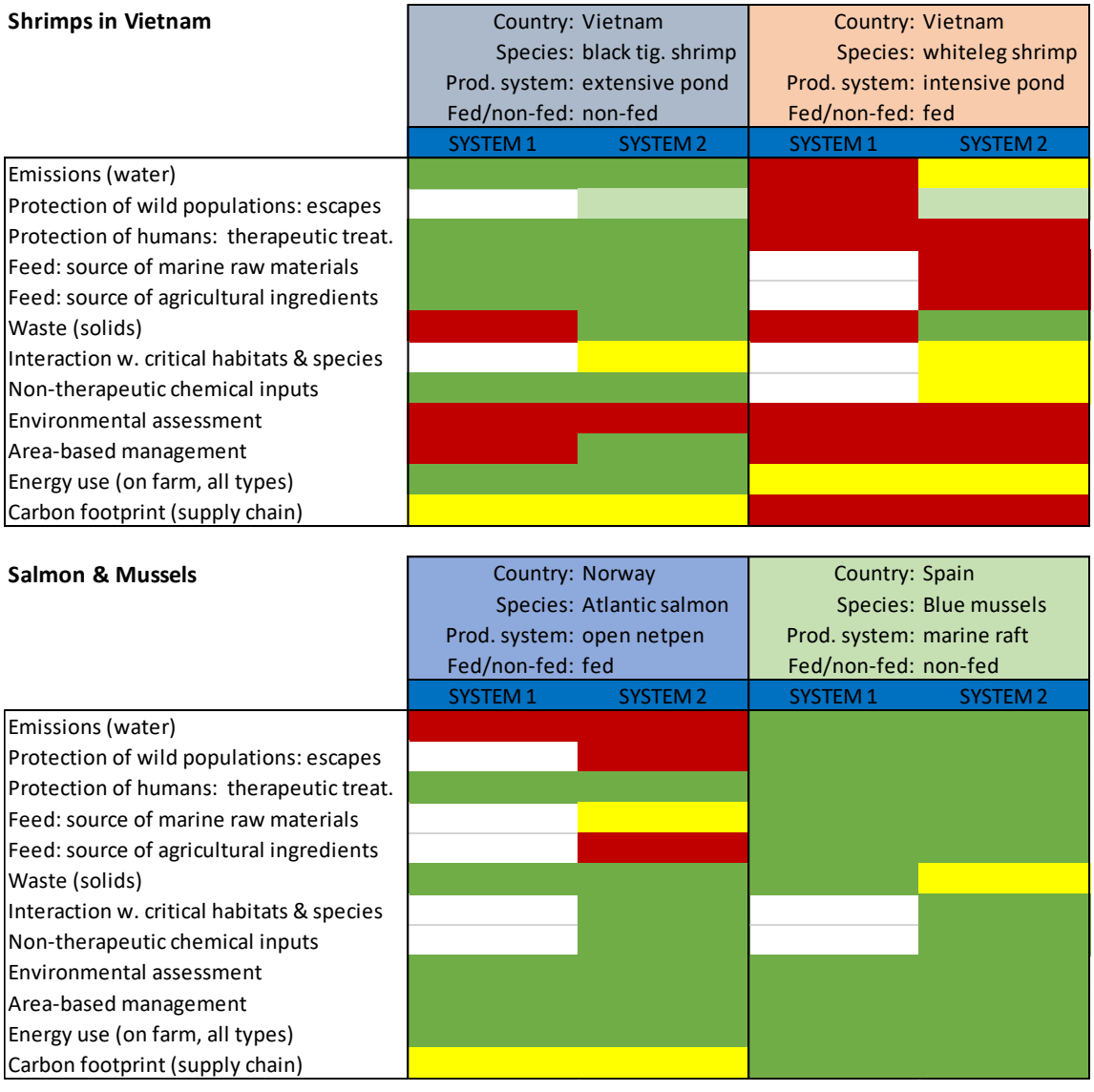

Fig 4.1 – Illustration of a future potential rating methodology based on four practical cases.

These examples illustrate how the rating is able to highlight contrasts between case studies (and between indicators within a given case study). Unsurprisingly the marine raft blue mussel production system in Spain obtains good scores for all the criteria, while intensive pond of whiteleg shrimps in Vietnam has a poor performance. The key aspect illustrated here is the fact that moving from system 1 to system 2 provides not only a more robust assessment, but also a much more exhaustive scoring of all criteria. In the case of the Atlantic salmon in Norway, 4 of the 12 criteria have not been scored in this exercise under system 1, missing some very important aspects of aquaculture sustainability, while system 2 allows a more thorough assessment. In addition, the rating of some criteria changes when moving from system 1 to system 2. Usually, this change implies a better rating under system 2.

From these few examples, it should be emphasized that **the switch from System 1 to System 2 could and probably should be an opportunity offered to producers, allowing them to obtain better scores, provided that they provide the reliable and verifiable information that will be required for the evaluation.** This also implies that in the final rating of the product, by aggregating all indicators, a lack of rating under System 1 should lead to a "bad" score (see section 6 for more details on the combination of criteria).

4.4.2 Cost / benefits of system 2 compared to system 1

System 1

Development cost

- Expert knowledge is needed to develop a scoring system which translates the three available data points "country", "species", and "production system" (if available in the future), for each indicator separately, into a sustainability score. This scoring system should cover a large part of the seafood products marketed in the EU, if not all; the exact percentage will only be clear once the scoring system is trialed for several examples. It would probably require 1-2 experts to develop this scoring system.

Administrative process cost (DG MARE)

- Considering the cost of the development of some consultation and validation process with stakeholders before launch or apply the system. This process could be externalized or not, but in any case, should be also accompanied by 1-2 experts.
- Initial implementation costs, mainly training of producers and advertising to consumers. This cost exists in each system, but in system 1, the training is easier.

Application cost

- The application of this scoring system would be carried out by the producer or be automated, and therefore, no cost is calculated.

Maintenance cost System

- The scoring system will need to be updated based on feedback, errors, and new scientific and market insights. Perhaps 1-2 experts would need to review the scoring system every 2 or 4 years.

System 2

System 2 would require the same type of development, administrative and maintenance cost as system 1, although the development would include more data points and correspondingly a broader scoring system in order to cover all seafood products marketed in the EU. The difference in cost will only be known when the percentage of seafood products that can be covered by system 1 has been determined.

Application cost

- The application of this scoring system could in exceptional cases require expert knowledge for scoring, although this could also be included in a more complex scoring system for such seafood products.

5 CRITERIA AND INDICATORS OF SOCIAL SUSTAINABILITY FOR FISHED AND FARMED PRODUCTS

5.1 Selection of criteria for the social dimension of sustainability

The DGMARE expectation from the EWG is to address sustainability issues regarding social considerations. It clearly appears to the experts that the two main considerations to be addressed are the respect of human and labour rights in fisheries and the impact of fisheries on local communities. Several countries/fleets are currently suspected of violating these fundamental rights. The International Labour Organisation (ILO) is now trying to address these practices, notably through its convention on labour rights in the fishing sector[18]. However, it seems that there is still a long way to go before these practices are eradicated in the fisheries sector.

Three main criteria have been identified for the evaluation of sustainability of fish products with a view to the social dimension, as in the table below:

Dimension	Criteria	Importance	Feasibility
Social dimension	Working conditions for the production of fish and aquaculture products	A	B
	Working conditions in the processing of fish	A	C
	Fair production (impact on local communities)	B	D

- *ILO rules (including slave and children labor) in production*

A lot of countries have not yet ratified the Work in Fishing Convention No.188. Moreover, there is difference between the ratification of this convention and its implementation. Several countries that have not yet ratified this convention do respect the human and labour rights of fishers. The reverse is also true, several signatory countries are also suspected of not respecting this convention.

- *ILO rules (including slave and children labor) in processing*

The social dimension of the processing industry has been included due to the importance of processed fish products for the consumer. As seen in table 5.1 below, more than half of the money spent on fish by EU households is used for processed fish products.

[18] ILO 188 'Work in Fishing' convention : https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_596898/lang--en/index.htm

The processing sector is not concerned by the ILO convention "Work in Fishing" No.188 However, it falls under other ILO labour conventions[19]. "ILO rules" sub-criteria are also directly impacted by traceability issues inside the supply chain. Tracing back some seafood products to their original fleet/area can be problematic, especially for products that travelled a lot or are processed in several areas and therefore have long, complex value chains to trace. The group also discussed the inclusion of other post-harvest parts of the fisheries value chain (administration, marketing etc.) where abuses may occur.

- *Fair production (impact on local communities)*

Impact on communities is important from a social point of view, both in developing and developed countries. An initial scan of this impact can be approached by different indicator and average remuneration can be a good indicator to address this sustainability concern. Since the social dimension is the central aspect, a global indicator could also be the number of employees (fishing and/or processing) per mass of produced FAP. On the other hand, there is a wide reflection around what could properly define a "fair wage". For several experts, the problem is: which reference value can be used? Because wages and salaries also vary widely around the world, and it could be difficult to compare these different values. Another indicator that could be more precise in assessing fishers' rights it is the affiliation to the seafarer's social security system.

5.1.1 Considering the processing sector for the social dimensions of sustainability

As explained in paragraph 2.2 on the general approach followed in the present report, the EWG suggested NOT to include the processing sector in the specific scoring on sustainability criteria identified in the current report, thus defining a farmgate or just-landed-product rating of sustainability. Such a system must be later combined to a scoring that has to be dedicated to the sustainability of the whole food processing and transportation sector, especially mobilizing the more and more widely used LCA approaches.

However, the social dimension of the processing industry has been included here, not only due to the importance of processed fish products for the consumers (table 5.1 below, more than half of the money spent on fish by EU households is used for processed fish products), but also because the enforcement of ILMO rules in the FAPs processing sector is a specific and key issue that could obviously not been accounted for using standard LCA approaches.

Table 5.1 - Proportion of processed fish and seafood in EU household expenditure in 2018

	% total goods and services	**% total fish and seafood**
Food	14,05%	-
Fish and seafood	0,86%	100%
Fresh or chilled fish and seafood	0,40%	47%
Processed fish and seafood*	0,46%	53%
Frozen	*0,16%*	*19%*
Dried, smoked or salted	*0,09%*	*10%*
Other preserved or processed and preparations	*0,21%*	*24%*

(*Processed fish and seafood have been calculated as the sum of "frozen", "Dried, smoked or salted" and "Other preserved or processed and preparations"

Source: EUMOFA, 2019. The EU fish market. 2019 Edition. Publications Office of the European Union, 2019. p.39 based on Eurostat Harmonised index of consumer prices HICP (online; http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_hicp_inw&lang=en last retrieved 5.1.2021)

[19] The fish processing sector as any other productive sector is affected by a number of conventions that the International Labour Organisation (ILO) has adopted on e.g. forced labour (ILO 29), discrimination of collective bargaining (ILO 98), discrimination (ILO 111), or minimum age (ILO 138).

5.1.2 Subsidies and sustainability

Subsidies, as an economic instrument (therefore not specifically addressed by the EWG ToR), are a transversal topic that involves the environmental, economic and social aspects of sustainability. Subsidies have a bad reputation in fisheries, which often comes from a history of direct subsidies, failed scrapping schemes (Holland et al. 1999) and environmentally unsustainable fuel subsidies such as tax exemptions (Sumaila et al. 2010,2019)[20]. On the contrary, there are also less well-known beneficial subsidies that promote more socially and environmentally sustainable fisheries. It is important to make the difference between the harmful capacity enhancing subsidies and the beneficial forms of public funding (Skerrit et al. 2020) in order to assess the sustainability of fish products.

Direct subsidies come from a time where fishery was considered to be a key sector for food security. They have now been suppressed in the EU and many other countries due to compliance with WTO rules and were for example removed in Norway in 1989 to enter the Treaty of Free Trade Agreement with the EU (Jonssen 2020). Scrapping subsidies have often had a limited efficiency, with a reduction of the total number of vessels but low impact on the total capacity following the increase of the vessels' power. Scrapping subsidies were redistributed from the Small-scale fisheries (SSF) to the Large scale fisheries (LSF) (Eurostat 2019, cited in Pascual et al 2020a). Quantitatively, subsidies in Europe have been judged to clearly benefit large-scale fisheries, with small-scale fisheries accounting for only 7% of the total value (Schuhbauer et al. 2017). In general scrapping subsidies have been judged unsustainable (Pauly et al. 2002; Sala et al. 2018). Finally, fuel subsidies benefit more fuel intensive gears, they can mask the true operating costs increasing unsustainability and can often disadvantage the less fuel intensive small-scale fisheries sector when competing for resources (Jacquet and Pauly 2008).

However, subsidies can also be helpful and sustainability, especially for SSF. Subsidies from the European Marine Fisheries Fund seem to have had a positive effect on fishing communities e.g. in Slovenia facilitating the access to the market, investing in processing plants and thus achieving better prices (Pascual et al. 2020b). Another example is the subsidies to start-ups for commercializing underused species (in Finland, Salmi et al. 2020), which can promote the activity of younger people. On the environmental side, subsidies on investment can contribute to the use of economically and environmentally friendly engines for emission reduction (in Malta, Vella 2020) and for supporting the management of marine mammals such as seals (in the Baltic, e.g. Salmi et al. 2020). Finally, subsidies that promote investment in safety measures promote better working conditions. In general subsidies should be promoted to support improvements in social working conditions (Gómez and Maynou, 2020), the environment protection or poverty reduction (Tipping 2016, Kumar et al 2019, Cisneros-Montemayor et al. 2016, 2020) instead of fishing capacity.

The subgroup agreed on the importance to consider subsidies in the assessment of the sustainability of fish products, however the time at the meeting was insufficient to agree on criteria, indicators or rating. Nevertheless, identified data sources include those mentioned by Sumaila et al. (2019) as well as by the OECD[21].

5.1.3 Obstacles identified during the discussion

. *Quality of available data:* Some experts questioned the needed data for several sustainability sub-criteria that were addressed during this session. This EU initiative wants to cover all the seafood products inside the EU market. As seen above, this would need to include both fresh and processed

[20] However, it needs to be stated that in Europe high fuel and eco taxes are implemented in many MS while in many countries outside of the EU (e.g. New Zealand or the USA) governments introduced no or very low fuel taxes. Those fuel taxes and especially eco taxes shall internalize the external costs of fuel consumptions (e.g. pollution and increasing health costs). Simply removing the tax exemptions would lead to a disadvantage for European vessels as they would have to pay high taxes compare to other countries with very low or no taxes (negative impact on competitiveness). This will harm especially the smaller vessels as the larger ones can buy fuel outside of the EU.

[21] For information on the subsidies (support to fisheries) from the OECD: https://www.oecd-ilibrary.org/agriculture-and-food/data/fisheries/fisheries-support-estimates_ade64fdc-en Subsidies data from the OECD: https://stats.oecd.org/Index.aspx?DataSetCode=FISH_FSE

products. That means that imported seafood products are also covered. Data can severely be limiting for some areas of the world, especially for developing countries. This limit must also be taken into account when setting up this system, in particular to avoid distortions of competition if the data is missing.

. Accessibility of data for operators: If the scoring process is intended to be used by operators in the fisheries sector, the data must be easily accessible. The indicator must also be easily "understandable" by these actors, in particular if the approach is not mandatory. If the recognition by stakeholders of the indicator suitability is too complex or too long, there is a risk of losing the operators' interest.

Moreover, if operators are responsible of the scoring, the risk of misunderstanding several sub criteria or indicators should be carefully considered. Thus, clear and understandable information to the operator need to be provided to avoid misinterpretation.

. Which part of the supply chain we want to assess: One big concern expressed during this session is to understand if only fisheries or also the processing sector is covered. Requirements (legal, logistic, etc.) are not the same for fisheries and processing sector (Damico et al 2016). Working on the processing sector is probably interesting, especially from the consumers' point of view as they are really interested in the fact that the product they consume comes from a clean/green production. But this also requires more data, likely a more complex assessment methodology and more expert time.

5.2 From criteria to indicators under a scoring system based on simple data only (system 1)

5.2.1 Defining system 1 for social criteria

System 1 is based on the definition of indicators referring to the minimum mandatory information required by CMO for fishery and aquaculture products (see paragraph 3.2.1 in this report). Area of production and country are among these mandatory requirements. **The definition of indicators for the social dimension is at this stage substantially linked to the country identification**.

Even if the country unit can be used for some general social statistics and governance information, as explained below, more suitable units of analysis would be the fishing community and, as a proxy, the fleet or fleet segment.

The use of social criteria in marketing standards also has some particular issues with relation to the countries' involvement in international institutions as the WTO and the ILO. The rules of the WTO are based around the opposition to discrimination in trade. The GATT (General Agreement on Tariffs and Trade) is the core agreement for trading in goods but also the TBT Agreement (Technical barriers to trade) is relevant for the introduction of market standards in an EU regulation.

The EWG was not able to discuss those trade agreements in detail but looked at one of the most important aspects: do market standards for all products (including the EU products) discriminate products from outside the EU when exporters to the EU have to reveal information regarding labour conditions in the production (e.g. minimum age, collective bargaining possibilities, etc.).

The International Labour Organisation (ILO) has adopted a number of conventions on e.g. forced labour (ILO 29), discrimination of collective bargaining (ILO 98), equal remuneration (ILO 100), discrimination (ILO 111), minimum age (ILO 138) or child Labour (ILO 182). All these conventions were ratified by all 27 EU Member States and many more countries around the world. It would therefore be possible to require information on a fish product as all EU member states have ratified those regulations so that countries from outside the EU are not discriminated when they have to provide that information.

A different case is the ILO 'Work in Fishing' Convention 188. In 2010 (Council decision 2010/321) the Council of Ministers has already agreed that MS are allowed to ratify the ILO Convention 188 (necessary decision on EU level) and this shows the commitment of the MS to implement the convention. However, as of today only 7 MS have ratified the convention. In the meantime, however, there is an EU Council directive (2017/159) which requires all MS to follow the ILO rules

from Convention 188 except for specific articles related to control and enforcement and to the remuneration of the crew.

The ILO convention covers only the fishing activity and is not for fish processing activities that are covered by standard ILO rules for industries.

The EU has included some aspects of ILO labour rules in Partnership agreements with third countries. The reason for that is that the EU cannot force countries to implement the rules by, for example, a ban on imports (comparable to a ban of fish imports in case of violation of the IUU fishing rules).

The marketing standards would technically fall also under the TBT agreement as 'Technical Regulation'. The idea is to introduce an obligation to provide certain information on the production directly with the product (e.g. on the package). This shall allow the consumers to better inform their decision. As regarding the GATT agreement, it would be possible to implement such a technical standard as long as it is not discriminating other countries (as all have to follow the same rules).

In addition to the ILO standards and the data on their ratification, the socio-demographic data for the EU under the EU Multi Annual Programme for data collection (EUMAP) could be used to build indicators for assessing various aspects of the social dimension of sustainability. The data is collected as described in the Commission delegated decision 2019/910 (see Table 5.2 below) and is currently available for the reference year 2017. Further collection of these data is foreseen on a three-year basis.

Table 5.2 - Socio-demographic variables under the EU MAP

Variable	**Unit**
Employment by gender *	Number
FTE by gender	Number
Unpaid labour by gender*	Number
Employment by age*	Number
Employment by education level*	Number per education level
Employment by nationality*	Number from EU, EEA and Non-EU/EEA
Employment by employment status	Number
FTE National*	Number

Variables are collected for fisheries and aquaculture, and those marked * are also for the processing industry (Source: EU Commission delegated decision 2019/910, Table 6)

In addition to these socio-demographic indicators, other variables related to employment also collected under the economic data section of the EU MAP need to be considered for assessing the social dimension of sustainability. These variables are personnel costs, value of unpaid labour, engaged crew, unpaid labour and total hours worked per year (see Table 5A of the EU MAP EC 2019/910). The data collection is legally-binding for the economic variables according to gear ("sector") and a broad area definition ("supra-region"), which are defined in Tables 5B and 5C, respectively, of the EC 2019/910 delegated decision. These data are available in the current format at least since 2017.

5.2.2 Working conditions for the production of fish and aquaculture

The main unit of analysis suggested during the EWG for the evaluation of sustainability from a social point of view at this stage is the country. The subgroup observes, indeed, that some EU social data are available at the country level from the EUMAP data collection for the fishery,

aquaculture and fish processing sectors[22]. The collection of socio-demographic data for the extractive sector in the EU is compulsory with a periodicity of three years. The Regional Group on Economic Issues (former PGECON) recommends to collect this data differentiated for SSCF, LSF and high seas fleets, but this recommendation is only voluntary[23]. The European socio-demographic data under the EUMAP can serve as an indication of what could be possible in other countries outside the EU, for which information on data availability would need to be collected. An example of limited data is the OECD data for gender and working status. **Variables that should be used to assess the fulfilment of the ILO convention with different limitations are age, gender, nationality and education**.

The **age of fishers** would be useful data to check for the fulfilment of ILO Art 9[24], which sets the minimum age of fishers at 16 years, with some exceptions. The ILO Minimum Age Convention, 1973 (No. 138) and the Worst Forms of Child Labour Convention, 1999 (No. 182) also refer to the criteria of avoiding child labour and cover all kinds of vessels and postharvest activities. The inclusion of age of workers at country level could serve to flag workers of age below 16, for which a simple national average would not be sufficient, and minimum values or consistent age classes would be required. Because it includes two relevant age class (≤14 and 15-24 years), the EUMAP data, though not ideal, could be used directly for EU countries, or as a guideline to define data requested for other countries.

Another social issue related to age is the generational turnover. Average age at national level, when compared to average age of other sectors in national statistics, could give an idea of whether there is an aging population of fishers.

Gender discrimination is not considered in the ILO rules, but appears in the UN Voluntary Guidelines for SSF[25] and in the Discrimination (Employment and Occupation) Convention, 1958 (No. 111). In addition to the EUMAP data on gender for extractive fisheries, aquaculture and processing, some data for other non-EU countries can also be obtained in the OECD statistics[26]. To obtain insights on the existence of gender discrimination at country level, it would be important to distinguish between the extractive sector and the post-harvest sector. It is, indeed, important to note that gender is more significant for post-harvest activities including processing than for production or extractive sector if we maintain the same terminology used above, though importance for the extractive sector also changes geographically. There is little discussion that even acute gender differences in the extracting sector may not be necessarily indicative of discrimination, but of physical conditions or attitudes or historical/traditional habits. However, provided the attributes are similar for the work in the post harvesting sector, strong differences in gender composition would need to be analysed. For instance, gender information would need to be combined with salary information inside the same job category to evaluate if discrimination on remuneration occurs (see system 2).

Nationality of fishers could be important to check in order to verify that they receive the same working conditions, such as social security (ILO art. 36). The EUMAP presents a first step at analysing nationality with four groups: national, EU, EEA (European economic area) and international. However, the high presence of migrant at national level does not imply anything per se (in some cases it could be representative of a lack of discrimination in recruitment processes),

---

[22] Scientific, Technical and Economic Committee for Fisheries (STECF) – Social data in the EU fisheries sector (STECF-19-03). Publications Office of the European Union, Luxembourg, 2018,

[23] PGECON report

[24] When referring to ILO articles reference is made to the ILO Fishing convention 188.

[25] "Preferential treatment of women, indigenous peoples, and vulnerable and marginalized groups – in providing services and giving effect to non-discrimination and other human rights – should be accepted and promoted where it is required to ensure equitable benefits."(SSF Guidelines 6.2, p. 8)

[26] https://stats.oecd.org/Index.aspx?DataSetCode=FISH_EMPL

though it could be meaningful to relate the 'Nationality information' to issues such as intergenerational turnover of local fishers (see system 2).

Finally, data on **education** is also provided by the EUMAP. The lower education categories could be used as a proxy of vocational education (ILO art. 31), as for instance training in safety measures on board that should be provided by the skipper *("facilitating on-board occupational safety and health awareness training", ILO art. 8 c).* However, interpretation of this data should be done with caution as not to discriminate fishers with only lower education level. In this direction, collecting this information can entail problems: as expressed by STECF[27] "The education level was unknown for a relatively high share of the fishing sector (20% of people), which may reflect that such a question can be experienced as being sensitive or personal". In any case the information at national level would not be as meaningful as information at fleet level to flag problems of e.g. safety on board due to lack of training (see system 2).

The EU MAP provides another variable that appears to be interesting for analysing the working conditions of the fishers, as representative of the presence/lack of social and welfare warranties. **These potential and still to explore additional indicators include unpaid labour, social security, freedom of association and the number of worked hour per day**.

Regarding **unpaid labour**, the definition of the EUMAP is still subject to debate regarding the inclusion of self-employed and family members together, among other issues (e.g. for the fleets, only crew wage or also the people working on-shore?). The international standards make a distinction between paid employment (employees) and own-account employment (as opposite to paid and including working owners and unpaid family workers). This definition is similar for Eurostat[28], OECD[29] and ILO[30]. The definition of own account worker, be it included under unpaid labour (EUMAP), being called self-employed (Eurostat, OECD) or "vulnerable employment" (ILO) is therefore not specific enough to shed light on the working conditions of fishers. The interpretation of the variable is also open to discussion and PGECON has included this issue under the workshop on social variables planned for 2021.

Social security ensures the access to unemployment remuneration when fishers cannot work (e.g. in pandemic times, sickness, etc.). This should be applied to the whole value chain, from the vessel (unit of production, extractive) to the processing, marketing and distribution. From the voluntary guidelines for SSF, FAO:

"6.3 States should promote social security protection for workers in small-scale fisheries. They should take into account the characteristics of small-scale fisheries and apply security schemes to the entire value chain".

Data on social security systems are not directly available at the moment but, at EU level, there is an attempt to systematically include this aspect in the National fishery profile, recommended by STECF 20-03 (endorsing conclusion of STECF EWG 20-15).

Another important social indicator, again dealt with by the ILO conventions (ILO 98) is the **freedom of association and collective bargaining**. It would be necessary to collect data on fishery unions/cooperatives/associations, etc. In particular, more data on conditions for participation, including for women, should be available. This aspect has also been included in the list of necessary information to draft National fishery profile, recommended by STECF 20-03 (endorsing conclusion of STECF EWG 20-15).

---

[27] Scientific, Technical and Economic Committee for Fisheries (STECF) – Social data in the EU fisheries sector (STECF-19-03). Publications Office of the European Union, Luxembourg, 2018, ISBN XXXXXX, doi:XXXXXXXX, PUBSY No.

[28] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Self-employed

[29] https://stats.oecd.org/glossary/detail.asp?ID=778

[30] https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/publication/wcms_631497.pdf

Finally, a social indicator that could be calculated with existing data is the **number of hours worked per day**. The EUMAP includes two variables related to this indicator: the number of hours worked per year and the number of people employed ("engaged crew"). With some calculation the number of hours worked per day could be obtained from these two variables. Then the value obtained could be compared to the reference maximum value in the ILO convention of 14 hours worked per day (ILO art. 14). This indicator has the advantage that, as the two variables used to calculate it are considered economic variables under the EUMAP, they are not only available at country level, but also disaggregated at a higher level including gear, vessel length and broad fishing region (supra region)[31].

The remaining parameters for the study of biological sustainability (area of fishing, gear and species) present difficulties to be appropriately used for the evaluation of social sustainability. In what follows and for the sake of comparability, the subgroup made an attempt to explore the possibilities of obtaining social data according to the biological units of analysis. Relatively small ***areas*** is available in ICES and GFCM data, but not for the socio-demographic dimension (at GFCM level only age data are available) and data would also be incomplete for the fishery and aquaculture products imported to the EU. Information at the level of **species** could be used to identify the underutilised species, being often the target of SSF. TAC and TAC utilisation data would be needed for this but is not available in many fisheries (e.g. most Mediterranean areas). Some information can be derived from the ***gear***, e.g. passive gear for SSF, but this criterion is not sufficient similarly to distance from the coast (area of fishing). A combination of these units of analysis (together with vessel length, see system 2 below) would be ideal to identify fleet segments, e.g. the small and large scale. A hint at the importance of the vessel as unit of analysis is its use by certification schemes that have social parameters, as the former Responsible Fishing Scheme (RFS), now renamed Responsible Fishing Vessel Standard (RFVS)[32]. As said above, some data can nevertheless be disaggregated at gear level, as the number of hours worked and even at vessel length level are available data from the EUMAP.

Turning to aquaculture, the labour conditions seem to be better than in fish processing or on fishing vessels, though this differs depending on the type of aquaculture (e.g. more or less labour intensity). The main problem is the outsourcing of activities where the working conditions could be worse compared to those in the fish processing plants of the client company. This occurs especially at high season when the harvesting takes place.

Regarding imported fish and aquaculture products, as mentioned above, other sources of international data (UN, ILO) would need to be explored to investigate the possibility of using these indicators for fish imports. Apart from the OECD data, no other sources could be found by the EWG for social data on fisheries or aquaculture in the available time.

5.2.3 Working conditions for the processing of fish

The socio-demographic variables at country level available through the EUMAP as well as the number of hours worked are also available for the processing industry in the EU. The EUMAP indicators mentioned in the previous section would therefore be useful to measure **the compliance of the fish processing industry with similar standards than of the ILO rules.** For this criterion, the country level could be applicable. However, the data on processing under the EUMAP is not compulsory and, at the moment, depend on the interest of MS to collect that data. The EWG recognized that smaller geographic units would also be needed to have a meaningful assessment. This would be similar to the fleet level for sub-criterion 1. Indeed, since smaller areas are more meaningful in fisheries as they better representing specific fleets, smaller areas for fish processing can represent specific types/district of production (e.g. canning, freezing) with potentially different social characteristics.

---

[31] See Table 5b for the disaggregation of economic variables in the EU MAP Commission delegated decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors

[32] https://www.seafish.org/responsible-sourcing/responsible-fishing-scheme/

5.2.4 "Fair production" or impact of fisheries on local community.

A basic impact of fisheries on a local community is the fleet remuneration. Remuneration data is available in the EU through the EUMAP as 'personnel costs' and 'value of unpaid labour'. Similar data are available for the aquaculture (compulsory) and processing (voluntary) subsectors. The data for the fleet is available at national level and also aggregated by gear and vessel length, while the data for the aquaculture is available at national, species and type of technology levels. These data could be used to assess **the level of remuneration as established in the ILO Convention (art 23) and in more details in the recommendation 15 of the Work in Fishing Recommendation, 2007 (No. 199)**[33]. To do this assessment, the remuneration data should be combined with national minimum/ standard wages statistics to establish whether the remuneration can be considered as fair, as suggested by the accredited evaluation frame for social sustainability evaluation[34].

Ideally, the comparison would be established with sectoral minimum wages at national level (see for example Outeiro et al 2018). However, not all countries have established minimum wages and an alternative could be to use PPPs (Purchasing Power Parities) rates of currency conversion that intend to equalise the purchasing power of different currencies by eliminating the differences in price levels between countries[35]. The PPP is a statistical average of prices that provides an estimate of a cost-of-living (Deaton, Heston 2010). The PPP can be used as a conversion factor that allows transposing the value of an economic indicator (e.g. average income) from one country to another (Krugman, Obstfeld and Meritz 2014)[36]. PPP can exhibit the relationship between the prices of a same basket of goods in two countries. The PPP can thus be a better conversion factor than the market exchange rate because it takes the price levels into account (UNDP 2020). In addition to this limitation, some underreporting with respect to crew shares can occur, which increases the uncertainty of this EUMAP data for some countries.

5.3 Additional information required to move toward a more precise system 2

5.3.1 Working conditions for the production of fish and aquaculture

The system 2 referring to the social dimension of the sustainability of fisheries should be based on a combination of information already available in system 1 (area of fishing, gear and species) together with **vessel length**. This combination would make it possible to identify **the fleet segments which will therefore be the units considered in the assessment of the social sustainability.** In particular, according to the most widely used definitions, vessel length combined with the gear type allows identifying small-scale fisheries [37], which needs a special attention from a social perspective.

This combination has the advantage to draw the analysis closer to the fishing community. The disadvantages are a high degree of complexity and the unavailability of the socio-demographic data at this disaggregated level under the EUMAP and, presumably, also for non-EU countries that are

---

[33] Vessels of 24 metres in length and over, all fishers should be entitled to minimum payment in accordance with national laws, regulations or collective agreements.

[34] Conservation International. 2019 Social Responsibility Assessment Tool for the Seafood Sector: A Rapid Assessment Protocol. Available at: www.riseseafood.org.

[35] OECD (2020), Purchasing power parities (PPP) (indicator). doi: 10.1787/1290ee5a-en (Accessed on 10 December 2020)

[36] There are different sources of ppp calculations, e.g. the International Comparison Program (ICP) of the World Bank: https://www.worldbank.org/en/programs/icp the UN statistics for SDG1 (https://unstats.un.org/unsd/mdg/seriesDetail.aspx?srid=699), or the OECD https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm

[37] Though in the EU there is a legal definition of SSF included in Reg No. 508/2014 ("small–scale coastal fishing' means fishing carried out by fishing vessels of an overall length of less than 12 metres and not using towed fishing gear as listed in Table 3 of Annex I to Commission Regulation (EC) No 26/2004 (2)" the definition of SSF is much broader, for a recent review see for example Smith and Basurto (2019);

relevant for the evaluation of imported products. Though, some EU MS already collect socio-demographic data at the fleet level while this is not compulsory.

For the age, especially the sensitive under-aged category (child labour), qualitative information (from ethnography) would be needed, where field work such as interviews have to include family members (whether they coincide as unit of production or not). Considering family tradition, it is important to set specific questions on fisheries-related tasks, which can reveal new data on child labour. Therefore, as this kind of data is not easily revealed, the extent of child labour by family or others, both onboard the vessel and ashore, should be included in ad-hoc surveys on the field with techniques such as direct observation at port/vessels. The direct observation potentially enables to reveal both issue and non-issue situations highlighting the differences between public declarations and reality. Ethnography gives the possibility to triangulate observations, surveys and, if necessary, face-to-face interviews to investigate in-depth the child labour problematics. It is desirable that a preliminary research be carried out before establishing the age limit of the child labour indicator. This indicator should be accounted for with the assessment of working conditions and the role that child acquires as a worker within the family.

For the sensitive categories of education (no studies/no alphabetisation), ethnographic methods would also be required.

Regarding the generational turnover, an additional information than the age of the current fishers would be the number and age of newcomers to the fishery, which would make a better estimate of the prospects of the fishery (see the impact on local community below).

As said in system 1, gender information would need to be combined with salary information inside the same job category to evaluate if discrimination on remuneration occurs (see system 2). PGECON has already recommended that MS include employment in some post harvesting activities (but only those strictly linked with fishing operations[38]) in their remuneration statistics for the fisheries sector, but this recommendation has not been widely implemented. In addition, a data collection of combined harvest and post-harvest remuneration data (as it stands now) would render impossible the establishment of the gender distinction solely inside the post-harvesting sector. Therefore, additional separated data for the harvest sector and for post-harvest employment salaries would be needed to assess discrimination.

For aquaculture, a useful unit of analysis would be a combination of species and technique, based on the types of production systems described in Chapter 4 (see Table 4.2). Therefore**, the scoring of social criteria for aquaculture production in System 2 should be established at the level of each type of production system by country**.

5.3.2 Working conditions for the processing of fish

To analyse the social dimensions of the processing of fish beyond the country level, **an analysis at a smaller regional level or at the plant level would be required**. The EUMAP presents the possibility of collecting disaggregated data according to the size of the firm and to the region, which could allow some degree of analysis at the Small and medium-sized enterprises (SMEs) vs middle sized/large company level. Some countries collect data at a finer geographical level (e.g. NUTS2), which could provide more in-depth analysis.

On a practical level, the disclosure of data on processed fish to the consumer is difficult as being only voluntary, unlike for the fresh fish for which it is compulsory through the control regulation. The standards of data disclosure are therefore different. The standards are particularly low especially regarding two products for which most guarantees are demanded by the consumer, i.e. tuna and small pelagic fish (e.g. anchovy and sardine). The firms that, due to their size or other reasons, do not have an electronic system of traceability or adequate human resource have also

[38] EUMAP guidance document https://datacollection.jrc.ec.europa.eu/dc/fleet/guidance#_48_INSTANCE_pMomk7430Xoy_%3Dhttps%253A%252F%252Fdatacollection.jrc.ec.europa.eu%252Fdocuments%252F10213%252F1291400%252FEUMAP_guidance%252Bdocument_2020.pdf

more difficulty to process the related information (see project SECFISH[39]). These systems differ also across firms and an advancement in data collection (e.g. on the origin of raw material under the EUMAP) has been proposed (PGECON 2020) even if, due to the high cost and difficulties of collection, the future data collection of raw material data will still likely heavily rely on the voluntariness of MS.

5.3.3 Fair production (impact on local community)

As explained for system 1 and for labour conditions in system 2, a combination of area of fishing, gear, species and an additional unit of analysis on vessel length would also be needed to identify the community that a fishery impacts. The same considerations on salary and minimum wages would apply for this combination as explained for system 1.

For the generational turnover, as said above, an additional information to the average age of the current fishers would be the number and age of newcomers to the fishery, which would make a better estimate of the prospects of the fishery. Generational turnover can not only be related to working conditions, but also to the continuity of the activity itself. This can be an indicator of the expectations of the fishers, their attitude towards the fishery and many other qualitative aspects that are key to the survival of a community beyond wages. These aspects would need further analysis from the social sciences (e.g. anthropology, ethnology). A starting point could be the development of community profiles as suggested by STECF (EWG 20-14 on the social dimensions of the CFP).

With respect to aquaculture, a comparison of wages could be an indicator but there is often no available data or there is nothing to compare a given salary with. In some countries, workers receive high wages when moving to an area in order to incentivize mobility. Those wages are comparably high but, in many cases, it is not possible to judge whether a salary is sufficient in a given area or not. In this respect, some additional expert knowledge would be needed to analyse the data discussed for system 1.

Regarding aquaculture, an important distinction needs to be made between two value chains: input of feed into the production process is to be distinguished from the production of fish itself. For the production of fish, it is easier to enforce and control certain standards for labour while, regarding feed, the conditions under which the feed was produced are barely impossible to estimate. Many species in aquaculture still need a proportion of specific animal-based ingredients in their feed. There are regulations to reduce the fish-based content (with insects or algae products including, for example, Omega 3 fatty assets) but also plant-based ingredients could be problematic. Feed ingredients include, to a certain extent, fish meal and fish oil from catches of wild fish while even for plant-based ingredients small farmers may have been forced to convert their land into highly intensive production systems. This is often a question of enforcement of laws as many countries forbid this practice but no measure are taken to stop this practice.

For instance, the US have engaged a lot of effort to improve labour standards and avoid forced conditions in the production systems. In cases where there is a high risk of forced labour, auditors regularly visit the food processors or wholesalers increasing pressure to improve their labour practices. The kind of needed information would be partly at country level (governance, enforcement) and partly at the production system level. This is a broad topic that would require a larger availability of research resources, as e.g. a medium sized project, and the subsequent establishment of a monitoring system highlighting breeches in labour law.

5.4 Discussion and synthesis

5.4.1 Assessing the social dimension of sustainability at the stock level?

[39] https://datacollection.jrc.ec.europa.eu/documents/10213/1329978/SocioEconomic_SECFISH_FinalReport_MARE-2016-22.pdf/b10200fa-5f69-4312-99f0-d189159c243a?version=1.1

In order to link the social dimension data to the biological sustainability data, a lot of expert knowledge a stock basis, is often needed. This kind of link would only be possible for stocks corresponding to small areas where the link to the fleet is clear. There are rare examples such as GSA 17 in the Adriatic Sea with the small pelagic fish.

A demand from GFCM is for instance that its member states provide specific social variables at the more disaggregated stock level. This demand points in the direction of a further development of this kind of data that may be available at a finer scale (and related to a stock and a fishing community) in the near future. Ethnographic data (collecting data through face-to-face interviews by meaningful case studies) may provide social variables at the more disaggregated stock level, thus providing data at smaller scale with more realistic features. This data can be added to the data produced by country.

Regarding fair production and impact on local communities, qualitative information on the link between the stock and potentially vulnerable communities would be needed (e.g. from ethnography). As the development of family-based fishing companies is a worldwide common trend, both for SSF and LSF, surveys have to include family members.

5.4.2 Comparing system 1 and 2

The use of **country level** data as considered in system 1, given the wide variety of fleets, processing industry and aquaculture firms inside a country, can only provide a very limited overview of the social aspects of sustainability of fish products. For some variables, as the socio-demographic or the origin of raw material from the EUMAP for processing, the delivery of fleet level/ firm size/ geographic area data relies on the will of MS. It is, indeed, to be outlined that the data collection system of socio-demographics is at a very starting point (only one data call has been launched so far).

The effective use of the **fleet level** as in system 2 is particularly central because there is an important distinction in the debate regarding sustainable fisheries and 'fair production' between SSCF and LSF. SSCF is described as important for coastal regions bringing employment, value added and indirect values (e.g. local products of quality and heritage culture; tourists enjoying fresh fish and small vessels in harbours when visiting the coastline) to local communities. The main problem is that no or very limited information is available, especially for SSCF in developing countries. Additionally, the EU information is limited on some aspects of SSCF as logbooks are not required for vessels under 10 m length and the vessels are not required to report in the sale notes detailed catch areas or effort levels but only species and broad areas. Some progress is being done in this direction with the recommendation from PGECON to disaggregate socio-demographic data on SSCF, LSF and distant fisheries.

5.4.3 Preliminary approach to scoring

The subgroup did not have the time to develop a scoring system during the meeting and could only develop a very preliminary approach (see basis in system 1 on the ILO system).

The EWG suggests a three-step process (Table 5.3):

1) In the first round (**System 1 - Step 1**, Table 5.3), the marketing standards could include an information on the ratification of the core labour standard conventions ('has a country ratified ILO 188, 29, 98, 111, or 138?').
2) In a mid-term process (**System 1 - Step 2**, Table 5.3), requirements could include how far those conventions are enforced in those countries ('in country A ILO convention 29 is not enforced').
3) In a longer-term process (**System 2**, Table 5.3), producers and importers should be asked to provide information on the vessels' length, i.e., **fleet segments for fished products**, or **production system type for aquaculture**, in order to asses social criteria at the scale of production units according to system 2.

As part of this process, the availability of data on the actual enforcement of regulations and conventions on labour conditions would be checked at regular intervals.

Table 5.3 – Summary of preliminary indicators suggested to score social criteria in FAPs

<table>
<tr><th rowspan="2">Criteria</th><th colspan="2">System 1 – Assessment at the country level</th><th rowspan="2">System 2 - Assessment at the scale of "production units"</th></tr>
<tr><th>Step 1</th><th>Step 2</th></tr>
<tr><td>Working conditions for the production of fish and aquaculture products</td><td rowspan="3">Ratification of ILO conventions
From A (all aforementioned conventions are ratified) to E (no ratification)</td><td rowspan="2">Level of enforcement of ILO conventions, regarding age, gender, nationality, education</td><td>Same as system 1 step 2, at the scale of fleet segments or production system types</td></tr>
<tr><td>Working conditions in the processing of fish</td><td>Same as system 1 step 2, at the scale of small regions or by firm size category</td></tr>
<tr><td>Fair production (impact on local communities)</td><td>Level of remuneration, with reference to minimum wage indicators</td><td>Level of remuneration per fleet segments or production system types</td></tr>
</table>

The social subgroup concludes that the above-mentioned **step 1 of system 1 could be a useful approach to traduce major social contrasts that are important between the countries exporting FAPs in the EU.** This approach could be easily implemented in the short term, provided a preliminary analysis is conducted to score every country exporting FAPs in the UE market, according to the ILO rules they have ratified. Such an analysis could be conducted through an ad-hoc contract or by a restricted group of experts, allowing to test the coherence of the scoring. This scoring will require validation by DG MARE after STECF examination.

The sub-group acknowledges that **step 2 of system 1 will required much more preliminary work before being set up compared to step 1.** An in-depth analysis would have to be conducted at the country level, at least for the major FAPs importers, assessing the level of enforcement of ILO rules, regarding the aforementioned indicators. This is likely to require several months of work that could be entrusted to a dedicated team of experts (possibly a private consulting company together with supervision of scientific experts, as described in §6.4 on next steps).

As for system 2, where the scoring will be established at a finer scale than countries, the sub-group considers it could be implemented in a longer-term perspective, based on additional information (vessel length or aquaculture production system type) voluntarily provided by producers or importers. Such a system would be proposed only for products issues from countries, where the required information can be made available at the production unit scale, and can be verified through traceability. **This currently includes EU MS** (among others), where vessel length and production system type are already mandatory information for economic variables, while social indicators, though not compulsory, can be provided at this scale under the EUMAP.

However, the sub-group stresses that a preliminary work will be required, before setting up such a system 2, especially to define more precisely the indicators to use and their associated scorings, at the level of production units (fleet segment or production system type) per country (or still to define countries category). This work will likely be very time consuming, and therefore should also be entrusted to a small team of dedicated experts.

5.4.4 Further data needs for social aspects

The subgroup acknowledges that the data situation is much more limited in the social domain than in the environmental sustainability for both fisheries and aquaculture. The exercise of defining a system 1 and system 2 during the EWG has yielded the following considerations on extensions/modifications of currently available data.

From system 1 step 2, gender information would need to be combined with salary information inside the same job category to evaluate if discrimination on remuneration occurs. In practical

terms, this would imply the separated collection of remuneration data for the harvest and post-harvest sectors. Some steps in this direction have been taken by PGECON (recommendation to collect some employment data for harvest-related activities, but these data are still required on an aggregated level). This could maybe first take place as a pilot study.

For the age data, the subgroup has identified the need to match the ILO age category of under 16 to the EUMAP categories (currently of under 14 and between 14 and 25), which would also require a recommendation from PGECON.

The assessment of the working conditions would also require an unequivocal definition of informal types of work, currently masked by the term "unpaid labour" (see system 1). An improved definition at least at EU level would be necessary to obtain a useful indicator of less-protected labour, including forced labour.

The subgroup suggests the advancement of MS in the provision of socio-demographic data at fleet level and area/firm size for the processing/aquaculture sectors in order to assess the social dimensions of sustainability.

The introduction of ethnographic methods, with the first step of the community profiles have also been identified as necessary at least in key aspects as minimum age, training and working conditions in aquaculture, as well as for generational turnover in fishing communities.

6 ADDITIONAL FINDINGS - TOWARDS AN OPERATIONAL SCORING SYSTEM

6.1 Limits of the different criteria and indicators

According to the ToRs (Task 3), the EWG was asked to analyse the qualities and limits of the various criteria and indicators in the light of the following aspects:

- **Reliability:** Does the proposed scoring allow a reliable estimate of sustainability criterion? Are the results of this system consistent with the observed reality?
- **Scientific soundness** of the chosen measures and indicators.
- **Breadth** in terms of the product scope covered.
- **Effectiveness** in terms of distinguishing high from low sustainability products.
- **Verifiability** of the measures and indicators (including the availability of needed data and complexity of data gathering).
- **Simplicity and clarity** in terms of conveying a clear message through the supply chain and possibly the consumer.

To this aim, all experts of the group have been asked to rate these qualities for each criterion, on a 0 to 5 scale (low to high quality). The average results of the group (of respondents) reflect the aforementioned limits of each criterion and can be considered as an expert judgment highlighting the main strengths and weaknesses of the scoring system. As the list of criteria and indicators proposed for fished products significantly changed after the EWG meeting according to new discussions and experts' inputs, results of this detailed analysis will be presented only for criteria related to the aquaculture products (Table 6.1).

Table 6.1 - Expert judgement on the scoring qualities of the criteria of aquaculture products sustainability (For clarity, low scores are in orange, medium score in grey, and high scores in green; limits are conventional).

Criteria	No. of Experts	Reliability	Scientific soundness	Breadth	Effecti-veness	Verifiabi-lity	Simpli-city
SYSTEM 1							
Effluents	8	2,5	3,5	2,1	3,0	3,5	3,4
Protection of wild populations: escapes	8	1,8	2,5	1,5	2,8	2,8	3,3
Protection of humans: therapeutic treatments	8	3,0	3,1	1,1	2,4	4,3	4,8
Feed: source of marine raw materials	8	2,1	1,4	1,4	2,1	3,3	3,5
Feed: source of agricultural ingredients	8	2,5	2,9	1,4	2,1	3,8	4,0
Waste management	8	2,0	2,1	1,8	2,9	4,1	4,1
Interaction with critical habitats and species	8	2,0	2,0	1,3	2,6	3,5	4,0
Non-therapeutic chemical inputs	8	2,1	1,8	1,1	1,6	3,5	3,3
Environmental assessment	8	3,0	3,3	2,6	3,1	4,0	3,9
Area-based management	8	2,1	2,6	2,3	2,1	3,5	3,5
Energy use (on farm, all types)	8	3,4	3,4	1,1	2,3	3,8	3,6
Carbon footprint (supply chain)	8	3,0	2,8	0,9	2,3	3,4	3,5
SYSTEM 2							
Effluents	8	3,3	3,3	2,3	4,0	3,8	2,9
Protection of wild populations: escapes	8	3,3	3,5	2,3	3,9	3,3	2,8
Protection of humans: therapeutic treatments	8	4,4	4,3	3,3	4,3	4,4	3,5
Feed: source of marine raw materials	8	3,0	3,0	2,1	3,4	3,1	2,3
Feed: source of agricultural ingredients	8	3,4	2,8	1,9	3,1	3,1	2,3
Waste management	8	4,0	3,6	2,4	4,0	3,8	2,6
Interaction with critical habitats and species	8	3,6	3,6	2,6	3,1	3,6	2,9
Non-therapeutic chemical inputs	8	2,8	2,8	1,6	2,4	2,8	2,4
Environmental assessment	8	3,9	4,1	3,6	4,1	3,8	3,3
Area-based management	8	3,4	3,8	3,3	4,1	3,8	3,0
Energy use (on farm, all types)	8	3,1	3,1	2,1	3,1	3,3	2,6
Carbon footprint (supply chain)	8	3,4	3,1	2,1	2,8	3,1	2,3

Generally, for all FAP products and according to experts' judgment, the scoring based on **system 1** is considered as more simple and easier to control. However, this system seems not able to evaluate a wide variety of products and is considered of little 'reliability' for a majority of criteria. The 'scientific soundness' and 'effectiveness' of several criteria also appeared uncertain.

Comparatively, **system 2** is considered as less 'simple', but also as less 'verifiable' (however no really bad scores were obtained for these two qualities). The 'reliability', 'scientific soundness' and 'effectiveness' of the criteria scoring are significantly higher, while experts consider that the ability of the system to cover all the FAPs ('breadth') still remains a clear limit.

Comparable results were obtained for fishery products, as well as for the social dimension of sustainability in FAPs. They are presented in a simplified form in Table 6.2, based for each criterion on the detailed analysis presented in § 3 and 5. Regarding the criteria related to the environmental sustainability of fish products, this confirms, on the one hand, **the poor reliability and soundness of a very simple system based only on mandatory data** and, on the other hand**, the significant room for improvement which could result from making available some key additional data in the frame of a more advanced system**.

Table 6.2 – Qualitative judgement of the criteria for the fisheries products sustainability in the environmental dimension and for the social dimension of FAPs sustainability (poor and low scores are in orange, medium in yellow, and high in green).

	System 1		System 2	
Criteria for fisheries products in the environmental dimension	Scientific reliability & soundness	Simplicity & verifiability	Scientific reliability & soundness	Simplicity & verifiability
Fishing pressure	Poor	High	High	High
Fisheries management	Poor	Low	Medium	Medium
Impact on ETP and sensitive species	Not assessed	Not assessed	Medium	Medium
Unwanted landings and discards	Poor	Low	Medium	Medium
Impacts on the seabed	Medium	Medium	High	High
Impact on marine food webs	Not assessed	Not assessed	Medium	Medium
Carbon footprint	Poor	Medium	Medium	Medium
Waste and pollution	Poor	Low	Medium	Low
Criteria for the social dimension				
Working conditions (fish prod.)	Medium	Medium	High	Low
Fair prod. (impact on local community)	Poor	Low	Medium	Low
Working conditions (aquaculture prod.)	Medium	High	High	Low
Fair prod. (impact on local community)	Poor	Medium	Medium	Low

The EWG stresses that making this additional information available allows a more accurate assessment, but can also make the scoring simpler and easier to verify, at least for some indicators. In contrast for the scoring of the social criteria, system 2 based on fleet segments could make the scoring complicated and poorly verifiable.

The EWG concludes that **one of the main interests of building a scoring system based simultaneously on system 1 and 2 is to create a strong incentive for all producers and importers to provide the essential information to assess the sustainability of the products**.

6.2 How to combine indicators for a scoring of sustainability performances at the product level

6.2.1 Aggregating social and environmental dimensions?

In order to build a final sustainability scoring at the scale of a given FAP, a preliminary issue is to determine whether merging criteria across the social and environmental dimensions of sustainability is sensible. The EWG considers this is a highly political decision. However, because other scoring systems already exist on the market (especially the Nutriscore dedicated to the nutritional qualities of the product), multiplying scores can be very counterproductive at the consumer level. Therefore, two options should likely be considered:

Option 1 would be to **prioritize the environmental dimension** of sustainability, assuming on one hand that this is the main current expectation of the majority of citizens and, on the other hand, that other tools do exist regarding social aspects, such as the labelling of fair trade, or the fisheries regulations intended to exclude from the EU market products originating from IUU fisheries or slavery and children labour. For these latter criteria in particular**, the system of yellow or red cards applied to some countries might be much more efficient than a scoring system**.

Option 2 would be to acknowledge that **sustainability has to consider the three pillars of sustainable development (environment, economy and social)**, thus already including the social dimension in the first step of a single scoring system. In such a case, the final scoring should aggregate two scores, one for each dimension (environmental and social), probably considering a

weighting based on a political judgment. Note that some aspects of the economic dimension are implicitly (or could be) included in the two others notably through the criteria related to e.g. subsidies or fair production.

6.2.2 Combining rating of criteria into a single final score by dimension

Several options can be considered in order to combine the rating of several criteria into a final score (or at least one final score for the environmental dimension and another for the social aspects).

- The most obvious option is to use a **simple average**, thus giving the same weight to each criterion. As most of them have been expressed using letters (from E to A+), a preliminary conversion into numbers is required (from 0 to 5) before calculating the mean, then back-conversion into letters.
- As all criteria may not have the same importance, a **weighted average** could be used. However, determining the weight of each criteria is a political choice that can be based on the judgement of various categories of stakeholders (Producers, NGOs, experts). As a test, the EWG provides a weighting based on the scientific expert vote (Table 6.3).
- An alternative combination could be based on a **Penalties system** in order to allow the final scoring to take into account **'killer criteria'** (i.e. criteria considered as crucial to meet at least a medium score of sustainability). In that case, the scoring of each criteria would be used in inverse order to subtract some 'points' (of 'low sustainability') starting for instance from an initial score equal to 100. In such a system, the sum of all penalties would not be limited to 100, assuming that every negative combined score would be set back to zero in the final score of the considered dimension. Therefore, some "killer criteria" (e.g. large impact on ETP species, or a high risk of slave labour) could strongly decrease the final scoring. As a test, the EWG provides a potential penalties system, based on the experts' votes (Table 6.3).

Table 6.3 – Examples of two combinations of scoring (0 to 100): a weighted average and a penalty system, where weights and maximal penalties are based on scientific expert judgement in order to illustrate the two concepts. The variability columns refer to the variability between experts. Colours are used to highlight specific values.

	Scoring based on a weighted average		Scoring allowing 'killer criteria'	
Criteria	mean weight	variability (s.e.)	max penalty	variability (s.e.)
FISH PRODUCTS				
Fishing pressure	21,6	8,3	45	13
Fisheries management	20,3	8,7	38	14
Discards and ETP species	17,8	7,5	40	11
Impact on habitats	17,1	5,4	28	12
Food web: Impact on biomass	9,7	4,1	14	8
Energie (CO2)	13,5	5,7	16	10
AQUACULTURE PRODUCTS				
Effluents	10	5,1	27	18
Protection of wild populations: escapes	9,2	3,8	21	13
Protect. of humans: therapeutic treatments	8,3	3,2	21	12
Feed: source of marine raw materials	6,7	4	14	12
Feed: source of agricultural ingredients	7,4	3,3	16	17
Waste management	7,9	3,6	18	13
Interaction with critical habitats and species	8,2	3,6	22	16
Non-therapeutic chemical inputs	7,8	3,8	20	12
Environmental assessment	9,1	3,8	17	11
Area-based management	9,5	5,9	14	8
Energy use (on farm, all types)	8,4	3,9	14	8
Carbon footprint (supply chain)	7,4	5,8	18	11
SOCIAL DIMENSION				
Working conditions (fish prod.)	26,5	13,4	35	17
Fair production (impact on local community)	23,5	11,7	23	12
Working conditions (aquaculture prod.)	25,2	17,7	22	16
Fair production (impact on local community)	24,8	18	16	10

Regarding fishery products, and on the basis of a preliminary judgment, the EWG considers that all the selected criteria should not have the same importance in the final score. In particular, the impact on the food web was considered less important probably due to the difficulty of its assessment. Conversely, the "Fishing pressure", "Fisheries management" and "Impacts on ETP species" criteria were recognized as being of particular importance, and could potentially be considered "killer criteria", which considerably lowers the overall score when only one of these criteria is not met.

More homogeneous weightings have been suggested for aquaculture and social criteria. Only the "Effluent" criterion emerges as a bit more important than others for the scoring of aquaculture sustainability, while the working conditions in fisheries may be considered as a "killer criteria" regarding the social dimension of sustainability.

It should be stressed that this weighting of criteria was discussed by the EWG before the scoring system itself was completed and precisely described. The weighting should thus be updated at a later stage. However, the aforementioned results already suggest that **a simple average of heterogeneous criteria is likely not to be the most appropriate way to calculate the final scoring. The EWG highlights this issue should be revisited at a later stage of the**

implementation of the scoring system, involving a large panel of stakeholders in the discussion.

6.2.3 Accounting for data uncertainty in the final scoring

The reliability of basic criteria governs the credibility of the sustainability scoring system. The main issue is to compare the scoring of a single sustainability criterion using extremely diverse datasets in quantity and quality, such as in a well-defined fisheries in an EU area and in a poor-data area associated to an imported product.

At all levels of data reliability, from the best to the worse, experts are confronted with the fairness when comparing the scoring of FAP sustainability. Furthermore, on both ends, the fisheries sectors and consumers need to rely on a fair scoring system. The credibility of the scoring system therefore relies on the appropriate accounting of each criterion reliability.

Reliability relates here to data quantity and quality, i.e. to the intrinsic uncertainty levels when using different datasets in the estimate of a criterion.

A credible system therefore requires to account for data uncertainty, which could be done in different ways. We presently propose two main options:

- Option A is the main option described along the report that implicitly includes data reliability in the coexistence of two scoring systems (1 and 2). As presented, system 1 cannot reach the maximum score when the simplification of scoring and the coarseness of related data are considered as too uncertain to ensure effective sustainability. Therefore, **limiting the score under system 1 can already be considered an implicit accounting of data uncertainty in the scoring system**.

- Option B is an alternative path where each criterion is associated to a dedicated probability of reliability (how reliable is this criterion e.g. for that given area or gear?), so that the aggregation of scores could be a simple average or a weighted average if various degrees of importance between criteria are recognized (the two first aggregation methods above).

In this option, system 1 could reach the highest score (A+) but data quantity or quality would most likely impede this since each criterion is associated with a reliability probability that is most likely low within system 1.

A simple and may-be most natural method for integrating this uncertainty would be to **weigh the basic indicator scoring with the reliability estimate prior to combine the diverse criteria**, e.g. if the criteria is rated from A+ to E (i.e. from 5 to 0), the resulting indicator (CriteriaFair) would be: CriteriaFair = CriteriaScore * CriteriaReliability, with CriteriaReliability the probability of being reliable (from 0 to 1) as defined by the experts based on data quality and quantity. The resulting CriteriaFair would then have a decimal value from 5 to 0.

In such a system with option B, the data-rich sectors would be fairly rated as regards to their sustainability but also in comparison with the data-poor sectors, which would tend to have a lower score although adjusted to the level of available information and to the experts' knowledge. The sectors/areas that would invest effort in providing relevant data and improve management would be scored higher. Importantly, **this 'reliability adjustment' of the scoring system would represent another important incentive to provide reliable data and progressively fill up the data gaps**.

Within the EU, the gap of data availability between the industrial and small-scale fisheries for instance would a priori favour the sustainable part of the industrial sector. However, in that case, expert judgement could initially compensate for the lack of data for the small-scale fisheries following the known overall better practices. Furthermore, as the scoring promotes data-rich criteria, the small-scale fisheries sector would naturally tend to provide suitable data. Such system would therefore favour the collection of biological and socio-economic data of this sector which is largely missing.

As regards to the EU import of fish products, such 'reliability adjustment' system would ensure a low score to non-transparent remote fisheries on their practices with a particular zero scoring by

the experts for e.g. suspected slavery or IUU fishing. A severe penalty rule could additionally ensure that such extreme cases have an overall low score, for instance imposing a zero overall score if a zero value is set on any basic Criteria ('one zero, all zeros', see the 'killer criteria' above). On the opposite, well-documented and trusted remote fisheries could be highly scored.

In system 1, such a reliability scoring by large area/sectors would likely require one week of meeting of an expert group per year (likely two weeks in the first year). In systems 2 and 3, a more semi-permanent structure would be needed with increasing human and funding resources, respectively. Such board of experts would re-evaluate every two to three years the status of data reliability of each basic Criterion of the system.

6.2.4 Expression of the final scoring – A scalable scoring system

In order to be accepted by all stakeholders, it is of primary importance that FAPs be distributed over a large range of score levels avoiding a given score to be over- or under-represented. The whole scoring scale should ideally be used, in order to identify in the A+ categories the products currently considered as the most sustainable according to the considered criteria, while the worst E category should be addressed to products that justify a negative incentive on the market.

In other words, the rating of each criterion and the combination of all criteria should be scaled in such a way that products are distributed according to what will be considered a 'desirable' proportion by category. This can be unlikely during a first phase of the scoring system implementation because most of the imported products will likely be scored using System 1 that excludes the highest rate(s) due to high scoring uncertainty. However, as the possibility to move under system 2 will be given to all importers (provided they provide the requested information), this more advanced system should increasingly be used and the products distribution across scores should evolve rapidly.

More generally, as indicated in paragraph 2.3, the scoring system has to be intrinsically scalable. This implies that **the limits of the different categories must change over time, depending on the progress made in fishing or farming practices. In particular, the thresholds for the highest scores should evolve gradually in order to always distinguish best practices. Similarly, the lowest scores should include over time relatively unsustainable practices (e.g. 'D' scores entering the 'E' category) as sustainability improves so that extremes are constantly highlighted in the system.** (Another option for the high scores could be to add A++, A+++ categories; see Fig. 6.1 for an example). This approach is consistent with the idea that the scoring system does not intend to certify an absolute sustainability of the product, but to provide a tool allowing comparisons between products according to their performances for a sub-set of selected sustainability criteria.

It should also be mentioned that the aggregation of an increasing number of criteria scores will tend to smooth out the extreme levels for each product so that the basic criteria scores must cover these extremes in order to reach a relatively balanced distribution of the final scores for all products.

Table 6.4 illustrates the concept presenting a possible distribution (approximately derived from a Gaussian distribution), which one could expect in the medium term in order to favour the highest incentive effect. The EWG stresses that this key question should be deepened, in particular by analysing equivalent rating systems (such as the one used for the energy performance of household appliances) in close consultation with a large panel of stakeholders.

Table 6.4 - A potential distribution of FAPs placed on the EU market to maximize the incentive effect. Such a distribution implies that the rating limits have to evolve over time.

Final score	**A+**	**A**	**B**	**C**	**D**	**E**
'Desirable' proportion of EU FAPs in each category	<10%	15%	25%	25%	15%	10%

The EWG also notes that a final scoring by a single letter does not mean that no other information can be given to the market players (and ultimately to the consumers if appropriate) on the various sustainability criteria of interest. In the energy performances rating for instance, the overall score is accompanied by details on other characteristics (e.g. water consumption, noise) that contribute to the final scoring (see figure 6.1).

Similarly, the final information provided on the market could also show the detailed scores for a few indicators that are part of the score (e.g. stock, habitat impacts, fuel use intensity…), or possibly alternatively things that cannot be scored, but are assessed more qualitatively. Obviously, a preliminary analysis would be required, to identify the most appropriate criteria, selected according to the consumers' expectations.

Fig. 6.1 – The scoring system used for household appliances, as an illustration of a final score combined with additional detailed information.

6.3 About complementarity with the existing scoring schemes

6.3.1 Complementarity with certification schemes and labels

Acknowledging that certification schemes and labels are based on local, case by case assessment and a chain of custody, the EWG considers they should generally lead to a more reliable and effective scoring of the products. Therefore, the EWG stresses that the scoring system envisaged in the present report has to be regarded as complementary to the existing certification schemes and labels and certainly not as an alternative. Those existing certification schemes would need, at a later stage, to be listed and classified with their characteristics.

In that sense, a European label that is based on detailed specifications, should be considered as **a potential 'system 3' of the present scoring approach, allowing for a more robust assessment at the scale of a given fishery or fish farm and not by large categories** (such as the pseudo-métiers or the production system types used under system 2).

The EWG notes that the EU parliament published in 2016 a report advising the EU to develop its own ecological label on sustainable fisheries and aquaculture[40]. This initiative was not followed by a concrete action and there is no current renewal of an initiative for a public certification scheme.

In practice, the implementation of the scoring approach presented in this report must be carried out very carefully, especially avoiding to be (or to be considered as) in competition with the existing certification schemes and labels. This is especially true during a likely rather long period where the reliability of the scoring systems will still have to be tested and confirmed. From that point of view, the EWG stresses that the resulting rates should be carefully tested before being provided to the market players. Even in that case, rates should likely be considered in a first step as indicative and based on voluntarily communicated information. The implementation of a more prescriptive system should be the expected result of such a testing phase.

[40] https://eur-lex.europa.eu/legal-content/FR/TXT/HTML/?uri=CELEX:52016DC0263&from=EN

In the medium term, a possible way to avoid competitions between scoring schemes would be that producers and sellers have the possibility to freely choose the scoring system they want to display to consumers, using referenced ecolabels when available (provided a reliable Cain of Custody is in place) and the general scoring otherwise. This would allow the sustainability rating to be considered as mandatory information that should be provided to consumers (either as a referenced ecolabel or as a general score), or at least to inform consumers that a score does exist for all FAPs ... which may be a strong incentive for sellers to display it. In any case, implementation should be intensively discussed with all stockholders, including producers, market players and NGOs (especially those which are strongly involved in certifications and labels), as there will be issues related to Chain of Custody and costs of private labels.

An interesting feature of the parallel existence of different sustainability systems is the possibility to cross validate and potentially highlight differences. Such exercise could allow identifying successes and failures to suitably depict sustainability and, consequently, reinforce the overall robustness of the scoring systems.

6.3.2 Complementarity with LCA applied to food products

The EWG recall that the proposed scoring system applies to the production sector only (thus providing a score at landing/farmgate), while taking into account transports, processing and distribution is obviously a strong requirement to assess the sustainability issues and provide a sound information to consumers, especially when comparing imported with domestic products.

For fresh and chilled products, CO_2 emissions related to the transport is the main missing part of a more complete scoring. This aspect could rather easily be included by adding to the aforementioned ones a specific "Transport" criterion, provided information are available not only on the geographic origin of the product (what is already mandatory), but also on the transport means that is used from the production area to the entering in the EU market. One can for instance imagine to score the "Transport" criterion under system one just referring to the transport mean (e.g. by air=red, by truck=yellow, by boat or train=green), while distance should also be considered under system 2.

For processed products, a scoring related to sustainability must include two parts: one is related to the sustainability of fishing or farming for at least the most important ingredients of the processed product and the other is related to the post-production sustainability assessment. The first part should refer to the above presented system. However, this implies that **the currently mandatory information**, as defined in the CMO Regulation (species, fishing gear and area), **should be expanded beyond fresh and chilled products to all FAPs**. Regarding aquaculture, the production system from which the product originates must become a mandatory information on the market, for all processed and not-processed products. The setting up of such extensions, which are definitively required to efficiently inform consumers, is certainly a big challenge. In addition, voluntary information provided by producers or importers should be associated to the product in order to benefit from the system 2 scoring. This also requires to ensure the traceability of this additional information all along the value chain that includes processing.

Finally, as explained in paragraph 2.2, the second part of the scoring that is dedicated to the processing and distribution sectors is not FAP specific and should be considered in a general approach aligned with the approaches developed for the whole food processing sector, especially with those using Product environmental footprint (PEF) and Life cycle analysis (LCA) methods and indicators.

6.3.3 A strong requirement: the traceability of fished and farmed products

Making seafood products continuously traceable from the production site (fishing vessel or farm) to the final consumer **is a strong requirement to achieve sustainable fisheries and aquaculture** (beyond the FAO area of origin). Given the size of European demand for seafood, an EU-mandated traceability system will encourage transparency and accountability not only in the EU, but also far beyond the EU's own seafood supply. The traceability requirements on EU-produced seafood that have been implemented differently in different member states, have led to increased costs for EU producers and competitive disadvantages compared to producers in other countries.

Several stakeholders recently underlined that the ongoing revision of the EU's fisheries control system is a unique opportunity to secure this.

In particular, the EWG notes that the European Commission suggests a digital seafood traceability system which ensures that all the data elements necessary to establish a transparent supply chain are recorded and transmitted at each step of a seafood product's journey. This system must cover all seafood products available on the EU market, not least those that are imported into the EU, as well as preserved or processed products. At the moment, it is uncertain to what extent the parliament and council will support such a digital system.

Regarding more specifically the proposed sustainability scoring based on system 2, the voluntary information provided by producers and consumers (such as the fishing gear and sub-area) could be made better verifiable through e.g. a digital Catch Certificate where vessel numbers can be identified and registered in the aforementioned digital seafood traceability system that allows for controls. In addition, an automated system should, to a certain extent, be able to assess whether the provided information is correct through the crossing of information and alert the enforcement authorities. For instance, if an operator ticking the box 'pole and line' uses in reality the 'longline' catch method, the alert system would recognise that 'pole and line' would not be associated with the vessel type that is registered under the IMO number. Therefore, digitalisation of the seafood traceability system should be considered as a prerequisite for reliable information on sustainability.

6.4 Next steps

6.4.1 Fish products

Based on the detailed analysis provided in paragraph 3, Table 6.5 summarizes the additional work that is still required for each criterion before system 1 and 2 can be implemented. In parallel, a descriptive analysis should be carried out to identify the amount of fish products placed on the EU market by species, country of origin, fishing gear type and fishing area.

Table 6.5 – Next steps identified in order to implement the scoring system for fish products. Numbers in the *'who'* column suggest to whom the task could be entrusted (*1- possibly a single ad hoc contract; 2- needs a dedicated team of experts; 3- a dedicated EWG would be required*). Colours refer to a rough estimate of the time needed to carry out the related tasks (green=few months; yellow=about 1 year; orange=likely more than one year and at least an additional EWG is required; brown refers to longer-term perspectives)

	SYSTEM 1		SYSTEM 2	
Criteria	**Next steps**	**Who**	**Next steps**	**Who**
Fishing pressure	Test table 3.1 using ICES catch (thus defining operational limits for the vulnerability scoring)	1	Define the reference list of assessed stocks	1
			Test various rating of F/Fmsy (Table 3.8 & 3.9)	1
			AND build a database (or an expert tool) identifying F for all stocks of the reference list.	1 or 2
Fisheries management	Associate all species*area to its RFMOs	1	Define management rules categories and define/test a score by category	1 or 2
	AND score RFMOs performances in managing fisheries (based on management tools, ecosystem targets, enforcement, data collection, participative management)	1 or 2, and 3	AND score RFMOs performances in managing fisheries (based on enforcement, data collection and participative management)	1 or 2, and 3
Impact on ETP and sensitive species	**Not feasible**		Identify appropriate pseudo-métier (crossing gear types, species and possibly FAO areas) to score impact on ETP and sensitive species	2, and 3
			AND score RFMOs performances on managing fisheries (based on specific conservation rules, enforcement and specific data collection)	1 or 2, and 3
Unwanted landings and discards (other than ETP species)	Investigate the three options proposed to define a risk-based approach of scoring (by gear type, gear*species, or gear*species*area, see §3.2.5)	2	Identify appropriate pseudo-métier (crossing gear types, species and possibly FAO areas) to score unwanted catch rates	2 and 3
			AND score RFMOs performances on managing fisheries (based on specific rules dedicated to unwanted catch, enforcement and specific data collection)	1 or 2, and 3
Impacts on the seabed	Associate all species to a habitat and score habitat sensitivity, based on the scientific literature (Table 3.4)	1	. Simple scoring (step 1): define the combined scoring based on detailed fishing gear and species (and possibly FAO area)	1 (or 2)
			. More reliable scoring (step 2): Define the feasibility of setting up a declarative system related to habitats	4
Impact on marine food webs	**Not feasible**		Test various rating of B/Bo (Table 3.12)	1
			AND build a database (or an expert tool) identifying B/Bo for all stocks of the reference list.	1 or 2
Carbon footprint	Define a scoring by gear type and species group, based on the scientific literature	1 or 2	Determine the feasibility of setting up a declarative system of FUI (fuel use intensity)	4
			Literature review on FUI models	1
Waste and pollution	Define and discuss a scoring of plastic use by gear type, based on the scientific literature	1	Identify appropriate pseudo-métier (crossing gear, fishing area and target species) to score plastic use	2 and 3
	If the above appear not sufficient, identify and test appropriate simple pseudo-métier (crossing gear types, FAO areas and species grouping) to score plastic use	2	AND score RFMO performances on regulating plastic pollution (based on specific rules, enforcement, and dedicated data collection)	1 or 2, and 3

Table 6.5 highlights that **substantial work is still required before any scoring system can be implemented.** It should be noted that the required work before implementation is not necessarily more important in system 1 than in system 2. This is more criterion dependent as several are rather close to be already operational (see the green cells in Table 6.5), while others will likely not become operational before a couple of years. As the consequence, implementation should not consider system 1 and 2 sequentially. **For several criteria, the two systems must be implemented simultaneously, system 1 being the default system while system 2 represents an option offered to producers and importers to differentiate themselves from the cruder assessment under system 1**. Over time, the number of considered criteria in the whole scoring system should increase step by step while, for some of them, system 2 will become available only after a delay and will progressively expand to more FAPs.

The simplest criteria to score are the 'Fishing pressure' and 'impact on the seabed', under system 1, however an additional work is needed to make them operational (see Table 6.5 and the related paragraphs in Chapter 3). In addition, at least for the 'Fishing pressure' criterion, it would be highly desirable to develop system 2 at the same time, as it is not substantially more complicated or time consuming to implement, and could be directly applied to most of the products fished in the North-east Atlantic. This could be done, e.g., by ad-hoc contracts followed by a validation through a relevant group of experts (STECF EWG or the plenary).

Only a limited number of criteria could be made operational using this process. For most criteria, substantial additional analyses have to be carried out, likely far beyond what can be entrusted to dedicated ad-hoc contracts. This is especially the case for:

- **The definition of pseudo-métiers** as regards to the needs of several sustainability criteria under system 1 (unwanted landings, waste) and system 2 (ETP species, unwanted catch, waste). Such definitions should be based on statistical analyses, using various international or national databases (related to discards, accidental catches, etc.) and testing candidate scoring methods and levels on EU statistics of FAPs that are present on the market.
- **The assessment of all RFMOs or equivalent management bodies' performances**, regarding the achievement of objectives related to specific criteria (fisheries management, ETP conservation, unwanted catch regulation, waste limitation). Candidate associated scoring should be tested on EU statistics of FAPs that are present on the market.
- **The setting up of a reference list of assessed stocks** and the building of a database or an expert system identifying F/Fmsy (fishing pressure) and B/Bo (impact on the food web) for all stocks of the reference list.

The EWG stresses that such analyses will be time consuming and, therefore, cannot be realistically conducted by ad-hoc contracts nor in the frame of dedicated EWGs. The EWG considers therefore that **the most effective and efficient process would be to entrust this work to a dedicated small team of experts** through, e.g., **a contract that MARE would directly have with a consulting company.** Another similar option would be to contract a private expertise office together with scientific experts as consultants and/or in association with the JRC.

Thus, this team would be involved in the set-up of the scoring system (see a possible provisional timetable below) ensuring its development in the medium term. This should be done based on DG MARE requirements, under the guidance of a scientific committee (e.g., a sub-set of STECF). This team would need to prepare the materials (e.g., statistical analysis, compilation of RFMOs rules and achievements, etc.) requested by specific STECF EWGs. In addition, a broader network of scientists could usefully be identified, especially to provide expert judgments on the scoring of ,e.g., the various pseudo-métiers.

STECF EWG meetings should be regularly organized, at least once a year, to address specific issues justifying to mobilize a broader dedicated expertise. Considering the scoring of fish products, table 6.5 and the above implies that an EWG should be specifically dedicated to the scoring of RFMOs using, as an input, the aforementioned study on their own rules and management performances. Finally, all the implementation processes of the scoring system should be evaluated step by step by the STECF plenary.

6.4.2 Aquaculture products and social aspects.

A prerequisite of the scoring of sustainability for aquaculture products is that the information on the production system type should be made available. This could be rather simple for European products by using information already provided by MS in the framework of the DCF. In order to be operational, this information should however be provided for every product ensuring traceability along the entire value chain. As for the imported products, the list of production system types should be preliminary tested and likely adapted before any implementation.

As a consequence, **even the implementation of system 1 for the aquaculture products will likely take time and should be envisaged as a progressive process, covering step by step a broader part of the market**. In between, and hopefully for a limited period of time, **a 'grey score' might be considered for products that are not included into the scoring system**.

Provided the required information is available, the implementation of system 1 for the aquaculture products could be rather fast as it implies a more homogeneous preliminary work for all criteria than for fished products. Indeed, all the scoring processes will be defined by production system type according to a literature review and additional analysis using European or international databases.

Like for fished products, the EWG assumes for the aquaculture products that this work should be entrusted to **a dedicated small team of experts** (at least partly the same as for fished products, to ensure a consistent approach for all FAPs), working in close cooperation with a network of scientists, under the scientific umbrella of STECF. **A dedicated EWG will be needed in the short or medium term to set the operational scoring for as many criteria as possible** on the basis of preliminary work provided by the aforementioned expert team. Depending on the practical difficulties that are encountered, the implementation could be envisaged as a step by step process, starting with a limited number of easy-to-score and scientifically-sound criteria and then progressively expanding the list to criteria for which the scoring is more complex.

As for system 2, at this stage, it mainly appears as a medium-term perspective which still needs further investigations. Like for fished products, system 2 could provide the opportunity for producers/importers to differentiate themselves from an average performance of their species*production method. Setting up the system will require to define more precisely and for each criterion what should producers provide in terms of data, and (perhaps most importantly) how can this information be verified?

Eventually, **the scoring of the social criteria could be built at the country level under system 1**. Since relatively few countries outside the EU are supporting the bulk of FAP imports, such a system could be set up rather rapidly, at least for this limited list of countries. In a first step, the scoring will be based on the ratification of ILO conventions, while enforcement will be considered in a second step (see Table 5.3) by assessing their social performances according to the detailed specifications provided in section 5. This system 1 scoring could be progressively expanded to more countries. As for system 2, the scoring at the level of fleet segment or production system type could be envisaged in a longer-term perspective.

6.4.3 Time table

Previous findings regarding the next steps of the scoring system implementation are summarized in Table 6.6. No criteria, neither for fisheries nor for aquaculture, can be considered as immediately available. As stated above, even the simplest ones required additional work to be made operational (see Table 6.5). However, provided a small team of experts can be set up to conduct the aforementioned analyses, a simple scoring system can be set up for fish products in the short term (i.e. less than one year from the technical point of view). It might improve rather rapidly as far as the requested preliminary analyses will allow to include step by step more criteria and more robust scoring methods, especially adding system 2 to all products able to provide the requested voluntary information.

Table 6.6 - Summary of the scoring that could be implemented in the short term, medium term or in a longer-term perspective. Colours refer to the systems described in the report (1 or 2, or both simultaneously)

Criteria	Short term	Medium term	Longer perspective
Fishing pressure	Systems 1 & 2	Systems 1 & 2	
Fisheries management	NA	Systems 1 & 2	
Impact on ETP and sensitive species	NA	System 2	
Unwanted landings and discards	System 1 (if feasible) or NA	Systems 1 & 2	
Impacts on the seabed	System 1	Systems 1 & 2.1	System 1 & 2.2
Impact on marine food webs	NA	System 2	
Carbon footprint	System 1 (if feasible) or NA	Systems 1 & 2.1	System 1 & 2.2
Waste and pollution	System 1 (if feasible) or NA	Systems 1 & 2	
Aquaculture criteria	Grey score	System 1	Systems 1 & 2
Social criteria	System 1, step 1 (see Table 5.3)	System 1, step 2 (see Table 5.3)	Systems 1 & 2

➢ **On the short term,** therefore, the scoring system could include at least 2 criteria related to the environmental dimension of fish products, the 'fishing pressure' (using system 2 at least for EU products) and the 'impact on the sea bed'. Social criteria could also be considered (and applied to fish products) using a simple scoring by country.

Depending on the findings of preliminary analyses, and notably provided simple approaches would appear sufficient, some additional criteria might be included in the scoring. This may refer to 'unwanted catches', 'carbon footprint' and 'waste and pollution', using a simple risk-based approach by gear type and species. In other words, for these criteria a feasibility approach, possibly based on a literature review, is needed before deciding if they can be included to the scoring system in the short terms, or if they need additional investigations, notably based on statistical analyses as explained in § 6.4.2.

Eventually, the EWG 20-05 suggest **a new EWG should be organised at the late 2021 or early 2022 to examine the findings of all the preliminary analyses (provided they have been conducted during the year), to cross these results with EU FAPs statistics (by categories for all the mandatory information), and to propose, as much as possible, an operational scoring system.** At the same time, The EWG stresses that such a system should be considered only as a preliminary and insufficient phase, based on a small number of criteria and mainly using the coarse system 1 of scoring.

➢ **On the medium term,** and based on the additional analyses provided by the expert's team, two EWG should be envisaged. One EWG would deal with fish products, and be dedicated to the scoring of pseudo-metiers and RFMOs performances, regarding 'fisheries management', 'ETP and sensitive species' conservation, 'unwanted catch' regulation, and 'waste and pollution' limitation. This EWG might also examine advancements and reliability of the scoring for other criteria. The second EWG would deal with aquaculture products, and be dedicated to the scoring of all or part of the 11 selected criteria.

In both cases, it is very likely that a single meeting will not be sufficient to implement all the criteria as presented in the "medium term" column of Table 6.6. One can imagine **a step by step procedure in 2 or 3 years, each meeting intending to add new operational criteria within the scoring system**. At least one additional EWG should also be organised to score social criteria according to system 1 step 2 (based on ILO conventions enforcement).

- Finally, scoring which required the implementation of a new data collection system (such as fishing habitat and FUI declarations, or farm detailed characteristics, at the farm scale) would be consider in a longer perspective, provided further analysis conducted after the development on previous steps confirm they will be required.

6.4.4 Evaluation test phase

Finally, the EWG stresses that an intensive evaluation test phase must be carried out, highlighting the feasibility and reliability of the scoring of each criterion, and therefore the credibility of the system. This test phase could take into account all or part of the EU market and a small number of importing countries. The aforementioned team of experts should be responsible for simulating the scoring of the FAPs according to the criteria considered, the associated system 1 or 2 and the different candidate methods for combining the criteria (see 6.2).

During this testing phase, all scoring approaches and the preliminary results of scoring itself should be presented and discussed with stakeholders, including NGOs and industry, with the aim of benefiting from their expertise, and to build step by step a scoring system recognized by all the stakeholders and legitimate for the whole society. The first EWG, or the STECF plenary itself, should specify in more detail the protocol for such a testing phase, and how best to conduct it in close cooperation with stakeholders.

7 REFERENCES

Aguilar-Manjarrez, J., Soto, D. & Brummett, R. 2017. Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture. A handbook. Report ACS18071. Rome, FAO, and World Bank Group, Washington, DC. 62 pp.

Amoroso, R. O., Pitcher, C. R., Rijnsdorp, A. D., et al (2018) Bottom trawl fishing footprints on the world's continental shelves. Proceedings of the National Academy of Sciences, 115(43), E10275-E10282.

Auster, Peter, Richard Langton, Valentine Page C., et Andrew Shepard. « The impacts of mobile fishing gear on seafloor habitats in the Gulf of Maine (Northwest Atlantic): Implications for conservation of fish populations ». Fisheries Science 4, no 2 (1996): 185-202.

Baluyut, E.A , 1989 – Aquaculture systems and practices: a selected review. FAO, Rome.

Bastardie, F., Nielsen, J. R., Andersen, B. S., and Eigaard, O. R., 2010. Effects of fishing effort allocation scenarios on energy efficiency and profitability: an individual-based model applied to Danish fisheries. Fisheries Research, 106: 501–516.

Bastardie, F., Nielsen, J. R., Andersen, B. S., and Eigaard, O. R. 2013. Integrating individual trip planning in energy efficiency – Building decision tree models for Danish fisheries. Fisheries Research, 143: 119–130.

Bohnes, F.A., Hauschild, M. Z., Schlundt, J., Laurent, A. (2019) Life Cycle Assessment of aquaculture systems: A critical review of reported findings with recommendations for policy and system development.

Burgess MC, Diekert FK, Jacobsen NS, Andersen KH, Gaines SD. Remaining questions in the case for balanced harvesting. Fish and Fisheries 17 (4) : 1216-1226.

Cheung et al., 2007. Intrinsic vulnerability in the global fish catch. MEPS, 333: 1-12.

Cisneros-Montemayor, A. M., Ota, Y., Bailey, Megan; Hicks, C. C., Khan, A. S., Rogers, A. et al., 2020. Changing the narrative on fisheries subsidies reform: Enabling transitions to achieve SDG 14.6 and beyond. Marine Policy 117, p. 103970. DOI: 10.1016/j.marpol.2020.103970.

Cisneros-Montemayor, A. M., Sanjurjo, E., Munro, G. R., Hernández-Trejo, V., Sumaila, R. U., 2016. Strategies and rationale for fishery subsidy reform. Marine Policy 69, pp. 229–236. DOI: 10.1016/j.marpol.2015.10.001.

D'Amico, P., Armani, A., Gianfaldoni, D., Guidi, A., 2016. New provisions for the labelling of fishery and aquaculture products: Difficulties in the implementation of Regulation (EU) n. 1379/2013. In Marine Policy 71, pp. 147–156. DOI: 10.1016/j.marpol.2016.05.026.

Deaton, A, Heston, A., 2010. "Understanding PPPs and PPP-Based National Accounts." American Economic Journal: Macroeconomics, 2 (4): 1-35.Diggles, B.K., Cooke, S.J., Rose, J.D. et al. Ecology and welfare of aquatic animals in wild capture fisheries. Rev Fish Biol Fisheries 21, 739–765 (2011). https://doi.org/10.1007/s11160-011-9206-x

Engelhard GH, Peck MA, Rindorf A, Smout S, van Deurs M, Raab K, Andersen KH, Garthe S, Lauerburg RAM, Scott F, et al, 2014. Forage fish, theri fisheries, and their predators : who drives whom ? ICES Journal of Marine Science 71 (1) : 90-104.

Eurostat (2019) Fisheries database. Available online at https://ec.europa.eu/eurostat/web/fisheries/data/database. Accessed 25 Oct 2019.

FAO. 2010. Aquaculture development. 4. Ecosystem approach to aquaculture. FAO Technical Guidelines for Responsible Fisheries No. 5, Suppl. 4. Rome. 53 pp.

Froese, R. and D. Pauly. Editors. 2019. FishBase. World Wide Web electronic publication. www.fishbase.org, version (12/2019).

Froese R, Walters C, Pauly D, Winker H, Weyl OLF, Demirel N, Tsikliras AC, Holt SJ, 2015. A critique of the balanced harvesting approach fishing. Ices Journal of Marine Science 73 (6) :1640-1650

Garcia SM, Kolding J, Rice J, Rochet MJ, Zhou S, Arimoto T, Beyer JE, Borges L, Bundy A, Dunn D et al, 2012. Reconsidering the consequences of selective fisheries. Science 335 (6072) : 1045-1047.

Gómez, S., Maynou, F. (2020) Economic, sociocultural and ecological dimensions of fishing capacity in NW Mediterranean fisheries. Ocean Coastal Management 197, 105323.

Graham M. 1935. Modern theory of exploiting a fishery, and application to North Sea trawling. ICES Journal of marine science, 10: 264-274.

Henriksson, P.J.G., Guinée, J.B., Kleijn, R., de Snoo, G.R., 2012. Life cycle assessment of aquaculture systems – a review of methodologies I J LCA 17:304-313

Heymans JJ, Coll M, Libralato S, Morissette L, Christensen V (2014) Global Patterns in Ecological Indicators of Marine Food Webs: A Modelling Approach. PLoS ONE 9(4): e95845. doi: 10.1371/journal.pone.0095845

Hiddink et al. 2020.Selection of indicators for assessing and managing the impacts of bottom trawling on seabed habitats. Journal of applied ecology, 57 : 1199-1209

Holland, D., Gudmundsson, E., Gates, J. (1999): Do fishing vessel buyback programs work: A survey of the evidence. In Marine Policy, 23, pp. 47–69.

Hornborg, S., Belgrano, A., Bartolino, V., Valentinsson, D., Ziegler, F., 2013. Trophic indicators in fisheries: a call for re-evaluation. Biology Letters 9(1):20121050

Hornborg,S., Ziegler, F. (2014) Aquaculture and enerrgy use: a desk-top study https://www.gu.se/sites/default/files/2020-06/1536133_publication---energy-use-in-aquaculture.pdf

Jacquet, J., Pauly, D. 2008. Funding priorities to small-scale fisheries. Cons Biol 22(4):832–835

Johnsen, J. P., Small-Scale Fisheries Governance in Norway: Hierarchy, Institutions and Markets in: Pascual-Fernández, J.J., Pita, C., Bavinck, M., Eds. 2020. Small-Scale Fisheries in Europe: Status, Resilience, and Governance. MARE Publication Series 23. Springer. Ch. 21 p. 439-461 ISBN 978-3-030-37370-2. 610 p. https://doi.org/10.1007/978-3-030-37371-9_1

Kelleher, K. 2005. Discards in the world's marine fisheries. An update. p. 131. FAO Fisheries Technical Paper No. 470. Rome, FAO.

Krugman, P. R., Obstfeld, M., Melitz, M. 2014. International Economics. Theory and Policy. Pearson Education, Inc.

Kumar, R., Kumar, R. R., Stauvermann, P. J., Chakradhar, J., 2019. The effectiveness of fisheries subsidies as a trade policy tool to achieving sustainable development goals at the WTO. Marine Policy 100, pp. 132–140. DOI: 10.1016/j.marpol.2018.11.034.

Luna, M., Llorente, I., & Cobo, Á. (2019). Integration of environmental sustainability and product quality criteria in the decision-making process for feeding strategies in seabream aquaculture companies. Journal of cleaner production, 217, 691-701.

Maureaud A., Gascuel D., Colléter M., Palomares M.L.D, du Pontavice H., Pauly D., Cheung W.W.L., 2017. Global change in the trophic functioning of marine food webs. PLoS ONE, 12(8): e0182826.

Mazor et al., 2020. Trawl fishing impacts on the status of seabed fauna in diverse regions of the globe. Fish and fisheries, 22(1): 72-86.

Morgan and Chuenpagdee, 2003. Shifting gears: addressing the collateral impacts of fishing methods in U.S. waters. Available at: https://marine-conservation.org/archive/mcbi/ShiftingGears.pdf).

Nijdam, D., Rood, T., Westhoek, H., 2012. The price of protein: Review of land use and carbon footprints from life cycle assessments of animal food products and their substitutes. Food Policy 37(6), 760-770.

Outeiro, L., Villasante, S., Sumaila, R., 2018. Estimating fishers' net income in small-scale fisheries: Minimum wage or average wage? In Ocean & Coastal Management 165, pp. 307–318. DOI: 10.1016/j.ocecoaman.2018.09.002.

Parker, R.W.R., 2012. Energy Use and Wild-Caught Commercial Fisheries: Reasoning, Feasibility and Options for Including Energy Use as an Indicator in Fisheries Assessments by Seafood Watch. Monterey Bay Aquarium, Monterey, California.

Parker, R.W.R, 2012. Review of life cycle assessment research on products derived from fishereies and aquaculture: A report for Seafish as part of the collective action to address greenhouse gas emissions in seafood. Final report.

Parker, R.W.R., 2018. Implications of high animal by-product feed inputs in life cycle assessments of farmed Atlantic salmon I J LCA 23:982-994

Parker, R.W.R., Blanchard, J.L., Gardner, C., Green, B.S., Hartmann, K., Tyedmers, P.H., Watson, R.A., 2018. Fuel use and greenhouse gas emissions of world fisheries. Nature Climate Change 8(4), 333-337.

Parker, R.W.R., Hartmann, K., Green, B.S., Gardner, C., Watson, R.A., 2015. Environmental and economic dimensions of fuel use in Australian fisheries. Journal of Cleaner Production 87, 78-86.

Parker, R.W.R., Skontorp Hognes, E., Ziegler, F., Borthwick, L., Jafarzadeh, S., Tyedmers, P.H. (2020) Fish should swim, not fly- The role of airfreighting in seafood supply chain emissions Proceedings 12th International conference on Life Cycle Assessment of food 2020

Parker, R.W.R., Tyedmers, P.H., 2015. Fuel consumption of global fishing fleets: current understanding and knowledge gaps. Fish Fish. 16(4), 684-696.

Pascual-Fernández, J. J., Florido-del-Corral, D., De la Cruz-Modino, R., Villasante, S., 2020a. Small-Scale Fisheries in Spain: Diversity and Challenges, in: J. J. Pascual-Fernández et al. (eds.), 2020, Small-Scale Fisheries in Europe: Status, Resilience and Governance, MARE Publication Series 23, Springer Nature Switzerland, Ch. 13, p. 253-281 https://doi.org/10.1007/978-3-030-37371-9_13.

Pascual-Fernández, J. J., Pita, C., Bavinck, M., 2020b. Small-Scale Fisheries Take Centre-Stage in Europe (Once Again) in J. J. Pascual-Fernández et al. (eds.), 2020, Small-Scale Fisheries in Europe: Status, Resilience and Governance, MARE Publication Series 23, Springer Nature Switzerland, Ch. 1, p.1-22 https://doi.org/10.1007/978-3-030-37371-9_13.

Pauly, D., Christensen, V., 2000. Trophic levels of fishes. In: Froese, R., Pauly, D. (Eds.),FishBase 2000: Concepts, Design and Data Sources. ICLARM, Manila, p. 181.

Pauly, D., Christensen, V., Guénette, S., Pitcher, T. J., Sumaila, U. R., Walters, C. J., Watson, R., & Zeller,D., 2002. Towards sustainability in world fisheries.Nature, 418, 689–695.

Pérez Roda, M.A. (ed.), Gilman, E., Huntington, T., Kennelly, S.J., Suuronen, P., Chaloupka, M. and Medley, P. 2019. A third assessment of global marine fisheries discards. FAO Fisheries and Aquaculture Technical Paper, No. 633. Rome, FAO. 78 pp.

Philis, G., Ziegler, F., Gansel, L.C., Dverdal Jansen, M., Gracey, E.O., Stene, A., (2019) Comparing Life Cycle Assessment (LCA) of salmonid aquaculture production systems: status and perspectives Sustainability 11: 2517

Rijnsdorp, Adriaan, Ole R. Eigaard, Andrew Kenny, Jan Geert Hiddink, Katell Hamon, Gerjan Piet, et al. « Benthis- Final Report », 2017. https://www.benthis.eu/en/benthis/Results.htm

Rooney N, McCann KS, 2012. Integrating food web diversity, structure and stability. Trends in Ecology and Evolution 27(1) : 40-46

Sala E, Mayorga J, Costello C et al., 2018. The economics of fishing the high seas. Sci Adv 4(6). https://doi.org/10.1126/sciadv.aat2504

Salmi, P., Mellanoura, J., 2020. Finnish Small-Scale Fisheries: Marginalisation or Revival? In J. J. Pascual-Fernández et al. (eds.), 2020, Small-Scale Fisheries in Europe: Status, Resilience and Governance, MARE Publication Series 23, Springer Nature Switzerland, Ch. 26, p. 537-557 https://doi.org/10.1007/978-3-030-37371-9_13

Sánchez P. 2000. The impact of otter trawling on mud communities in the northwestern Mediterranean. ICES Journal of Marine Science 57:1352–1358

Schuhbauer, A., Chuenpagdee, R., Cheung, W.W.L., et al., 2017. How subsidies affect the economic viability of small-scale fisheries. Mar Policy 82:114–121. https://doi.org/10.1016/j.marpol.2017.05.013

SFP 2018., Best Practices for Aquaculture Management: guidance for implementing the ecosystem approach in Indonesia and beyond. (White paper by Conservation International, Sustainable Fisheries Partnership & University of California Santa Barbara). https://www.sustainablefish.org/Programs/Aquaculture/Resources

Skerritt, D. J.; Arthur, R.; Ebrahim, N., Le Brenne, Valérie; Le Manach, Frédéric; Schuhbauer, Anna et al., 2020.: A 20-year retrospective on the provision of fisheries subsidies in the European Union. In ICES Journal of Marine Science. DOI: 10.1093/icesjms/fsaa142.

Sumaila, U. R., Khan, A. S., Dyck, A. J., Watson, R., Munro, G., Tydemers, P., Pauly, D., 2010. A bottom-up re-estimation of global fisheries subsidies. In J Bioecon 12 (3), pp. 201–225. DOI: 10.1007/s10818-010-9091-8.

Sumaila, U. Rashid; Ebrahim, Naazia; Schuhbauer, Anna; Skerritt, Daniel; Li, Yang; Kim, Hong Sik et al. (2019): Updated estimates and analysis of global fisheries subsidies. Marine Policy 109, p. 103695. DOI: 10.1016/j.marpol.2019.103695.

Tallis, H., Levin, P., Ruckelshaus, M. et al, 2010. The many faces of ecosystem-based management: Making the process work today in real places. Mar Policy 34, 340–348.

Telfer T, H Atkin, R Corner. 2009. Environmental impact assessment and monitoring in aquaculture: Requirements, practices, effectiveness and improvements, Edition: FAO Fisheries and Aquaculture Technical Paper 527

The N2K GROUP (2017). European Economic Interest Group. Overview of the potential interactions and impacts of commercial fishing methods on marine habitats and species protected under the EU habitats directive. https://ec.europa.eu/environment/nature/natura2000/marine/docs/Fisheries%20interactions.pdf

Thrush S.F, Dayton P.K. 2002. Disturbance to marine benthic habitats by trawling and dredging: Implications for marine biodiversity. Annual Review of Ecology, Evolution, and Systematics 33: 449–473.Tipping, A., 2016. Building on progress in fisheries subsidies disciplines. Marine Policy 69, pp. 202–208. DOI: 10.1016/j.marpol.2015.12.008.

Tyedmers, P.H., 2001. Energy consumed by north Atlantic fisheries. In Fisheries impacts on North Atlantic ecosystems: Catch, effort and national/regional data sets. Fish. Cent. Res. Rep. 9(3):12-34

Tyedmers, P., 2004. Fisheries and Energy Use. In: C. Cleveland (Ed.), Encyclopedia of energy, 683-693 pp.

UNDP 2020 Why is it important to express GNI per capita in purchasing power parity (PPP) international dollars? Website http://hdr.undp.org/en/content/why-it-important-express-gni-capita-purchasing-power-parity-ppp-international-dollars (last retrieved 10.12.2020)

U.S. Environmental Protection Agency (EPA), 2016. Greenhouse Gas Inventory Guidance. Direct Emissions from Mobile Combustion Sources.

Vázquez-Rowe, I., Hospido, A., Moreira, M.T., Feijoo, G., 2012. Best practices in life cycle assessment implementation in fisheries. Improving and broadening environmental assessment for seafood production systems. Trends Food Sci. Technol. 28(2), 116-131.

Vella, A., Vella, N., 2020, Maltese Small-Scale Fisheries: Halting the Decline. In J. J. Pascual-Fernández et al. (eds.), 2020, Small-Scale Fisheries in Europe: Status, Resilience and Governance, MARE Publication Series 23, Springer Nature Switzerland, Ch. 11, p. 213-229 https://doi.org/10.1007/978-3-030-37371-9_13

Watson, R., Kitchingman, A., Gelchu, A., Pauly, D., 2004. Mapping global fisheries: sharpening our focus. Fish Fish. 5, 168-177.

Watson, R.A., 2017. A database of global marine commercial, small-scale, illegal and unreported fisheries catch 1950–2014. Scientific Data 4(1), 170039.

Winther, U., Skontorp Hognes, E., Jafarzadeh, S., Ziegler, F. (2020) Greenhouse gas emissions of Norwegian seafood products in 2017 SINTEF Oceans report 2019:01505

Zhou S, Smith ADM, Punt AE, Richardson AJ, Gibbs M, Fulton EA, Pascoe S, Bulman C, Bayliss P, Sainsbury K, 2010. Ecosystem-based fisheries management requires a change to the selective fishing philosophy. PNAS 107 (21) : 9485-9489

Ziegler, F., Hornborg, S., Green, B.S., Eigaard, O.R., Farmery, A., Hammar, L., Hartmann, K., Molander, S., Parker, W.R., Skontorp Hognes, E., Vázquez-Rowe, I. and Smith, A.D.M. (2016) Expanding the concept of sustainable seafood using Life Cycle Assessment. Fish and Fisheries 17(4): 1073-1093.

Ziegler, F., Ritzau Eigaard, O., Parker, R.W.R, Tyedmers, P, Skontorp Hognes, E., Jafarzadeh, S. (2019) Adding perspectives to: "Global trends in carbon dioxide (CO2) emissions from fuel combustion in marine fisheries from 1950-2016" Marine Policy (107):103488

8 AGENDA OF THE WORKING GROUP AND MAIN PRESENTATIONS

Monday 23th November

9:00 - Didier Gascuel (Chair): Opening of the EWG, presentation of participants, practical organisation of the meeting, introduction to BBB

9:15 - Jean Noël Druon: administration and rules for experts and observers.

9:30 - Gerd Heinen & Laurene Jolly: Revision of the EU marketing standards and DG Mare expectations

9:50 - Didier: Comments on ToRs and general agenda of the meeting

10:10 - Discussion (with the objective of a common understanding of the ToRs/Tasks)

11:00 – Jean-François Dewals (ad hoc contract): Overview of existing methods for the definition of sustainable fishery products (15' presentation, 30' discussion)

11:45 – Michèle Stark (ad hoc contract): Overview of existing methods for the definition of sustainable aquaculture products (15' presentation, 30' discussion)

12:30 – Lunch Break

14:00 – Guidance and discussion on the expectations of the afternoon work (dimensions and criteria of sustainability)

14:30 to 17:30 – work in two sub-groups:

. wild products from **fishery** (chair: Didier, rapporteur: Jean-François)

. farm products from **aquaculture** (chair: Friederike Ziegler, rapporteur: Michèle Stark)

-> detailed examination of the list of existing sustainability criteria

-> priorities and feasibility of using them for regulatory marketing standards

Tuesday 24th November

9:00 – Plenary: first discussion on potential methods for scoring and combining criteria (Task2)

. Introductory overview of potential EWG deliverables (Didier)

. The EcoCrest approach for a sustainable and ethic production chain. An experience to be shared (Antonio Di Natale)

. Discussion on scoring systems

11:00 – Adoption of a first list of dimension/criteria for fished and farmed products (Task1.fish)

12:30 – Lunch Break

14:00 – Guidance and discussion on the expectations of the afternoon work (from criteria to indicators, data requirements and appropriate scale for a scoring)

14:30 to 17:30 – work in small sub-groups

. Fish1: stocks status and fisheries management (rapporteur: Youen V., Kristina B.)

. Fish2: fishing gears, impacts on habitats, CO_2 emissions … (rap.: Fabio G., Josep L.)

. Fish3: unwanted catches and impacts on biodiversity (rap.: Armelle J., Lisa B.)

. Social dimensions (rap.: Ralf D., Leyre G.)

. Aquaculture: Friederike Ziegler., Cornelia K., Sterenn Lucas)

Wednesday 25th November

9:00 – Plenary: review of advancements in the subgroups (rapporteur's presentations)

9:30 to 12h30 – Small subgroups continuing and writing reports

12:30 – Lunch Break

14:00 – Plenary: discussion and preliminary adoption of the Task1 report on fished products

15:30 – Plenary: discussion and preliminary adoption of the Task1 report on farmed products

17:00 - Meeting of rapporteurs

Thursday 26th November

9:00 – Plenary: guidance and discussion on the expectations of the morning work (on scoring and combining criteria/indicators, according to Task2)

9:30 to 12h30 – Small subgroups continuing, tentative scoring (from literacy or experts judgment) and writing reports

12:30 – Lunch Break

14:00 – Plenary: guidance and discussion on the expectations of the afternoon work (on advantages and limits, and on the general challenges to translate, in practice, scoring into EU regulatory marketing standards, according to Task3)

14:30 - 17:00 – work in small sub-groups:

Friday 27th November

9:00 – Plenary: discussion and preliminary adoption of report on aquaculture products

12:30 – Lunch Break

14:00 – Plenary: discussion and preliminary adoption of report on social aspects

15:00 – Plenary: discussion and preliminary adoption of report on fished products

17:00 – Closure of the meeting

9 CONTACT DETAILS OF EWG-20-05 PARTICIPANTS

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

STECF members		
Name	**Affiliation[1]**	**Email**
Didier Gascuel (EWG chair)	ESE, Ecology and Ecosystem Health, Institut Agro, INRAE, Rennes, France	Didier.Gascuel@agrocampus-ouest.fr
Lisa Borges	FishFix, LISBON, Portugal	lisa.fishfix@gmail.com
Ralf Döring	Thuenen-Institute of Sea Fisheries, Herwigstr. 31, 27572 BREMERHAVEN, Germany	ralf.doering@thuenen.de
Armelle Jung	DRDH, BLP- Technopole Brest-Iroise- 15 rue Dumont d'Urville, 29280 PLOUZANÉ, France	armelle@desrequinsetdeshommes.org
Sebastian Villasante	University Santiago de Compostela, Av Angel Echevarry s/n, 15782 SANTIAGO DE COMPOSTELA, Spain	sebastian.villasante@usc.es

Invited experts		
Name	**Affiliation[1]**	**Email**
Christine Absil	Good Fish, Kerkewijk 46, 3901 EH VEENENDAAL, Netherlands	c.absil@gmail.com
Ondina Afonso	SONAE MC, Edificio Imopolis Estrada da Outurela 118, 2790-114 CARNAXIDE, Portugal	obafonso@gmail.com
Kristina Barz	Thünen Institute of Baltic Sea Fisheries, Alter Hafen Süd 2-, 18069 ROSTOCK, Germany	kristina.barz@thuenen.de

Maria Cozzolino	NISEA società cooperativa r.l., Via Irno 11, 84131 SALERNO, Italy	cozzolino@nisea.eu
Jean-François Dewals	Université de Bretagne Occidentale, 3 rue des Archives, 29200 BREST, France	jean-francois.dewals@orange.fr
Antonio Di Natale	Fondazione Acquario di Genova, Area Porto Antico- Ponte Spinola, 16128 GENOVA, Italy	adinatale@costaedutainment.it
Jörn Steffen Gieseler	inbiseco - intern. biologists` services consultancy, Kirchweg 118, 28201 BREMEN, Germany	j.gieseler@inbiseco.de
Leyre Goti	Thünen Institute of Sea Fisheries, Herwigstrasse 31, 27572 BREMERHAVEN, Germany	leyre.goti@thuenen.de
Fabio Grati	IRBIM-CNR, largo Fiera della Pesca 2, 60125 ANCONA, Italy	fabio.grati@cnr.it
Sílvia Gómez	Autonomous University of Barcelona, Dep. Social Anthropology. Building B-Campus UAB. Bellaterra (Cerdanyola del Vallès), Barcelona, E-08193 BELLATERRA, Spain	silvi.gomezmestres@gmail.com
Myrto Ioannou	Department of Fisheries and Marine Research, 101 Vithleem Street, 1416 STROVOLOS, Cyprus	mioannou@dfmr.moa.gov.cy
Cornelia Kreiss	Thünen Institute of Sea Fisheries, Herwigstr. 31, 27572 BREMERHAVEN, Germany	cornelia.kreiss@thuenen.de
Ignacio Llorente Garcia	Universidad de Cantabria, Facultad Económicas y Empresariales, 39005 SANTANDER, Spain	ignacio.llorente@unican.es
Josep Lloret	University of Girona, Universitat de Girona- plaça sant domenec 3, 17004 GIRONA, Spain	JOSEP.LLORET@UDG.EDU
Sterenn Lucas	Institut Agro - Agrocampus-Ouest, 65 rue de Saint Brieuc - CS 84215, 35042 RENNES, France	sterenn.lucas@agrocampus-ouest.fr

Loretta Malvarosa	Nisea, Fishery and Aquaculture Economic Research, Via Irno- 11, 84135 SALERNO, Italy	malvarosa@nisea.eu
Marie Savina-Rolland	Ifremer, 8 rue François Toullec, 56270 LORIENT, France	marie.savina.rolland@ifremer.fr
Giuseppe Scarcella	CNR-IRBIM, L.go Fiera della pesca, 60125 ANCONA, Italy	g.scarcella@ismar.cnr.it
Antonello Sala	Italian National Research Council, Largo fiera della pesca, 60125 ANCONA, Italy	a.sala@ismar.cnr.it
Michèle Stark	Seafood Advisory GmbH, Ey 16, 3294 BÜREN AN DER AARE, Switzerland	michele.stark@seafoodadvisory.ch
Vjekoslav Tičina	Institute of Oceanography and Fisheries, Šet. I. Meštrovića 63, 21000 SPLIT, Croatia	ticina@izor.hr
Luc Van Hoof	WMR, Haringkade 1, 1970AB IJMUIDEN, Netherlands	luc.vanhoof@wur.nl
Youen Vermard	Ifremer, 29280 PLOUZANÉ, France	youen.vermard@ifremer.fr
Christian Von Dorrien	Thünen Institute of Baltic Sea Fisheries, Alter Hafen Süd 2, 18069 ROSTOCK, Germany	christian.dorrien@thuenen.de
Friederike Ziegler	RISE Research Institutes of Sweden, PO Box 5401, 40229 GÖTEBORG, Sweden	friederike.ziegler@ri.se

JRC expert		
Name	**Affiliation[1]**	**Email**
Jean-Noël Druon	European Commission – Joint Research Centre (JRC), Ispra, Italy	jean-noel.druon@ec.europa.eu

European Commission		
Name	**Affiliation[1]**	**Email**
Gerd Heinen	European Commission – DG MARE, Brussels, Belgium	Gerd.HEINEN@ec.europa.eu
Laurène Jolly	European Commission – DG MARE, Brussels, Belgium	Laurene.JOLLY@ec.europa.eu
Lucie-Mariette Guirkinger	European Commission – DG MARE, Brussels, Belgium	Lucie-Mariette.GUIRKINGER@ec.europa.eu
Jean-Noël Druon	European Commission – Joint Research Centre (JRC), Ispra, Italy	jean-noel.druon@ec.europa.eu

Observers		
Name	**Affiliation[1]**	**Email**
Benoit Caillart	F & S sarl	b.caillart@fs-marine.fr
Bruna Campos	Stichting BirdLife Europe	Bruna.Campos@birdlife.org
Marzia Piron	Mediterranean Advisory Council	marzia_piron@hotmail.it
Delphine Ranninger	SCAPMAREE	rse@scapmaree.fr
Severine Renault	AND International	severine.renault@and-international.com
Peter Samson	Union du Mareyage Français	uniondumareyagefrancais@gmail.com
Claire Van Cuyck	CIPA	cvancuyck@cipaquaculture.asso.fr
Marc-Philip Buckhout	Seas At Risk vzw	mpbuckhout@seas-at-risk.org

10 LIST OF BACKGROUND DOCUMENTS

Background documents are published on the meeting's web site on:

http://stecf.jrc.ec.europa.eu/web/stecf/ewg2005

List of background documents:

EWG-20-05 – Doc 1 - Declarations of invited and JRC experts (see also section 9 of this report – List of participants)

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),

- at the following standard number: +32 22999696, or

- by electronic mail via: https://europa.eu/european-union/contact_en

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU publications
You can download or order free and priced EU publications from EU Bookshop at: https://publications.europa.eu/en/publications. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

XX-EN-N

STECF

The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.

The European Commission's science and knowledge service

Joint Research Centre

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.

EU Science Hub

ec.europa.eu/jrc

@EU_ScienceHub

EU Science Hub - Joint Research Centre

Joint Research Centre

EU Science Hub

Publications Office of the European Union

doi:XX.XXXX/XXXXXX

ISBN XXX-XX-XX-XXXXX-X