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CRITERIA FOR ALLOCATING ACCESS TO FISHING IN THE EU

STUDY

EN

2015

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POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

FISHERIES

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STUDY

This document was requested by the European Parliament's Committee on Committee on Fisheries.

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Abstract

This study proposes a set of criteria and indicators for the purpose of allocating fishing opportunities in EU Member States, which according to Article 17 of the new CFP should include those of an environmental, social and economic nature. The proposed criteria and indicators should be applicable in a wide range of circumstances therefore the term allocation in this study should be understood in a broad sense referring to any aspect of giving access to fishing opportunities.

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LIST OF ABBREVIATIONS

CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CFP	Common Fisheries Policy
DCF	Data Collection Framework
DG ENV	Directorate-General for the Environment
DG MARE	Directorate-General for Maritime Affairs and Fisheries
EAFM	Ecosystem-based Approach to Fisheries Management
EDF	European Defense Fund
EDPS	European Data Protection Supervisor
EEZs	Exclusive Economic Zones
EFCA	European Fisheries Control Agency
EP	European Parliament
ERS	Electronic Recording and Reporting System
EU	European Union
FMC	Fishing Monitoring Centre
GDP	Gross Domestic Product
GVA	Gross Value added
GES	Good Environmental Status
IATTC	Inter-American Tropical Tuna Commission
ICCAT	The International Commission for the Conservation of Atlantic Tunas
ICES	International Council of the Exploration of the Seas
ILO	International Labour Organization
IMO	International Maritime Organization
IOTC	Indian Ocean Tuna Commission
ITQ	Individual transferable quotes
IUCN	International Union for Conservation of Nature
MS	Member State
MSY	Maximum Sustainable Yield
NAFO	North west Atlantic Fisheries Organization

NEAFC	North East Atlantic Fisheries Commission
NGO	Non-Governmental Organisation
NUTS	Nomenclature of territorial units for statistics
OECD	Organisation for Economic Co-operation and Development
PECH	Fisheries Committee of the European Parliament
PO	Producers Organization
RBM	Right Based Management
RFMOs	Regional Fisheries Management Organizations
SMART	Specific, Measurable, Attainable, Relevant, and Time-Bound
STECF	Scientific, Technical and Economic Committee for Fisheries
TACs	Total allowable catches
ToR	Terms of Reference
VMS	Vessel Monitoring System
VTQ	Vessel Transferable Quota
7FP	7th Framework Program

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EXECUTIVE SUMMARY

The new Common Fisheries Policy (CFP) requires Member States to use transparent and objective criteria including environmental, social and economic criteria when allocating fishing opportunities available to them. Against this background, the European Parliament (EP) has commissioned this study on 'Criteria for allocating access to fishing in the EU', which was awarded to Blomeyer & Sanz and prepared in the period October 2014 to January 2015.

This study explores different options for allocating fishing opportunities among the operators of a single European Union (EU) Member State (MS) in order to fulfil the CFP's objectives. It provides an overview of how different countries in the EU and worldwide have tackled this question, namely, how they allocate fishing opportunities and, in the case of Member States, to what extent those systems respond to the new challenges of the CFP. Another objective was to propose a system, i.e. a set of criteria, indicators, and measurement techniques, to support MS in the allocation process.

A web-based survey was carried out directed at competent Fisheries Management Authorities in EU MS, certain non-EU countries, and Regional Fisheries Management Organisations (RFMOs). This was complemented with stakeholder consultations and desk-based research.

Following the definition of the system, i.e. criteria and indicators, two case studies were carried out in order to assess and validate the proposed system. The case studies focused on the allocation of fishing opportunities in the Spanish Bluefin tuna fishery and the Danish coastal fisheries. Various stakeholders were interviewed concerning the specifics for each case study and assessment/validation of the proposed system; i.e. the relevance of the proposed criteria and indicators; the feasibility of measuring and obtaining the data for each criterion; possible indicator target values; alternative criteria and/or indicators; etc.

A general finding is that the most common feature of allocation systems in the EU and worldwide is the historic record of catches, when this involves the distribution of catch shares amongst eligible participants in the fishery. This normally forms the basis for allocation and it may be weighted in different ways. Of crucial importance is the reference period; i.e. its length -or duration- and whether it is a fixed or rolling reference period.

Member States indicated a varied set of systems in place for the allocation or access to fishing opportunities, not necessarily involving catch share systems. Most affirmed that social, economic and environmental criteria are taken into account, which is in conformity with the CFP objectives. However, the allocation of fishing opportunities in pelagic and industrial fisheries appears to be driven by economic criteria primarily. Environmental criteria appear to be prioritised in demersal fisheries.

An important part of the development of the system involved an in-depth review of the CFP; its objectives, proposed criteria and guidelines, identifying operational management objectives -i.e. focused, manageable, and consensual- in order to define appropriate criteria. This was complemented with stakeholder consultation and extensive desk-based research. The proposed criteria and indicators are:

<u>Social allocation criteria: support fishing communities</u>
Indicator 1: Fisheries dependency - employment measured in relative terms
Indicator 2: Revenue contribution to local economy – at the NUTS 3 level

Social allocation criteria: social corporative responsibility
Indicator 1: History of fisheries compliance – using CFP Point System for the last five years
Indicator 2: History of compliance - combines fisheries compliance with other behaviour (e.g. tax duties; alignment to ILO standards on crew security and enrolment, etc.) (last five years)

Economic allocation criteria: catch dependency
Indicator 1: Catch records - catches of the targeted stock during the last three years
Indicator 2: Footprint - trips where catches of the targeted stock took place (last three years)

Economic allocation criteria: improve economic performance
Indicator 1: Gross Value Added (GVA) - net output of an individual/metier/sector after deducting intermediate inputs from all outputs
Indicator 2: Fuel efficiency - litres of fuel per kg of live fish and shellfish landed

Environmental allocation criteria: implementing an ecosystem approach to fisheries management
Indicator 1: Large Fish – the proportion of the catch larger than length at maturity (Lm50)
Indicator 2: Protected Species Index (PSI) – volumes of by-catch of protected, endangered or vulnerable species
Indicator 3: Marine Seabed Impact – extension of the bottom surface where relevant fishing activity occurred with respect to key habitats location

The case studies indicated general agreement with the proposed social and environmental criteria and indicators. It is however important to state that the application of proposed social criteria in a system of transferable fishing rights is not considered sufficient, if the management objective is to protect coastal and/or small-scale fisheries. This is because transferable rights are designed in such a way that market forces are the primary drivers, leading to improved economic performance, however, the weaker players tend to struggle in such a system. Other complementary measures are necessary such as those proposed in the Danish case study, which are not directly linked to allocation.

Another perceived shortcoming concerns the available data and whether these are sufficiently detailed and reliable, particularly in relation to the socio-economic impacts of specific fisheries. For example, it may not be feasible to measure at the level of a particular fishery and even less so at the metier level -i.e. confounding effects of various fisheries.

In relation to using economic performance as a criterion, there appears to be less agreement. Some consider this of prime importance, bringing about environmental and societal benefits by reducing fishing capacity and its negative effects as well as maximising resource rent. Others consider this criterion inappropriate in the context of protecting and promoting coastal and small-scale fisheries. This illustrates the problem of conflicting management objectives.

Irrespective of the indicator chosen to measure economic performance – GVA, return on investments (ROI), and/or catch value, the latter is generally considered the best candidate indicator to inform allocation process, when considering economic criteria.

A relevant finding from both case studies is that these provide support to the proposal of introducing differentiated management regimes, one for large-scale fleets and another for small-scale fleets. The rationale behind this is that that large-scale industrial fisheries could

be managed according to the objectives of capacity adjustment and economic efficiency, taking into account environmental sustainability. On the other hand, the management of small-scale fleets in coastal communities should rather focus on socio-economic objectives. This implies that a specific allocation system has to be modified according to the context.

Another important finding is that it is almost impossible to backtrack once a system of transferable fishing rights has been introduced, even if these are not permanent rights. It is thus of crucial importance to design rights-based management on the basis of a careful analysis of management objectives, as these are often conflicting, and extensive all-inclusive stakeholder consultation.

1. INTRODUCTION

The introduction presents the background and aim of the study (section 1.1), outlines the study methodology, limitations and definitions (1.2), and presents the report structure (1.3).

1.1 Background

The new Common Fisheries Policy (CFP) introduced new rules on how Member States (MS) must allocate their fishing opportunities among their operators (Article 17), i.e. *'the criteria to be used may include environmental, social and economic aspects'*. In particular, Article 7 on the types of conservation measures focuses on the idea of reducing the environmental impact of fishing by using incentives such as fishing opportunities. The contractor considers that this is not the first time these concepts have arisen in the CFP, although not so explicitly as now. In the former legal framework, the obligations (Article 20.3) noted that '*each Member State should decide, for vessels flying its flag, on the method of allocating the fishing opportunities assigned to that Member State in accordance with Community law*'. The European Commission (EC) must be informed about the allocation method.

The objectives of the new CFP are clearly described in different chapters of the basic regulation. Article 17 establishes the set of criteria to use when allocating fishing rights among operators, and provides concrete examples such as: (a) the impact of fishing on the environment; (b) the history of compliance; (c) the contribution to the local economy; and (d) the historic catch levels. Whilst item (a) is a clear environmental criterion, items (b) and (d) may be considered social criteria, and (c) economic. Nevertheless, categorising (b) and (d) as social criteria is potentially problematic, as they are closely associated with (c), the local economy. Article 17 also highlights environmental concerns when encouraging MS to '*provide incentives to fishing vessels deploying selective fishing gear or using fishing techniques with reduced environmental impact, such as reduced energy consumption or habitat damage*'. The same idea is presented in Part III '*Measures for the conservation and sustainable exploitation of marine biological resources*', where Article 7 enumerates the types of conservation measures, for example economic incentives to promote fishing methods that contribute to more selective fishing.

A set of technical measures is also listed in Article 7 to guarantee sustainable exploitation of marine biological resources. These measures promote the use of specific types of gear and/or fishing patterns. The EC emphasised this principle in 2012 when it proposed a ban on the use of bottom trawling and bottom set gill nets when targeting deep-sea stocks as defined in the regulation.[1] In this context the EC aimed at ensuring the sustainability of deep-sea fisheries and protecting vulnerable marine ecosystems. This was the first time that the EC proposed such a measure, and it was heavily criticised as disproportionate. Indeed, the Fisheries Committee of the European Parliament (PECH) asked for a complementary impact assessment to evaluate the socio-economic impact of such a measure.[2] The EC had at its disposal accurate and detailed data which was provided by the MS. Without this, it would not have been possible fulfil the PECH request.

[1] COM(2012) 371 final.

[2] Complementary information to the Commission's Impact Assessment (SWD(2012)203 final) accompanying its proposal for a regulation of the European Parliament and of the Council establishing specific conditions to fishing for deep-sea stocks in the North-East Atlantic and provisions for fishing in international waters of the North-East Atlantic and repealing Regulation (EC) No 2347/2002 (COM(2012)0371).

Against this background, the European Parliament (EP) has commissioned this study in support of the work of the EP Committee on Fisheries. The study, 'Criteria for allocating access to fishing in the EU' (IP/B/PECH/IC/2014-019), was awarded to Blomeyer & Sanz following an invitation to submit an offer by the EP.

The general objective of the study is to explore different options for allocating fishing opportunities among the operators of a single EU Member State in order to fulfil the objectives of the CFP. The study has two specific objectives:

1) Provide an **EU and worldwide overview** of how different countries have tackled this question, namely, how do they share their fishing opportunities among their operators and to what extent those systems respond to the new challenges of the CFP;

2) Propose a **system** (set of criteria, indicators, and measurement techniques) that can support MS in the allocation of quotas between their vessels in a balanced way with regard to environmental, social and economic aspects.

These objectives are achieved through the following sub-objectives:

- Describe and analyse relevant **criteria** for the allocation of fishing opportunities while addressing the problem of compatibility between criteria (i.e. trade-offs when attempting to meet environmental, economic and social objectives).
- Identify and describe one or more measurable **indicators** for each criterion, including the most adequate measurement techniques.

1.2 Methodology and limitations of the study

This section briefly presents the methods deployed (1.2.1), limitations of the study (1.2.2), and some preliminary considerations (1.2.3).

1.2.1 Methods deployed

The study has been carried out on the basis of desk research, stakeholder consultation (interviews and surveys), and two case studies. The main steps included:

1. Analysis of the current situation through surveys to Fisheries Management Authorities of EU MS and other countries, namely, Norway, Iceland, Denmark (in respect of the Faroe Islands & Greenland), Canada, Australia and New Zealand, and to Regional Fisheries Management (RFMOs). This was complemented with desk research and stakeholder consultations.
2. Assessment of relevant criteria included in the new CFP and other sources, proposing additional criteria if necessary. The criteria was set at the fish stock level. This task was performed on the basis of desk research and stakeholder consultations
3. Review of indicators and measurement techniques. For each criterion, the contractor proposed the most suitable indicators. Indicators were set at the level of metier and aim to be universally applicable to all metiers. This task was carried out on the basis of desk research, stakeholder consultations, and the contractor's own judgment.
4. Test the criteria and indicators in two case studies, namely, a case study on Bluefin tuna fishing opportunities allocated in Spain; and small-scale artisanal fishing opportunities allocated in Denmark. This included consultations with stakeholders involved in the allocation of fishing opportunities in the regions, with a view to assess the relevance and feasibility of the proposed criteria and indicators.

5. Conclusions and recommendations on the basis of the contractor's own judgement drawing from literature reviewed, feedback obtained, and lessons learnt from testing the criteria and indicators in the case studies.

1.2.2 Limitations

The limitations of this study are as follows:

- The study was carried out with limited resources and in a limited time-frame (late October 2014 to early January 2015).
- The number of non-EU countries analysed is limited, and therefore extreme care should be taken in extrapolating to the non-EU world.

1.2.3 Preliminary considerations

Fisheries terminology may be vague or open to interpretations. Thus. it is worth setting some definitions and presenting preliminary considerations for the purpose of the study.

The terms of reference of the study requests conducting two case studies comprising at least five metiers. The study follows the Data Collection Framework (DCF) definition of metier, i.e. '*a group of fishing operations targeting a similar (assemblage of) species, using similar gear, during the same period of the year and/or within the same area and which are characterised by a similar exploitation pattern'*.[3] Furthermore, 'operator' is defined by the CFP as '*the natural or legal person who operates or holds any undertaking carrying out any of the activities related to any stage of production, processing, marketing, distribution and retail chains of fisheries and aquaculture products'*.

Setting or limiting access to fisheries is a fundamental feature in fisheries management. The development of a license system, through the establishment of fleet registers, represents the first step towards that purpose. A second step includes the establishment of fishing opportunities shares or quotas to face resource scarcity. Furthermore, the CFP requests the EC and the Member States to share the responsibility regarding fishing opportunities. In this respect it is worth mentioning the misbalance between fleet fishing capacity and fisheries resources in the EU.[4]

Since Member States had developed specific practices to manage their fleets and fishing activity well before joining the EU, there may be a wide variety of fisheries driven by different logics. The study defines the term 'fisheries' as a unit, or combination of units, engaged in raising and / or harvesting fish. Furthermore, in view of the huge variety of allocation practices, recent studies (MRAG 2009) deemed necessary to develop a common understanding centred on the concept of Right Based Management (RBM), which '*includes any system of allocating fishing rights to fishermen, fishing vessels, enterprises, cooperatives or fishing communities*'. RBM also encompasses management based on rights to pursue fisheries. Those rights may be expressed in terms of access to fishing but also in

[3] Commission Decision 2010/93/EU adopting a multiannual Community programme for the collection, management and use of data in the fisheries sector for the period 2011-2013, as extended by Commission Implementing Decision of 13.8.2013 extending the multiannual Union programme for the collection, management and use of data in the fisheries sector for the period 2011-2013 to the period 2014-2016.

[4] COM(2014) 545. Guidelines for the analysis of the balance between fishing capacity and fishing opportunities according to Art 22 of Regulation (EU) No 1380/2013 of the European Parliament and the Council on the Common Fisheries Policy.

terms of use, ownership and harvesting. The legal side of rights differs considerably among Member States and is out of the scope of this study. Regarding fisheries most of rights are created on the basis of legal instruments (licenses or fishing permits) or procedures (registers or allocation systems). A system allocating participant's share constitutes a first step in an RBM programme, brings stability and contributes to the programme objectives. Annex I presents a widely accepted typology of RBM.

Finally, it is worth noting that an allocation system is not the only fisheries management tool pursuing the sustainability of fisheries resources. In fact, the CFP includes a set of technical measures such as gear restrictions, minimum conservation size, fishing closures that complement the former tool as part of a wider overarching policy.

1.3 Structure of this report

The next chapters of this report address the main requirements for this study, notably:

- Section 2 – Sets the scene for the study with an overview of how Member MS and other non-EU countries are currently managing the allocation of fishing opportunities
- Section 3 – Proposes a set of criteria and indicators for the allocation of fishing opportunities, including a discussion on the criteria compatibility dilemma
- Section 4 – Shows the main findings from validating the criteria and indicators in two case studies
- Section 5 – Reflects on the main conclusions and recommendations.

2. OVERVIEW OF CURRENT ALLOCATION SCHEMES

This section presents the different governance arrangements involved in the allocation of fishing opportunities (section 2.1); describes the different systems in place (2.2); and finally, comments on the main difficulties faced by MS for the allocation of fishing opportunities and how these challenges have been addressed (2.3).

KEY FINDINGS

- The **Authority** responsible for the allocation of fishing opportunities is the Central Government. Beyond sovereign waters, RFMOs are perceived as the adequate governance level, regardless of the vessels' flag state.
- At **EU level**, the liability of distributing fishing rights is shared between the EU and MS; the EU establishes the principles of fixing fishing opportunities and performs the allocation at national level whilst MS distribute the national shares internally.
- The more common feature driving worldwide allocation systems is the historic **record of catches**. This normally forms the basis for allocation and it may be weighted in different ways. Of crucial importance is the reference period; i.e. its length -or duration- and whether it is a fixed or rolling reference period.
- Most EU MS affirm that social, economic and environmental criteria are considered in setting fishing opportunities, fulfilling the **objectives** of the **CFP;** environmental criteria appear to be prioritised in demersal fisheries. whilst pelagic and industrial fisheries are mainly driven by economic criteria.
- Social concerns are considered difficult to consider in the allocation process, and environmental variables are difficult to quantify; incentives as **quota granting** are considered suitable tools to reward better performance.
- Allocation decision-making appears to be conducted in a transparent and participatory way involving relevant stakeholders; though EU MS observe difficulties to reach a **compromise** that is acceptable to all.
- Although 40 % of EU MS failed to answer survey questions on **transparency**, more than 75 % responded that they are informing the EC on the allocation method.

2.1 Governance arrangements for the allocation of fishing opportunities

The nature of fisheries can be firstly considered highly related to coastal communities, being the activity, per se, limited to certain distance to the coast. Whilst any citizen of any country may perform such activity, it is the national management authority who is in charge of allocating fishing rights in accordance to the country legal framework.

Nowadays, however the fishing activity spreads worldwide as fleets fish abroad, either in sovereign third countries waters or in high seas. At international level, the higher decision-making level corresponds to Regional Fisheries Management Organizations (RFMOs), which manage shared stocks and fishing in high seas. In application of Articles 63.2 and 64 of the Law of the Sea (UNCLOS, 1982), states have to cooperate, directly or through RFMOs, when fishing beyond their exclusive economic zone (EEZ). The UN Fisheries Stocks Agreement (UNFSA 1995) states that an effective RFMO should '*agree, as appropriate, on participatory rights such as allocations of allowable catch or levels of fishing effort*'.

At EU level, the Lisbon Treaty establishes (Article 43.3) that the European Council, following a proposal from the EC, shall adopt measures to set the fishing opportunities allocation criteria and to allocate share among operators on the basis of the criteria. According to the CFP, the allocation must ensure the relative stability of fishing activities of each MS for each fish stock or fishery. In turn, MS are expected to allocate fishing opportunities having due regard to the objectives of the CFP.

So the allocation of fishing opportunities may follow a three-tier or two-tier system approach. In the first case, the RFMO allocates shares to the EU; the EU allocates its share to the Member States; and these allocate their share among operators. In the second case, the process is the same except that RFMOs are not involved. Whilst this results in a wider variety of allocation systems, they all pursue the same goals of sustainable fisheries.

2.2 Different allocation systems

National and international management authorities face similar challenges and objectives when developing their allocation systems, namely ensuring sustainable fisheries. Although there is no 'one size fits all' solution there are common grounds to explore in all systems.

There are four main approaches, which may be combined resulting in further systems:

- Catch-history / fisheries-presence granting. This is the largely extended system worldwide (Anderson & Holliday 2007). The historical of fishing activity (catches) is considered the best way to ensure that those countries, fleets, or operators traditionally engaged in a given fishery are included in the initial share allocation.
- Fishing capacity. This approach takes into account different vessel parameters such as length, engine power, or gross tonnage.
- Uniform allocation. This system does not necessarily follow any particular criteria and may be considered as a neutral solution.
- Auctions. This is also a neutral system that presents additional advantages compared to uniform allocation, namely, the prevention of the 'race to fish'. On the other hand, auctions may have disadvantages such as concentration of production in few number of big operators, or the exclusion of smaller operators that cannot compete in the bidding for quota shares.

What follows is an overview of the different systems and approaches followed by RFMOs, some non-EU countries, and EU Member States.

RFMOs

Most RFMOs share goals and objectives, with a view to balance the interests of coastal and distant water fishing countries, through sustainable management frameworks. For this study, the contractor consulted all RFMOs, in which the EU is contracting party, with regard to their systems for allocation access to fishing.[5]

One first finding form RFMOs feedback is that some of them hardly consider themselves concerned with the establishment allocation criteria, despite what is stated in some RFMO Conventions (e.g. Art 7.e of NEAFC Convention) and confirmed by countries, such as Norway and New Zealand.

[5] The RFMOs that responded to the consultation include, IATTC, IOTC, CCSBT, NAFO, NASCO, SEAFO, SPRFMO, CCAMLR, GFCM.

Despite there is no single solution, data on catch history is the largely extended approach, as confirmed by feedback and previous studies (MRAG 2006). By way of example, the International Commission for the Conservation of Atlantic Tunas (ICCAT) establishes allocation criteria that includes the history of catches and other socio-economic factors. The relative importance, or weight, of each criterion however, is not determined.

There are different approaches with regard to who establishes the socio-economic criteria and when. Some RFMOs indicate socio-economic factors are considered by the contracting parties during the TAC negotiations. However, a few others argue that this task is carried out by the scientific committee when fixing the TACs. Finally, it is worth noting that whilst MRAG (2006) found that stock assessment and stock distribution are considered in the allocation process, none of the RFMOs consulted made particular mention to this.

Worldwide countries (excluding the EU)

Worldwide, most systems were initially based on the history of catches criterion. Over the time they have evolved to include a combination of multiple criteria (e.g. catch records, auctions, etc.) resulting in a wide variety of hybrid systems.

In those countries where stakeholders have been actively involved in the design of the system, these have turned out particularly well (EDF pers. comm).[6] Canada is an example with its British Columbia groundfish (demersal) integrated programme in which, following a public consultation process, an independent arbitrator submitted recommendations that were adopted (FLFS 2010). This programme has developed into one of the most comprehensive catch share programmes in the world, including over 70 species, 30 of which are managed via quota, and includes all commercial fishers targeting groundfish, regardless of gear type. There have been two major innovations; a) integrating all sectors into one overarching catch share program, ensuring total accountability in the commercial groundfish fisheries, and b) developing a flexible system that accounts for different species and different business models. (Marine Scotland 2014)

In South Africa, a participatory process brought together the views of different fishermen communities, facilitating managers the development of a comprehensive approach (Grieve 2009).

Chile is a good example where auctions have worked successfully over the years. In this sense, Chilean Patagonia Tootfish fishery was 50% auctioned whilst others fisheries including Black cod, Orange roughy, Yellow prawn were almost 100% auctioned, and a tiny share allocated considering catch records. Contrary to Chile, Russia removed the auction system in 2004 following monitoring and enforcement issues and a decline in profits.

Peru considers the history of catches criterion (60%) and holding capacity (40%) for allocating share to steel hull fleets. For wooden hull fleet however, only catch records are considered (EDF pers. comm).

Argentina set up a more sophisticated individual transferable quota regime. This included a multi-criteria weighting process rewarding vessel companies that contribute to employment, investment, and economic development, i.e. catch history (50%), level of employment

[6] EDF developed an online tool and guidelines that facilitates stakeholder engagement in setting priorities, namely small-scale fishermen communities. These tools are available at www.catchshare.edf.org

(30%), contribution to the processor factor (15%), and parent company investment in the economy (5%). (EDF pers. comm).
In the USA, Limited Access Privilege Programs (LAPPs) were developed in conformity with Magnuson-Stevens Act (2006). This provides limited access privileges to harvest a quantity of total allowable catch (TAC). These limited privileges can take various forms such as individual fishing quota (IFQ), community quota, and quota held by regional fishery associations. A specific program (LAPP) may consist of a combination of all three types of access privileges.

For Cape Cod fisheries, a set of criteria were developed considering socio-economic and environmental factors, following the establishment of the Cape Code Fisheries Trust in 2008 (Grieve 2009). Further cases include the Mid Atlantic Tilefish fisheries where the 77% of the quota is allocated to eligible fishermen, based on catch history, and the remaining to research (3%), incidental catches (5%), and provision for appeals resolution (15%); and Halibut fisheries: 70% for catch history (the highest annual catch along three years) and 30% for vessels length (EDF pers. comm).

Namibia, through its recently established fishery for orange roughy, shows an interesting case whereby all eligible fishing companies must comply with exploratory fisheries protocols aimed at securing a commercially viable exploitation of the stock. (EDF pers. comm).

Australia generally follows the approach of using individual transferable quotas within a TAC framework. For example, an individual transferable quota programme was developed for the Southeast trawl fisheries based on 40% to 80% quota allocated depending on the species, and 20% to 50% based on vessel length, breadth depth and engine power. Furthermore, Australia signed a bilateral agreement with Papua New Guinea (the Torres Strait Treaty) granting, for the first time, preferential access to islanders (Grieve 2009).

New Zealand relies mainly on the history of compliance. According to Authorities' feedback, environmental criteria are considered, however not further details were provided. Anderson & Holyday (2007) signals that the country introduced a quota management system for all marine fisheries in 1986. This presented some changes compared to previous systems, e.g. the Maori indigenous group was allocated 20% of the individual transferable quotas for new species entering in the system, whilst the remaining share was allocated based on industrial catches and auctions. New Zealand is the country with the most developed system of individual transferable quotas (ITQs) and the legal titles to fish quota do not have time limits. It is probably the best example of concentration of rights where only three large companies now own most of the groundfish quota, as there are no caps on quota holdings (Marine Scotland 2014)

Faeroes Islands considers historic catch levels (Inspectorate Unit records) and benefits from methods and technology to minimize discards and by-catches. Managers estimate the contribution of the fishing sector to the society by means of economic performance indexes such as the Gross Domestic Product (GDP). Greenland also uses the history of catches and adds the contribution to the local economy criterion based on individual vessels track record. Greenlander authorities however, remark the trouble to find appropriate data for environmental factors.

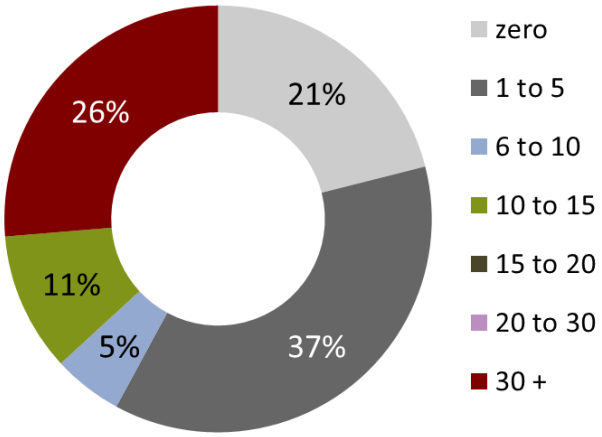
Iceland either follows a system based on the history of catches (for demersal fisheries) or based on a uniformed allocation (for pelagic fisheries). Other criteria are considered hardly relevant despite included in the national law governing fisheries. Norway however, in addition to historic catch levels, include environmental criteria and to a lesser extent

economic factors. Norwegian authorities discuss with stakeholders the allocation process and share twice a year.

EU Member States

An overview of the different systems in the EU is shown in Annex II, including information on number of vessels, RBM, allocation process, criteria, and indicators by MS. What follows are the main findings from the survey addressed to MS with regard to their systems and the alignment of these with the new CFP. [7] For further details on the survey see Annex III.

Figure 1: How many fisheries does your MS allocate fishing opportunities for?

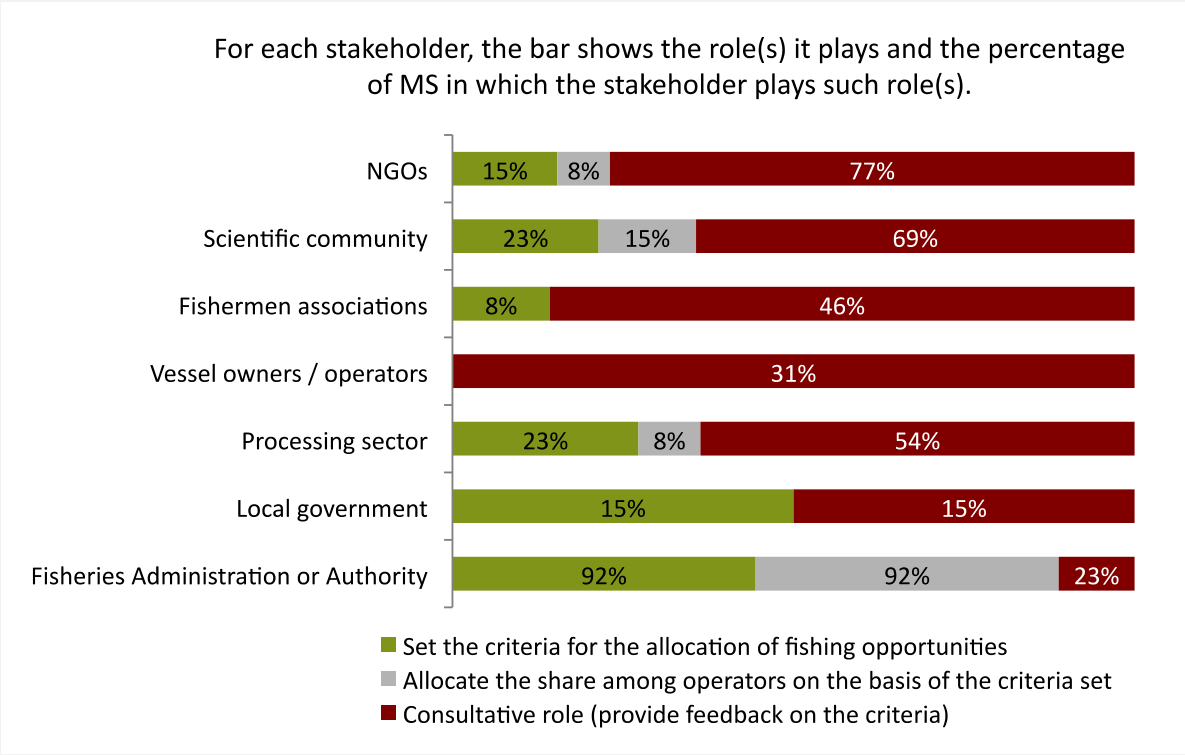


The number of fisheries for which a country allocates fishing opportunities varies across the EU, although the most common number is between fifteen to twenty fisheries (37%) followed by more than thirty fisheries (26%). It is worth noting that 21% indicated that their MS does not allocate fishing opportunities for fisheries (Figure 1). This may suggest that some MS only associate fishing opportunities with the national share of the TAC.

Fishing allocation systems in particular, and RBM systems in general, involve a wide variety of fisheries stakeholders at all levels. The overall process is led by the MS Fisheries Administration, who – in nine out of ten MS – is involved in criteria setting and operators share allocation (Figure 2). In a very few MS (15%) the local government also takes part in the criteria setting. Non institutional stakeholder, for their part, play several roles, with one exception, namely vessels owners / operators, only passively involved (consulted) in the process and only in very few MS (31%). In this respect, it is worth noting that NGOs, scientists, fishermen associations and the processing sector are consulted in nearly more than half MS, are also involved, although in much fewer MS, in the criteria setting process, particularly the scientific community and the processing sector (23%).

[7] The survey defined, *criteria*, *operator*, and *fishery* as follows. *Criteria*: Principles or standards taken into account to allocate fishing opportunities among operators. *Operator*: The natural or legal person who operates or holds any undertaking carrying out any of the processing, marketing, distribution and retail chains of fisheries and activities related to any stage of production, aquaculture products (EU Common Fisheries Policy (CFP)). *Fishery*: A unit, or combination of units, engaged in raising and / or harvesting fish. We define ten units: Demersal; Pelagic; Industrial fishery; Small-scale fishery; Fish for human consumption; Fish for industrial use; Migratory/mobile stocks; Sedentary stocks; National stocks; Shared stocks.

Figure 2: Stakeholder roles in the allocation of fishing opportunities



With regard to the flexibility of the systems, some MS indicate having different criteria depending on the fishery (40%), while others follow, mostly, the same criteria regardless of the fishery (40%). The remaining MS (20%) have a universal set of criteria, which may be complemented with additional criteria for some fisheries. (See Annex III, Q3).

MS indicate considering economic, social and environmental in a balanced way for all the categories of fisheries surveyed. In a scale of 1 (very low) to 5 (very high), each criterion scored 3.4 on average (Figure 3). Demersal / pelagic and industrial / small-scale fisheries were the categories most rated (62% to 77%); followed by the categories fish for human / for industrial use and migratory / sedentary stock (15% to 31%); and national / shared stocks (8% and 23% respectively). (See Annex III, Q4). Furthermore, from Figure 3 it can be observed that the social criteria scores higher (relevancy) in pelagic than in demersal fisheries, whilst the economic and environmental criteria score very similar for both; in small-scale fisheries the social criteria weights more than in industrial fisheries, whilst it in industrial fisheries the economic and environmental criteria seem more relevant.

Further MS general consideration of economic, social, and environmental criteria, MS were asked to rate the relevance of seven specific criteria drawn from the CFP, and to indicate to what extent their systems considers each criterion. Figure 4 shows the average rate by criterion, and indicates that, overall, MS are moderately aligned with most CFP criteria (average rate 2.3 over 5). There are two notable exceptions to this, firstly, the criterion of historic catch levels that, as expected, is highly rated by MS, both in terms of uptake and relevance (4.6). And secondly, the criterion of reduced energy consumption showing low uptake level (1.8) and the lowest relevance rate of all criteria (2.3). Figure 4 clearly shows that the current uptake level is always lower than the relevance for all criteria, except for catches history, which may suggest further work is needed to align MS systems with the new CFP criteria. In this respect, some MS refer to the difficulties to implement these criteria, particularly with regard to measures aimed reducing energy consumption, minimizing discards / bycatches and minimising impact on marine environment.

Figure 3: Rank the extent to which your country considers the following type of criteria in the process of allocating fishing opportunities

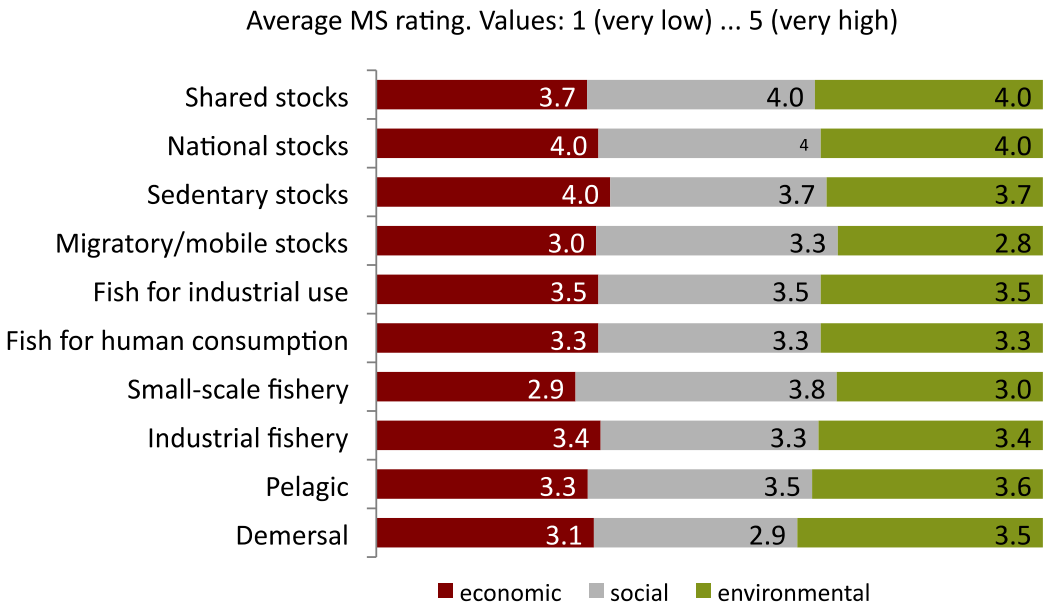
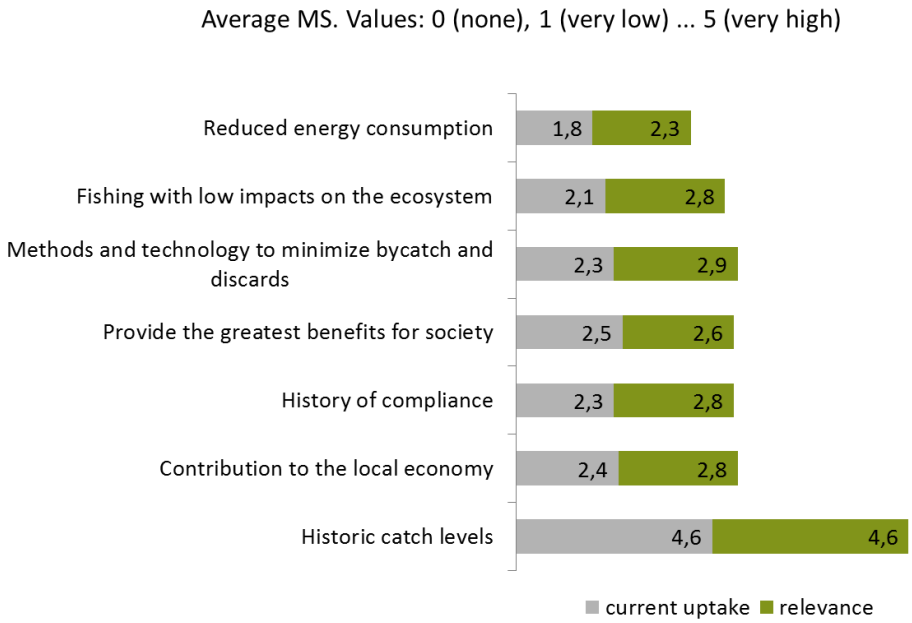


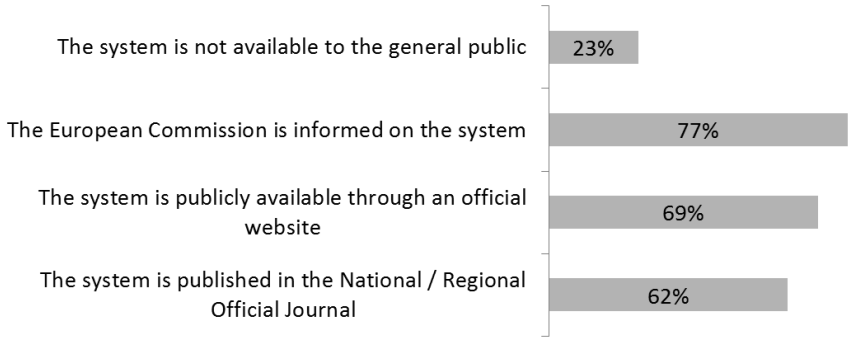
Figure 4: MS view on the relevance and uptake of the CFP criteria



Finally, a brief mention to the transparency of the systems, which –based on feedback obtained- shows positive results, i.e. nearly three out of four MS confirm that their system is available to the general public (Figure 5).[8] In most MS the system is available through national or regional official journals (62%) or an official website (69%). It is worth noting also that a large number of MS (77%) indicate informing the EC on their systems; the contractor however could not find evidence in this regard during the interviews held with DG MARE in the context of the study.

[8] Note that 40% of the respondents to the survey skipped this question.

Figure 5: In what ways the system for allocating fishing opportunities is transparent / accessible within MS



2.3 Main challenges

This section describes the main challenges faced by fishing management authorities in the process of allocating fishing opportunities and briefly presents some ongoing solutions.

As already noted in previous sections, catches history has been the most straightforward and broadly used solution against the initial question of who to favour under the need to allocate. The main rationale behind catches history is to be fair to traditional groups engaged in the fishery by giving them preferential access over newcomers. However, the main challenge arises when it comes to set the reference period for the catches – usually in measured in years. Table 1 present some solutions.

Table 1: Common features for allocation formulas considering catch records

	Definition	Goal
Catch History	Calculation of a fisherman's historical participation in the fishery based on his/her landings as a percentage of the fishery's total landings	To ensure a fair and equitable distribution of concessions that is based on past patterns of participation
Control date	A fixed date, after which landings are not counted toward an individual's standing. A date is often set for a period prior to discussions about Quota Management.	To prevent fishermen from increasing effort to improve their landings in the period leading up to Quota management implementation.
Base years	Years used to calculate landings. It is generally a three to five year period.	To accurately represent participation in the fishery over a sustained period of time.
Excluded years	The year(s) that may be excluded from the calculation. These are often the years of lowest individual landings.	To include the best representative years of participation and account for years of non-participation.

Source: Environmental Defense Fund (EDF).

MS were also invited to indicate what constraints (political, legal, capacity, stakeholder reluctancy), if any, may be an obstacle for the adoption of the new CFP criteria (Figure 6).[9] Overall, stakeholders' reluctancy (i.e. opposition from stakeholders, associations, producer associations) is the major challenge to adopt economic, social and environmental criteria. This is followed by legal constraints.[10] With regard to the 'Historic catch levels' criterion, it is worth noting that legal and capacity development constraints weight as much as stakeholder reluctancy. In this respect, MS explain that the best way to deal with stakeholder reluctancy is by engaging them in the decision making process and setting up the appropriate mechanisms. In fact, many MS have developed administrative arrangements, e.g. in Ireland stakeholders meet monthly to discuss about allocation issues; Germany, UK, and Spain have adopted co-management.[11]

'Contribution to the local economy' is the *easiest* criterion to adopt, according to responses, showing similar rates for political, legal, capacity and reluctancy constraints. 'History of compliance', for its part, is the only criterion for which the political side is not regarded as a problem for its adoption, unlike capacity development issues - for a few MS -, and certainly legal aspects - for a larger number.

The four categories of constraints weight about the same for the criterion 'Provide the greatest benefits for the society', although some MS highlighted the difficulty to measure it (e.g. Ireland). On the other hand, legal and stakeholder reluctancy pose the main challenges for the implementation of the following criteria, namely, 'Methods and technology to minimize by-catch and discards' and 'Fishing with low impact in the ecosystems'. In fact, 'Methods and technology to minimize by-catch and discards' is, together with 'Historic catch levels', the criterion that overall scores the highest number of concerns. Some MS point to lack of data / data reliability as an important area for improvement.

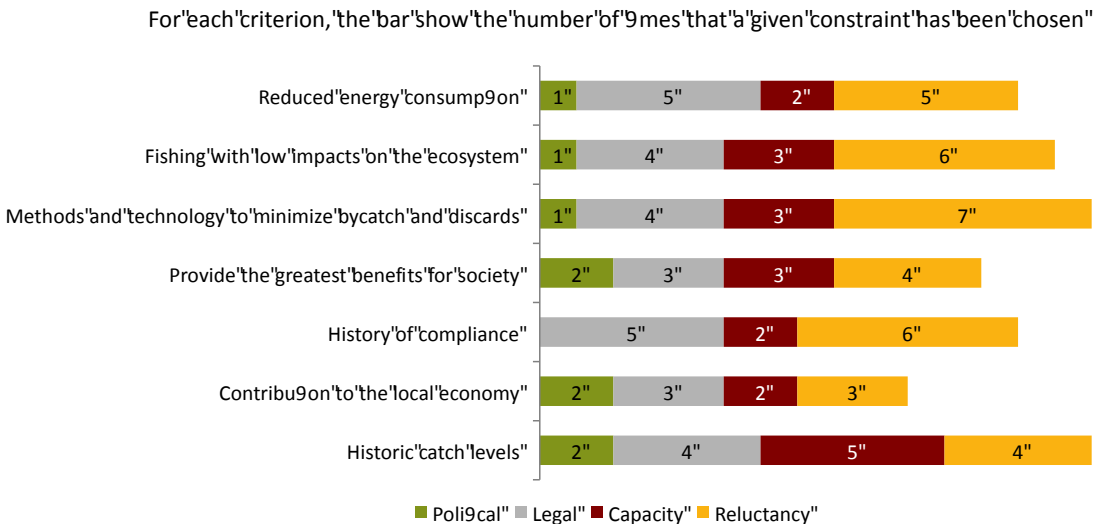
Finally, and similarly to the case with 'History of compliance', the main obstacles for the implementation of the criterion 'Reduced energy consumption' are the potential conflicts with national or regional legislation, and stakeholder opposition. Political and capacity aspects are also signalled, but to a lesser extent.

[9] 12 out of 20 MS responded to that question.

[10] Feedback indicates that some MS are currently reviewing their legal allocation frameworks (e.g. Estonia, Sweden, Lithuania, Romania), which may help explain the results.

[11] In Spain a Sectorial Fisheries Meeting (*Conferencia Sectorial de Pesca*) takes place bi-annually.

Figure 6: MS view on the main constraints to include the following criteria in the process of allocating fishing opportunities



3. PROPOSAL OF A SYSTEM

This section introduces some key elements of a system to allocate fishing opportunities (section 3.1); briefly describes the new CFP's objectives (3.2); reviews the CFP's criteria (3.3); proposes indicators (3.4); and discuss the criteria compatibility dilemma (3.5).

KEY FINDINGS

- Social, economic and environmental criteria to guide the allocation process are central to the proposed system for the allocation of fishing possibilities, as are the associated indicators to monitor the performance of fishing vessels in relation to these criteria. These criteria and indicators were developed on the basis of a review of the CFP, relevant EU-funded research, the scientific literature, and stakeholder consultations. The proposed criteria and indicators are:
- **Social allocation criteria: support fishing communities.** Indicator 1: **Fisheries dependency**- employment in relative terms; Indicator 2: **Revenue** contribution to local economy –at the NUT3 level
- **Social allocation criteria: Corporate social responsibility.** Indicator 1: **History of fisheries compliance** – using CFP Point System for the last five years**.** Indicator 2: **History of compliance** - combines fisheries compliance with other standards and obligations (e.g. tax duties; alignment to ILO standards on crew security and enrolment, etc.) -last 5 years
- **Economic allocation criteria: Catch dependency.** Indicator 1: **Catch records** – catches of the targeted stock during the last three years. Indicator 2: Fisheries **footprint** –trips where catches of the targeted stock took place -last three years
- **Economic allocation criteria: Improve economic performance.** Indicator 1: **Gross Value Added** (GVA) - net output of an individual/metier/sector after deducting intermediate inputs from all outputs. Indicator 2: **Fuel efficiency** - litres of fuel per kg of live fish and shellfish
- **Environmental allocation criteria: implementing EAFM.** Indicator 1: **Large Fish** - the proportion of the catch larger than length at maturity (Lm50). Indicator 2: Protected Species Index –**PSI** –volumes of by-catch of protected, endangered or vulnerable species. Indicator 3: Marine **Seabed Impact** – extension of the bottom surface where relevant fishing activity occurred with respect to key habitats location.
- Fisheries management is generally characterised as having multiple and sometimes conflicting objectives. Striking a balance between environmental, social, and economic criteria for the allocation of fishing opportunities generally involves extensive consultation and consensus-building, which may take years.
- There are several tools to support decision-making. One such tool is Analytical Hierarchy Process -AHP- which has been applied extensively in many different, complex areas, including fisheries, where trade-offs have to made between multiple objectives. In practical terms this tool can assist in assigning weights according to a hierarchy of objectives/criteria. However, it is important to stress that this process will have to be carried out on a case-by-case basis - one size does not fit all, as each fishery is unique.

3.1 Key elements of a system to allocate fishing opportunities

This section identifies the key elements of a system (hereafter, 'the system') to help MS allocate quotas between their vessels in a balanced way. The system is made up of criteria, indicators, and measurement techniques. Furthermore, various approaches and techniques are proposed for the actual allocation of fishing opportunities among fishing vessels.

Each CFP objective will be linked to one or more criteria, and each criterion may have one or more indicators against which to measure the performance of a fishing vessel. These tools may be applied at the level of fishing vessel, metier, or segment level, depending on the context. Each criterion will be labeled as economic, social, or environmental (or a combination).

3.2 A review of the CFP's objectives

This section briefly reviews and selects those CFP objectives (focus on Article 2 of the CFP) to be included in the System. The aim is to classify them as economic, social or environmental to facilitate the identification of criteria by category (see section 3.3)

The objectives of the Common Fisheries Policy (CFP) were originally twofold: Preserve fish stocks while protecting the marine environment; and ensure the economic viability of the European fleets and provide consumers with quality food.

The 2002 reform added to these objectives the sustainable exploitation of fisheries resources from an environmental, economic and social point of view in a balanced way. Sustainability should be based on sound scientific advice and on the application of the precautionary principle. Accordingly, there was a last objective in the CFP, to contribute to the collection of scientific data.

This doctrine has been maintained in the new reform, which took effect on 1 January 2014. Even so, there is a new set of environmental and ecosystem aspects in the CFP, which emphasize the first objective, acknowledging that there is certain impact of fishing on the marine environment.

In the context of this report, three dimensions should be defined more specifically: these refer to the need to ensure that EU fishing is environmentally, economically and socially sustainable. Society is increasingly demanding a balance between maximizing economic performance and minimizing environmental impact and the CFP's overarching objectives are aligned with this view. Nevertheless, it is unclear how social, economic and environmental goals should be simultaneously fulfilled[12].

The CFP envisages that fisheries activities shall provide a source of food for the EU, foster a competitive industry and ensure a fair standard of living for fishing communities. The CFP should also ensure that fishing contributes to the Europe 2020 Strategy for smart, sustainable and inclusive growth, by providing employment benefits.

CFP objectives are described in detail in Article 2 of the basic regulation. They are introduced here in the following paragraphs:

[12] OCEAN2012 suggests enshrining environmental objectives within in the CFP as a prerequisite to fulfilling social and economic objectives. Grieve (2009).

1. The CFP shall provide '*conditions for economically viable and competitive fishing capture and processing industry and land based fishing related activity'.* Economical viability relates to financial resources and benefits emerging from a project or activity at first steps. Fishing and related activities must be competitive, with the CFP strengthening the ability of operators to maximize the added value of their products. Both viability and competitiveness are essential for economic sustainability.

2. The CFP shall '*contribute to a fair standard of living for those who depend on fishing activities, bearing in mind coastal fisheries and socio-economic aspects'*. This recognizes the importance of small-scale, artisanal or coastal fishermen. MS are encouraged to provide coastal communities with preferential access to resources. Similarly, '*coastal fishing activities'* shall be promoted, raising society's awareness of the operators and their activity.

   In view of the dependence of certain coastal communities on fishing, it was deemed necessary to ensure the '*relative stability of fishing activities*' by allocating fishing opportunities among MS, based on a predictable share. This share is currently used as the basis of allocations of fishing opportunities at the December Council. The purpose of the 'Principle of relative stability' that underlies the EU allocation system is to set a fixed allocation based on historic catches, with a view to prevent continuous disputes over quotas, and thus providing stability to the operators.

3. The CFP shall '*contribute to an efficient and transparent internal market for fisheries products'*. This is not limited to the overall objective of fishing as contributor to the availability of food supplies for consumers at reasonable prices. A transparent CFP means a set of rules that allow citizens to access information held by authorities, and that ensure the traceability, security and quality of products marketed in the Union. In this way a level playing field for operators, especially producers, may be ensured.

   It is worth noting that MS shall apply '*objective criteria including those of an environmental, social and economic nature'* in a transparent manner.

4. As with the environmental dimension, the reformed CFP should follow a more cautious approach to fisheries management. The scope of the CFP includes the conservation of marine biological fisheries resources and the management of fisheries targeting them.

   The CFP states that between 2015 and 2020 catch limits must be fixed to guarantee the long-term sustainability of fish populations, ensuring that their size and productivity are not harmed. The theoretical equilibrium is called the '*maximum sustainable yield'* (MSY target) and is clearly stated as an environmental objective.

   The CFP shall also '*implement the ecosystem-based approach to fisheries management to ensure that negative impacts of fishing activities on the marine ecosystem are minimized, and … avoid the degradation of the marine environment'.* The CFP refers to the existence of ecologically meaningful boundaries when managing natural resources to safeguard the composition, structure and functioning of the marine ecosystems. There is neither a precise definition of those boundaries nor guidance to implement them.

Implementing the ecosystem approach, the CFP aims to be '*coherent with the Union environmental legislation*'[13]. The goal is to ensure that fishing impact is minimized and avoids marine environment degradation.

In particular, the CFP shall help to ensure that fishing fleets are more selective in what they fish, to eliminate the practice of discarding unwanted fish, and to ensuring that all catches are landed and best used. This objective is to be done gradually and on a case-by-case basis.

5. The CFP shall '*provide for measures to adjust fishing capacity of the fleets to levels of fishing opportunities'* in alignment with the MSY target consistent with maintaining economically viable fleets without overexploiting marine biological resources. It is worth noting that, with regard to this particular objective, there is convergence among the three dimensions under consideration in this study.

   To contribute of the achievement of CFP goals, multiannual financial assistance is provided by means of the European Maritime and Fisheries Fund (EMFF)[14] planned for the period 2014-2020. The Fund is intended to help fishermen in the transition to sustainable fishing.

Finally, it is worth noting the Union '*should promote the objectives of the CFP internationally*'. This refers not only to using the same EU standards beyond EU borders but ensuring EU leadership in international negotiations to promote the alignment of other actors with CFP objectives.

3.3 Criteria

This section assess the CFP's criteria for the allocation of fishing opportunities (section 3.3.1), and proposes additional relevant criteria (3.3.2).

3.3.1 The CFP's criteria

This section starts with the identification and review of all the criteria recommended by the CFP for the allocation of fishing opportunities, including incentives.

In Recital 33 the CFP establish the basis of the response to this study: '*Access to a fishery should be based on transparent and objective criteria including those of an environmental, social and economic nature. MS should promote responsible fishing by providing incentives to those operators who fish in the least environmentally damaging way and who provide the greatest benefits for society*'.

Article 17 states that when allocating the fishing opportunities, '*MS shall use transparent and objective criteria including those of an environmental, social and economic nature*'. The following list of criteria is extracted from the CFP basic regulation:

- Historic catch levels
- Contribution to the local economy
- History of compliance
- Provide the greatest benefits for society

[13] Marine Strategy Framework Directive (Directive 2008/56/EC).

[14] Regulation (EU) No 508/2014, of the European Parliament and of the Council of 15 May 2014 on the EMFF.

- Methods and technology to minimize by-catch and discards
- Fishing with low impacts on the ecosystem
- Reduced energy consumption

This study has already noted some conceptual inconsistencies in the definition of some CFP criteria. Whilst some criteria include specific mention of objectives, e.g. *'fishing methods that contribute to more selective fishing and to the avoidance and reduction, as far as possible, of unwanted catches*', others are more general, e.g. '*historic catch levels'*. The contractor has (re)defined criteria as was required and has provided further description of the rationale behind each criterion.

When referring to the allocation of fishing opportunities, this implies some sort of rights-based management. The situation varies considerably amongst Member States, ranging from a controlled open-access to fishery resources to the introduction of individual transferable quotas for specific fisheries. A broad definition appears to the be the most appropriate such as, 'any system of allocating fishing rights to fishermen, fishing vessels, enterprises, cooperatives or fishing communities (MARG 2009)'. There are also geographic differences, where large commercially important single-species fisheries are more common in northern regions and much less so in the south, where multi-species, multi-gear and small-scale fisheries are more dominant.

As specified in the CFP, there are various types of conservation and technical measures (Article 7) that may be used including: 'incentives, including those of an economic nature, such as fishing opportunities, to promote fishing methods that contribute to more selective fishing, to the avoidance and reduction, as far as possible, of unwanted catches, and to fishing with low impact on the marine ecosystem and fishery resources' (Article 7, d). This may refer to any aspect of giving access to fishing opportunities, whether this be through pooled (e.g. fishermen/companies/producer organisations) or individual quota allocation, days-at-sea, effort management schemes, etc., and this can be interpreted as including licensing conditions.

The system proposed in this study should therefore be applicable in a wide range of circumstances. The criteria and indicators should be defined in such a way that they are applicable in general, albeit there may be a need to include additional indicator in order to measure performance against criteria. Whether these criteria apply to an individual allocation or pooled allocation (e.g. métier/association/company etc.) is to be decided on a case-by-case basis.

3.3.1.1. The Social and Economic dimension

It is important to have well-specified management objectives, which will be used to determine whether a particular fishery is successful and well managed. The European Commission identified five main structural failings of the CFP during the recent reform process: a) fleet overcapacity, b) imprecise policy objectives, c) short-term focus in decision-making, d) insufficient involvement of industry, and e) poor compliance.[15]

When considering the social dimension of the CFP, it is necessary to determine whether suitable social objectives have been defined. Once the objectives are defined, the next step is to define criteria and indicators to assess progress and achievements. These definitions are more straightforward in the case of environmental and economic objectives. Nevertheless, significant efforts were needed recently for defining operational environmental

[15] European Commission (2009), Green Paper on the Reform of the Common Fisheries Policy, COM(200)163 final.

objectives in the context of the MSFD - for the purpose of achieving Good Environmental Status in European Waters.

It is helpful to consider the proposals for the reform of the CFP. The European Commission defined the following social objectives in 2009:

- Reversing the decline in employment in the fisheries sector, particularly in catching;
- Increasing the attractiveness of the fisheries sector and turning it into a source of high quality jobs;
- Ensuring the viability of coastal communities by promoting economic growth and jobs;
- Facilitating the transition to sustainable fishing;
- Unlocking the potential of European aquaculture to expand and create new jobs in inland as well as in marine aquaculture.

It is important to note the emphasis on employment and the quality of these jobs. The quality of jobs can be measured in terms of wage levels, safety and safe working conditions, duration of working day, competency level required, and continuous training. It is also interesting to note that aquaculture is expected to play an important social role, mostly through job creation.

The CFP indicates a series of considerations on the social dimension such as:

(Recital 3) ' Recreational fisheries can have a significant impact on fish resources and Member States should, therefore, ensure that they are conducted in a manner that is compatible with the objectives of the CFP'.

(Recital 12) '*… It should also foster direct and indirect job creation and economic development in coastal areas*'.

(Recital 19) '*Existing rules restricting access to resources within the 12 nautical mile zones of MS have operated satisfactorily, benefiting conservation by restricting fishing effort in the most sensitive part of Union waters. Those rules have also preserved the traditional fishing activities on which the social and economic development of certain coastal communities is highly dependent. Those rules should therefore continue to apply. MS should endeavour to give preferential access for small-scale, artisanal or coastal fishermen*'.

(Recital 20) '*Small offshore islands which are dependent on fishing should, where appropriate, be especially recognised and supported in order to enable them to survive and prosper*'.

(Recital 21) '*Marine biological resources around the Union outermost regions referred to in the first paragraph of Article 349 of the Treaty should be especially protected since they contribute to the preservation of the local economy of those territories, having regard to their structural, social and economic situation. Certain fishing activities in those waters should therefore be limited to fishing vessels registered in the ports of those territories*'.

(Recital 35) '*In view of the precarious economic state of the fishing industry and the dependence of certain coastal communities on fishing, it is necessary to ensure the relative stability of fishing activities by allocating fishing opportunities among MS, based on a predictable share of the stocks for each Member State*'.

(Recital 36) '*Such relative stability of fishing activities, given the temporary biological situation of stocks, should safeguard and take full account of the particular needs of regions where local communities are especially dependent on fisheries and related activities, as decided by the Council in its Resolution of 3 November 1976, and in particular Annex VII thereto*'.

These considerations lay down a number of conditions that apply in the EU such as special conditions that apply to outermost regions, particularly in the case of small islands, and that preferential access should be given to small-scale fisheries in the 12 nautical mile zone. As already said, relative stability in the allocation of fishing opportunities among MS is maintained and considered an important instrument for maintaining and protecting small-scale fisheries.

The specific objectives of the CFP include only two points that can be classified as predominantly social objectives: (i) '*contribute to a fair standard of living for those who depend on fishing activities, bearing in mind coastal fisheries and socio-economic aspects*' (Article 2.5f); and (ii) '*promote coastal fishing activities, taking into account socio- economic aspects*' (Article 2.5i);

Concerning the allocation of fishing opportunities, the CFP states that MS shall use environmental, economic and social criteria (Article 17). Various socio-economic criteria are proposed such as the history of compliance, the contribution to the local economy and historic catch levels.

Another aspect is small-scale fisheries in the EU. The Green Paper[16] on the Reform of the CFP noted that '*fisheries with their large share of small- and medium-sized companies play an important role in the social fabric and the cultural identity of many of Europe's coastal regions. Many coastal communities remain dependent on fisheries for their income, some of them with limited potential for economic diversification. It is therefore essential to secure a future for coastal, small-scale, and recreational fishermen taking fully into account the particular situation of the small- and medium sized enterprises.*'

The Green Paper included a proposal to introduce differentiated management regimes: one for large-scale fleets and another for small-scale fleets. The rationale behind this proposal was that large-scale industrial fisheries should be managed in line with the objective of capacity adjustment and economic efficiency. On the other hand, the management of small-scale fleets in coastal communities should have a focus on social objectives (using direct allocation of quotas or effort or through collective schemes). However, this was not adopted due to resistance from MS where it was viewed as an issue best determined at the national level (Symes 2014).

In the EU, small-scale fisheries are viewed as a social-cultural issue, associated more with the sustainability of coastal communities in the remoter parts of the EU's peripheral regions than with the overall economic performance in the fisheries sector (Symes 2014). However, it is important to note that the CFP is not seen as an instrument of social policy (Gallizioli 2014) and thus the CFP has made few direct concessions in the past to the small-scale sector in providing protection from the effects of structural and geographical concentration in the commercial fishing industry (Symes 2014). It is envisaged that public funding, including EMFF 2014-2020, will play a role in helping the small-scale segment adapt to changing conditions in the wake of the CFP reform, thereby strengthening its economic viability, and maintain its contribution to the life of coastal communities.

[16] COM(2009)163

Another social aspect in the CFP relates to the enforcement of the rules. For example, Article 17 states '*History of compliance'* as an example to use when allocating fishing opportunities. To ensure that the rules of the CFP are respected the policy has a control chapter[17] where monitoring and surveillance of fishing activities are the main enforcement tools. Most of the CFP rules aim to protect the biological status of fish stocks in order to ensure the sustainability of fisheries. Policy managers must ensure a level playing field with fair competition among operators, and effective deterrents against wrongdoers.

Catch records were used as the basis for setting the relative stability of fishing activities as quoted in Recital 36. The percentages agreed then have remained unchanged until now but are updated when new States joined the Union. Thus, catch records have been the more prominent socio-economic aspect in the original CFP and successive CFP reforms, as far as the allocation of fishing opportunities is concerned.

3.3.1.2. The environmental dimension of the new CFP

Implementing the ecosystem-based approach to fisheries management (EAFM) is perhaps the more outstanding feature of the reformed CFP with the discard ban policy. EAFM implies that fishing activities should be managed such that the overall health of the marine ecosystem is not placed at risk. Moving from traditional single stock management to ecosystem considerations is challenging as the associated traditional uncertainties under single stock assessment are now multiplied. To safeguard ecosystems, both the species composition and the structure and functioning of habitats are important.

Fisheries stocks have to be kept at safe biological limits according to the precautionary approach[18] to make MSY possible. Apart from aiming at the maintenance of all stocks above biomass levels capable of producing MSY, the reformed CFP declares an overarching objective, namely implementing the ecosystem approach to fisheries management. Now negative impacts of fishing need to be minimised, avoiding the degradation of the marine environment, well beyond the impact of fishing on target fish stocks (ICES 2014a).

Although EAFM is not a new concept[19] the allocation of access to fishing as a practice of the EAFM implementation may be an innovative step forward at EU level. The FAO (2003) prescribed a list of steps towards converting policy goals into action, relevantly '*setting operational objectives*' and '*developing indicators and reference points'*. In the CFP there is a clear quantitative boundary or reference point to comply with the objective of getting all stocks under MSY framework by 2020 at the latest. However, when defining the ecosystem-based approach there is no quantitative goal - only a general requirement to '*manage fisheries within ecologically meaningful boundaries*'.

Nevertheless, there are new provision in the CFP that may help.

(Recital 11) '*The CFP should contribute to the protection of the marine environment, to the sustainable management of all commercially exploited species…'*

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17 Council Regulation (EC) No 1224/2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy; and Commission Implementing Regulation (EU) No 404/2011 laying down the detailed rules for the implementation of Council Regulation (EC) No 1224/2009.

18 As defined in the United Nations Fish Stock Agreement, 1995: '*The absence of adequate information shall not be used as a reason for postponing or failing to take conservation and management measures*'.

19 For instance the Convention of CCAMLR in 1980 as an early adoption of the EAFM.

(Recital 13) '*An ecosystem-based approach to fisheries management needs to be implemented, environmental impacts of fishing activities should be limited and unwanted catches should be avoided and reduced as far as possible'*

Indeed, Article 17 obliges MS to use '*objective criteria*' when allocating fishing opportunities. MS should incentivise more environmentally-friendly gears/fishing techniques (as understood by lawmakers). Namely, '*reduced energy consumption*' or reduced '*habitat damage*' are quoted as examples to provide such incentives.

Similarly, the CFP shall ensure coherence with EU environmental legislation, specifically with the time-bound objective of '*achieving a good environmental status (GES) by 2020*', as defined in the Marine Strategy Framework Directive (MSFD). The MSFD specifically calls MS for the development of scientific-based indicators[20] and standards to make achievement of goals possible. This legal basis aims to protect effectively the marine environment across Europe, implementing the ecosystem approach to all human activities. The cornerstone for achieving GES is to maintain biodiversity. Fishing is one of those human activities affecting the marine environment, so that the CFP call for coherency is relevant.

It is important to note that 2014-2020 envisages playing an important role in the reduction of the impact of fisheries on the marine environment, reducing to the extent possible unwanted catches, and protecting biodiversity and the ecosystems.

3.3.2 Other criteria

In this section the contractor provides the basis of its proposal. CFP criteria are reviewed and categorised as social, economic or environmental. Some have been redefined. Additional criteria are also suggested with a view to contributing to the CFP's overall objectives.

3.3.2.1. Defining operational social and economic objectives

As introduced in the preceding section, the CFP does not state specific social objectives apart from securing a fair standard of living and promoting coastal fisheries, including the creation of high-quality jobs. The results of the EU research project SOCIOEC (2010) were used as the initial basis for the proposal of relevant and operational objectives, and thus the criteria to be used. That project used a pragmatic approach to the choice of objectives by focusing on those that are both manageable, i.e., they are likely to be achievable through current or potential management measures) and consensual, i.e., they are likely to be acceptable to a broad range of stakeholders). It is also important to note that SOCIOEC used a participatory approach with extensive consultations of stakeholders.

[20] The MSFD use the same approach that the one used in this report as to the understanding of objectives, criteria and indicators. More precisely the objectives are sorted out in subcategories called '*Descriptors'* when facing the GES overall goals. The eleven qualitative descriptors that describe what the environment will look like when GES has been achieved include:

1. *Biodiversity is maintained*
2. *Non-indigenous species do not adversely alter the ecosystem*
3. *The population of commercial fish species is healthy*
4. *Elements of food webs ensure long-term abundance and reproduction*
5. *Eutrophication is minimised*
6. *The sea floor integrity ensures functioning of the ecosystem*
7. *Permanent alteration of hydrographical conditions does not adversely affect the ecosystem*
8. *Concentrations of contaminants give no effects*
9. *Contaminants in seafood are below safe levels*
10. *Marine litter does not cause harm*
11. *Introduction of energy (including underwater noise) does not adversely affect the ecosystem*

Table 2: High-level social, economic and environmental objectives proposed for fisheries management under the new CFP

Sustainability pillar	Population level	Time spam	High level objective	Indicators
Ecological	Society	Long term	Maximize yield in tonnes of commercial species	MSY and Fmsy
Ecological	Society	Long term	Gradually eliminate discards on a case-by-case basis	Volume / mortalities of discards
Ecological	Society	Long term	Minimizing by-catch of vulnerable and protected species	Volume / mortalities of by-catch
Ecological	Society	Long term	Minimizing negative impact on seabed habitats	Develop metric that considers habitat and likely impact of gears/fishery
Economic	Society	Long term	Maximization/optimization of present value	Utility
Economic	Society	Short term	Maximization/optimization of gross value added (or rent)	GVA
Economic	Firm/ Individual	Short term	Maximization of profits (within ecological and social constraints)	Profit
Social	Society	Long term	Ensure viable coastal communities	Employment
Social	Society	Long term	Improve policy and decision making through improved inclusive governance structures	Presence of consultative / co-mgt structures / shared responsibility for decision making
Social	Individual	Long term	Ensure fair living standard, improved working and security conditions on board of fishing vessels	Wages, hours spent working, number of accidents

Source: SOCIOEC Project.

When considering the proposed social objectives in Table 2, a suitable criterion for the allocation of fishing possibilities would be 'support fishing communities'. It should be noted that such a criterion could also be seen as a contribution to the local economy and benefits to the society in the form of maintaining livelihoods, good working conditions, and food security.

The other two social objectives proposed by SOCIOEC concern fisheries in general and deal with the improved conditions at the societal (governance) and individual levels. Governance objectives may be relevant as the new CFP advocates moving from the top-down, micro-

management approach to a more bottom-up approach, based on greater stakeholder participation in the management of resources. Thus, governance objectives could be relevant for allocation if a new system(s) is(are) implemented.

Social allocation criteria: Support fishing communities

Most EU MS support their coastal and small-scale fisheries, either through explicit policy or implicitly, through social objectives such as the protection of traditional fishing communities and consideration of socio-economic factors. When introducing RBM systems, individual transferable quotas (ITQ) in particular, the protection of existing small-scale fisheries becomes a key concern (MRAG 2009).

Fisheries with open access or limited entry are generally considered to lead to situations of overexploitation and overcapacity (the tragedy of the commons), which is why RBM has been promoted as a way of making fisheries more economically efficient and profitable, and thus generating more wealth to society (economic or resource rent). Fisheries subsidies, are considered a major driver of overexploitation and overcapacity. An alternative view is that governments continue to subsidize fisheries and are simply meeting traditional objectives such as maintaining or increasing employment and supporting local fishing communities, which also has the desirable effect of reducing tension, criticism, and gaining political support from these sectors (Hilborn 2007). If these are stated policy objectives, it can be argued that management has actually been successful, although to the detriment of environmental objectives.

Nonetheless, there appears to be a major trend of introducing RBM systems in various forms, particularly for the larger more lucrative fisheries. All MS have implemented some type of RBM, including a variety of individual (non-transferable) quotas, individual transferable quotas, vessel catch limits, and community-based catch quotas (MRAG 2009). The major issues when introducing RBM in small-scale fisheries appear to be how to maintain these rights within the community, how to avoid the concentration of rights in the hands of a few, and how to allow new entrants to the fishery. This becomes expensive as fishing rights become assets that gain considerable value over time. The initial allocation normally involves the reservation of quota at the national level for the small-scale segment, allocations on the basis of communities and/or small-scale gears/fisheries, and possibly the establishment of special zones (protected zone, small-scale fishing zones, territorial use rights, etc.). Various limits on transferability are introduced in order to maintain the fishing rights within the community and avoid the concentration of ownership.

As seen in Section 2, there are numerous case studies concerning the allocation to small-scale traditional fisheries when introducing RBM systems in developed countries, where support to small-scale fisheries and local communities are key concerns (OECD 2006, MRAG 2009). In developing countries, the examples are more in the form of co-management, which ideally should include the introduction of exclusive rights to fish resources in the area of a specific fishing community. It can be argued that this latter approach has many similarities to introducing RBM in small-scale traditional fisheries, where an environmental stewardship role is envisioned for fishermen.

In relation to the social objectives of the CFP which are to support and promote coastal and small scale fishing activities, it is important to note that for this to be successful there is a need to consider a series of environmental, economic and social factors. From an environmental point of view, the allocation of fishing opportunities should be based on MSY

and this resource base is the foundation for economic and social benefits.[21] A major difficulty is to distinguish economic from social aspects in general terms, and it should be noted that the CFP regulation states as an objective to promote coastal fishing activities, taking into account socio-economic aspects. From an operational point of view, the SOCIOEC-proposed high-level objectives appear to particularly useful as these were based on an assessment of whether these objectives are achievable (through current or potential management measures) and consensual (acceptable to a broad range of stakeholders).

As SOCIOEC suggests, a suitable indicator for this objective could be a composite one based on factors such as employment and opportunities for young fishermen. Data on employment is a basic statistic which can be used as an indication of whether jobs are being maintained in the fishing communities and processing industry, thus indirectly showing whether the fishing sector continues to play an active role in local communities and maintaining socio-cultural attributes. In relation to opportunities for young fishermen, additional data would be required such as the age of fishermen.

A recent study on the socio-economic dimensions in EU fisheries proposes a number of indicators that were found to be particularly useful (MRAG 2013). Note that these include both social and economic indicators:

- Number of fishermen entering and leaving the fleet segment annually
- Business type - using small and medium enterprise definitions
- Annual income received by fishermen by fleet segment
- Number of injuries and fatalities by fleet segment annually
- Gender of employees in fisheries firms by fleet segment and position
- Age of employees in fisheries firms by fleet segment and position
- Nationality of employees in fisheries firms by fleet segment and position
- Education and level of training of employees in fisheries firms by fleet segment and position
- Annual level of public support to the catching sub-sector
- Proportion of working population employed in the fish catching sub-sector in each NUTS 3 region - annually
- Percentage of local revenue generated by fish catching sub-sector in each NUTS 3 region annually
- Number unemployed in each NUTS 3 region annually

It is interesting to note that one of the findings of the above study was that all survey respondents were descended from fishing families, indicating a strong socio-cultural heritage. As this is the case, including descent from fishing families as an indicator is not particularly useful as almost all are descendants. The same goes for gender where almost all in the harvest sector are men. Nonetheless it would be important to monitor this over time as this may change. Other aspects could be included such as job satisfaction, solidarity within the catching sector, and involvement in fishing associations.

Social criteria: Corporate social responsibility

Compliance is one of the core aspects of the CFP. Beyond an allocation context EU lawmaker always saw compliance with the rules as a prerequisite to achieve CFP goals, mainly those pursuing the adequate conservation status of fisheries resources. Compliance will be assessed as candidate contributor to the allocation process, as required by Article 17.

[21] This is the policy objective stated in the CFP, but it should be noted that Maximum Economic Yield is achieved at lower levels of fishing effort.

Allocating access to fishing where the history of compliance matters is an option already in place. For example, in Argentina the sanction history of operators is used to reduce the primary allocation of several fisheries (southern blue whiting, Patagonian tootfish, long tail and Argentine hake). This factor is used to modify allocation by between -1% and -5%. Other factors, include catch history (50%), level of domestic employment (30%), contribution to the processor sector (15%), and parent company investment in the economy (15%)[22]. Similarly the Commission for the Conservation of the Southern Bluefin Tuna (CCSBT) proceeded against Contracting Parties wrongdoing, reducing their shares (Cox 2009).

Managers may also decide to favour those who contribute to the achievement of goals in any fisheries legal. Those operators who do not demonstrate an unquestionable history of compliance cannot access fishing. For instance, according to the control chapter of the CFP, fishing vessels listed on the Illegal, Unreported or Unregulated (IUU) EU Vessel list, will not be authorized to fish within EU waters[23]. Another technique requires vessels to be submitted for inspection before beginning any fishing for Tootfish in South Georgia Patagonian waters[24].

In the context of this study, compliance can be understood as a ranking criterion rather than solely eligibility, weighing up the relative merits of each applicant with other considerations. Managers may adjust the weighting of this criterion to dis-incentivise further non-compliance - further non-compliance would thus constrain the operator's economic potential.

It is essential to consider carefully to whom or to what the fishing rights are allocated, for example, the vessel, the entity awarded with access, or the vessel's owner/master. It is persons, not vessels, who commit infractions (either the holder of the fishing license or the master) so that gauging merits/demerits of the concerned subject would be at that level and not at the business level. In contrast, IUU lists identify the track record of vessels and their owners and flag. Flag track records, as criminal prosecution of legal persons at a high governance level is difficult. Here the role of the Spanish authorities is remarkable in putting and end to flag hopping by prosecuting Spanish nationals´ performance beyond the Spanish fleet register (Rois Madarro, 2013). Those rules prohibit the registration for positions of command in vessels from third countries without prior notice to the Spanish Fisheries Management Authority, and the engagement for paid work on board vessels included in lists of IUU fishing by EU citizens[25].

Compliance as an allocation criterion needs a reference period. The testimony of an alleged infraction requires certain time to be legally confirmed long after the date when the infraction occurred. Thus, the length of the infringement proceedings and its variety[26] worldwide may be equally considered when setting the reference period. Generally speaking it seems that the reference period in this case should be longer, although not permanent. For instance, ICCAT established a set of criteria[27] for the '*allocation of fishing possibilities*'

22 Further details in http://www.cfp.gob.ar/

23 Council Regulation (EC) No 1005/2008 of 29 September 2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing, amending Regulations (EEC) No 2847/93, (EC) No 1936/2001 and (EC) No 601/2004 and repealing Regulations (EC) No 1093/94 and (EC) No 1447/1999; and Commission Regulation (EC) No 1010/2009 laying down the detailed rules for the implementation of Council Regulation (EC) No 1005/2008.

24 http://www.sgisland.gs/index.php/%28d%29Toothfish_Licence.

25 A case has been recently put in practice with a third country vessel included in the blacklist of the Convention for the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) for illegal fishing (more details in www.fis.com).

26 For an exhaustive revision at EU level see Blomeyer & Sanz (2014).

27 ICCAT Recommendation [01-25] for the allocation of fishing possibilities.

where the record of compliance is not taken into account where relevant sanctions have already been applied.

It is worth noting that compliance may have a wider perception. Grieve 2009, found three cases where the history of was a central consideration in allocation processes. In particular Cape Cod commercial fisheries (scallops and groundfish) in the United States use a quota allocation system that takes into account applicants' business '*acumen and character*' (CCFT, 2009). Examples of aspects taken into account include:

- Fisheries rules compliance
- Paying taxes
- Not employing illegal immigrants
- Participation in local management forums
- Participation in financial planning and capacity training

This innovative approach is still under development[28], and requires further investigation to assess its suitability in the context of EU fishing access. Such a system would certainly enable '*good* -EU- *citizenship*' to be included as an active contributor to the allocation process (Grieve 2009). This is a legal and political-psychological concept with high relevance for both the social and the political systems of which the operator is a member. In the EU acquis a 'good' citizen is expected to share the values of the European 'identity' such as pluralism, tolerance, friendship, social justice and respect for human rights. The conclusions of the 2007 International Labour Organization (ILO) Work in Fishing Convention are also relevant. These referred to fair living standards in terms of employment, working and security conditions. Third countries in West Africa, where EU fishing occurs under the auspices of sustainable fisheries partnership agreements, established compliance with ILO and International Maritime Organization (IMO) standards as compulsory requisites prior to granting EU and other foreign vessels access to surplus fisheries resources in sovereign waters[29]. The CFP basic regulation is clear in this regard:

(Recital 15) '*The CFP should contribute to the improvement of safety and working conditions for fishing operators*'

(Recital 52) '*Respect of the democratic principles of human rights, as laid down in the Universal Declaration of Human Rights… should constitute an essential element of sustainable fisheries partnerships agreements*'

The compliance criterion has both social and economic concerns. It needs to be re-defined so that the track record of 'corporate social responsibility' is included as an indicator in this criterion. The indicators proposed in this study will seek to address the criterion 'corporate social responsibility' from two perspectives: fisheries-only, and more generally.

According to the level of aggregation in the RBM system of allocation there may be other social concerns. A community of users may aggregate rights, meaning access to fishing by several individuals with different rankings. Acceptability of this criterion may also be a matter of concern. With the main aim of improving transparency, the EU publishes a

[28] During the development of this study, the concerned fishermen association was contacted http://www.ccchfa.org/fisheries-trust - to find out updated information on the multi-criteria model used, unfortunately without success.

[29] Convention on the determination of the minimal conditions for Access and exploitation of marine resources within the maritime areas under jurisdiction of the MS of the sub-regional fisheries commission http://spcsrp.org/medias/csrp/publications/csrp_CMA_version_originale_juin_2012_english.pdf

compliance scoreboard on the Internet[30] each year. This initiative looked promising as it showed compliance performance at the level of MS, but it was rejected in the last CFP reform of the control chapter.

Economic criteria: Catch dependency

Allocation of fishing opportunities in RBM systems is usually based on the historical track record of the owner or vessel. The most common approach in the EU and elsewhere is to base this allocation on historical catches, landings, or engine power of vessels throughout a fixed reference period (MRAG, 2009). For example, the Danish pelagic ITQ allocation was based on weighted catch history from 2003, 2004, and 2005, where the weights used were 20%, 30% and 50%, respectively (Bonzon et al. 2010). However, this should include an appeals process, as there can be a number of factors that affect an individual's fishing capacity during the reference period, such as sickness, accidents, damage, etc.

Using historic catch levels as the basis for allocation implies recognition of attachment or involvement in the fishery, in such a way that past investment should be rewarded. Although called the history or historical track record of catches, the reference period is generally a short period (e.g. 3 to5 years) prior to the introduction of the RBM system. This appears to be the approach that is most accepted as a 'fair' basis for allocation and it is also most easily quantified in an objective manner. There may, however, be disagreements about the validity of statistics, which have to resolved. Certainly, some quota allocation systems were initially based in rolling reference periods, but records were found to be unreliable, and a three-year reference period was agreed as the best choice (Hatcher *et al* 2002).

Fisheries environmental fluctuations and market disruptions both have a bearing on the reference period. Both phenomena influence fishing behaviours and landing figures (EDF, pers. comm). Catch history may be incorporated in the allocation system in different ways: using baseline years; weighting years; or allowing individuals to report on the best years over a given period.

Considering the high-level objective of the CFP, which is to use environmental, economic and social criteria in the allocation of fishing opportunities, a first step is usually to consider catch records, which is an objective way of identifying who is currently involved in the fishery and thus can be considered eligible for obtaining fishing rights. Subsequently, other criteria including socio-economic factors can be used to determine how to divide the rights among eligible candidates.

Historic catch levels is an indicator that can be used to measure participation in fishing activity. Thus, this criterion should be re-defined as 'fishery-dependence' which involves the identification of a stakeholder in the harvesting process. This has both economic and social implications.

The use of other criteria such as levels of discards and by-catch, environmentally-friendly gears, etc. do not appear to be considered in the allocation process, at least in the initial stages of establishing an RBM system. The use of such criteria in the allocation of fishing possibilities in the EU would constitute an innovative and original approach to allocating rights.

[30] COM (2003) 344 final Communication from the Commission - Compliance with the rules of the Common Fisheries Policy 'Compliance work plan and scoreboard'.

Careful consideration should be given to eligibility, or who will be entitled to hold fishing rights and who can participate in the harvesting. These rights are normally allocated free of charge at the initial stages of an RBM system and they are expected to become valuable assets over time. The definition of eligible participants in the RBM system can be designed in such a way that various economic and social factors are taken into account. For example, in the case of the Danish ITQ system, there are requirements for involvement in fishing, which exclude the possibility of outsiders buying into the system (MRAG 2009):

1. Danish citizenship or domicile in Denmark for minimum 2 years
2. Minimum 12 months of employment as a registered fisher with 'B' status
3. Minimum 60% of personal gross income in the previous 12 months originates from commercial fishing

The history of catches was also the basis of the stability principle of fishing activities. In 1976 the Council agreed to use the period 1973-1978 as the basis to decree preferential access to the fleets based in certain areas that were more dependent than others of fisheries and related activities (UK and Ireland). Although the principle is defined as dynamic, little has changed, except for minor adjustments as new MS accede to the EU.

Historical catches provide the basis for allocation in most of the RFMOs, or participation in the fishery in the cases of the Inter-American Tropical Tuna Commission (IATTC) and CCAMLR (Cox 2009). Some of these RFMOs (ICCAT) have developed criteria for allocation which take into account a number of other issues such as the '*special interests of developing States*', fishing interests and aspirations, coastal communities, compliance, zone attachment, geographical location, etc. But even in these cases, there is no agreement on the weighing of these criteria in the allocation process. Rather, the criteria are used in a qualitative way to help inform allocation decisions (Cox, 2009).

Economic allocation criteria: Improve economic performance

With regard to the economic dimension of the CFP, it is worth recalling the high-level objectives proposed by SOCIOEC including:

- Long term societal objective of maximizing/optimizing present value
- Short term societal objective of maximizing/optimizing gross value added - or resource rent
- Short term individual or company goal of maximizing profits within ecological and social constraints

The allocation of fishing opportunities according to various criteria generally implies the introduction of some form of RBM. This is related to a major trend towards implementing RBM in various forms and the new CFP regulation also states that MS should be able to introduce transferable fishing concessions (Recital 42). Under definitions, '*a transferable fishing concession means a revocable user entitlement to a specific part of fishing opportunities allocated to a Member State or established in a management plan adopted by a Member State in accordance with Article 19 of Council Regulation (EC) No 1967/2006 (the Mediterranean regulation), which the holder may transfer*' (Article 4.23).

The widespread problems of overexploitation and overcapacity have led to increasing emphasis on stating goals related to the economic performance of fisheries and their efficient operation. The key issue from an economic perspective is that economic or resource rent is maximized, which is a measure of the wealth generated by fisheries for the benefit of society. This represents the amount left over when all exploitation costs, including a normal

return on labour and capital, have been deducted from revenues (IDDRA 2010). For example, the World Bank states that successful management of fisheries requires that this rent is either capitalized into the price of a fishing right or extracted as a royalty (WB/SIFAR/IDDRA 2004). Otherwise the situation in an open-access fishery will normally lead to the dissipation of rent through overexploitation, which is related to the race-for-fish and overcapitalization.

Considering the issue of underperformance in fisheries (WB/FAO 2009), a recent study by IDDRA estimated that UK fish resources have the potential to produce resource rents in the order of £573 million per annum (based on 2010 data) and that the capitalized value of such rents would be £6.4 billion (IDDRA 2010). Although highly uncertain, the study estimated that around £50 million of rent is currently generated which leaves substantial room for improvement.

Those who make a case for introducing RBM stress the importance of strong and high quality rights in maximizing resource rent generation, measured by a number of attributes such as exclusivity, period of validity, security, and transferability (MRAG 2009).

Again from the economic perspective, the assumption is that social welfare (at least at the societal level) will be maximized if resource rent is maximized. Maximization of economic efficiency is achieved by the unrestricted transferability of permanent fishing rights, thus allowing market forces to bring about the gains in efficiency. However, there is the major caveat that economic efficiency will generally lead to the exclusion of weaker performers, which includes a large number of those involved in small-scale and traditional fisheries. It is important to bear in mind that the CFP defines transferable fishing concessions as revocable and it is a stated objective to promote small-scale and coastal fisheries. There is therefore a trade-off with regard to the objective of improving economic performance.

The preceding text has elaborated on explicit and implicit economic objectives of the CFP, along with a general trend for greater emphasis on economic performance in fisheries. It is argued that the major reason for widespread failures of fisheries management systems has been that resource rent has been ignored and should in fact be dealt with explicitly as the driving force instead of dealing with symptoms such as overcapacity, overexploitation and underperformance (Cunningham *et al* 2009).

However, it is not common to use economic criteria for the allocation of fishing opportunities except in special cases where social concerns are not relevant e.g. South Georgia's Toothfish fishery (Grieve 2009). The most common and basic criteria for the allocation of fishing opportunities is historic catch levels, which can be interpreted as a measure of fishery dependency. A value can be attached to catch levels, thus transforming this into an economic criterion, but this would not create much added value in the context of this study on allocation. Instead it would be desirable to develop criteria that address the issues stated in the CFP regulation such as: a) '*provide the greatest benefits for society*' (Recital 33); and b) '*contribution to the local economy*' (Article 17).

There is considerable merit in the proposal by the EC of introducing differentiated management regimes: one for large-scale fleets and another for small-scale fleets (Green Paper for the Reform of the CFP). It is understandable that MS prefer to determine this at national level, taking into account the context in each country, but it does appear that MS are generally following this rationale. In the context of allocation, the same rationale can be applied where the criteria for large-scale fisheries should be maximizing resource rent, value, and/or profits, thus emphasizing economic performance and the greatest benefits to society.

On the other hand, the allocation to small-scale fleets in coastal communities should follow socio-economic criteria such as those presented in section 3.3.1. It is proposed that this should be handled under the heading of the social dimension of the CFP instead of trying to separate social from economic considerations. Note that this will thus address the criterion of contribution to the local economy.

3.3.2.2. Defining operational environmental objectives

Including environmental criteria when deciding who is allowed to fish and how much can be individually fished is a management challenge. The biological state of the fishery is generally the first issue to be considered when setting fishing opportunities for fisheries resources. This section shows that optimising the biological status of a stock is an essential prerequisite for authorising harvesting of population in a sustainable way. Recalling the list of the high-level objectives proposed by SOCIOEC, there are aspects that become irrelevant such as the long term societal objective of maximizing yields of commercial species.

As explained in preceding sections the challenge becomes greater when linking stock assessment and fishing pressure indicators in the same fishing allocation equation (MRAG 2014). Since environmental status covers not only commercial species, but also the marine environment as a whole, the new CFP challenges can be properly addressed in the same framework.

MSFD and SOCIOEC objectives share ecological concerns. The participatory approach used in the SOCIOEC project found that high-level objectives match the needs identified in MSFD, namely long term societal objectives with a view to:

- Eliminate discards gradually
- Minimise by-catch of vulnerable and protected species
- Minimise the negative impact on seabed habitats

To help MS to implement the MSFD, the EC developed a comprehensive and all-encompassing set of criteria and indicators contributing to GES.[31] But the overarching objectives of the MSFD fall out of the scope of this study that focuses on allocation criteria contributing to the CFP objectives.

In relation to the CFP objectives of minimizing negative impacts and the degradation of the marine environment, particular attention should be paid to some MSFD criteria to ensure that:

- Biological diversity is maintained (Descriptor 1)
- Populations of all commercially exploited fish and shellfish are within safe biological limits, showing a population age and size distribution that is indicative of a healthy stock (Descriptor 3)
- All elements of the marine food webs, to the extent that they are known, occur at normal abundance, diversity and levels, capable of ensuring the long-term abundance of the species, and the retention of their full reproductive capacity (Descriptor 4)
- Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded, and that benthic ecosystems, in particular, are not adversely affected (Descriptor 6)
- Properties or quantities of marine litter do not cause harm to the coastal and marine environment (Descriptor 10)

[31] Commission Decision 2010/477/EU on criteria and methodological standards on good environmental status of marine waters

The development of MSFD indicators and criteria at EU level is still an on-going work mainly carried out by the International Council for the Exploration of the Seas (ICES) and the EC Joint Research Centre (JRC), hereinafter 'the MSFD reviewers'. Due to the need to distinguish between criteria that are fully operational and those that require further development, the EC launched a public consultation to review the EC's set of criteria and indicators. (Milieu Consortium 2014). In this respect, MS have been the most active group in providing feedback, and in fact, some of them are still sending their views. The overall work is coordinated by DG ENV, including the setting of quantifiable boundaries for GES, establishing standardised methods for monitoring and assessment, and feedback gathering. This task, which started in early 2013, is expected to be completed by April - May 2015 (pers. comm DG ENV).

ICES have long included ecosystem aspects in the single-species framework, considering technical and biological interactions (ICES 2014a). Moreover, discards are increasingly taken into account in stock assessment (ICES 2014a). ICES also remarks the need that both fisheries and environmental policies converge, especially when the '*non-fisheries parts of the trophic chains will be considered and integrated into advice beyond fisheries management*'.

Overall, MSFD sets the adequate basis to address the environmental concerns of the study. An added value of MSFD, compared to other options, is its contribution to the implementation of EU standards.[32] It is considered most cost-effective to merge Fisheries and Marine Environment Policies' needs coherently, as required by CFP by 2020.

This study will focus on MSFD criteria / indicators required against which to measure the environmental impacts of EU fishing operators. Despite most of MFSD environmental criteria and indicators may not be particularly ad-hoc for the fishing allocation process, it is possible that different gears and / or fishing patterns incur in multiple impacts. Similarly, there may be some useful indicators that may help measure several criteria, including:

- Descriptor 1 (D1). The biological diversity has a broad scope and the elements that characterise D1 include species, habitat types and ecosystems. With regard to species, the identification of the relevant species, their geographical distribution and the population size and state is fundamental. With regard to habitat, the focus is identification, extent and condition. And finally, with regard to ecosystem, key aspects include the relative composition and components. In this respect, a review of MSFD pointed out the need to prioritise the biodiversity features, compared to the current framework. The majority of MS reported having covered species, habitats and ecosystem when addressing D1 but at different levels of detail (Palialexis *et al* 2014). However, more worrying is the fact that many GES features have not been set in a measurable way, so there is a gap when choosing appropriate indicators. The group conclude that it is necessary to establish a set of relevant species and functional groups and similar efforts deserve the identification of habitats (JRC 2014).

Descriptors D1 (biodiversity per se), Descriptor 3 (commercial fish), Descriptor 4 (food webs) and Descriptor 6 (sea-floor integrity) are considered to be linked, and are frequently addressed as the 'biodiversity theme' (Zampoukas et al., 2012). Thus, a coherent approach across them is key in order to avoid overlapping and contradictory or double assessments. Moreover, MSFD reviewers suggested the possibility to combine the current descriptors.

[32] IEEEP (2014) suggests, for instance, the possibility that the UK allocates fishing opportunities according to environmental criteria using MSC standards (www.msc.org). Other approaches refer to fisheries life cycle assessment, ISO 14040, where series are used to perform environmental comparisons between different kinds of fisheries (see a revision of work published in http://lca.seafish.org/references.aspx).

For all the above reasons, D1 is not included as a candidate indicator for this study.

- Descriptor 3 (D3). MSY is, in practice, a broad concept than may be applied to '*entire ecosystems, and entire fish community or a single stock*' (ICES 2014a). MSY depends on the biomass population; members interaction among themselves and with other populations; environmental conditions; and notably, on fishing techniques and selectivity. MSY in a single stock reading – as carried out by the CFP from the beginning - can be only achieved in a healthy ecosystem. Fishing opportunities are fixed on the basis of available scientific advice and in accordance to the MSY framework. Similarly, careful attention should be paid in those situations where the quality / availability of data is not sufficient to carry out the stock assessment. In those cases – and there are many stocks like this in the EU and adjacent waters -, fishing opportunities may be dealt with through regulated access, and not necessarily through the definition of TACs.

In other words, descriptor D3 is linked to stock assessment or other alternative indicator methods. This determines whether a specific stock can be subject to fishing and to what extent. The issue of allocating fishing opportunities would come in the next stage and therefore, it does not make sense to use this indicator in this context.

However, even the EC admits an imbalance between the TACs agreed, following the annual negotiations, and the catches considered sustainable by the scientific advice. The excess of fixed TACs with respect to scientific advice in the North East Atlantic and adjacent waters over sustainable catch reached 35%[33].

- Descriptor 4 (D4). All elements of marine food webs relate to important functional aspects such as energy flows and structure of the food web such as size and abundance. The elements considered include productivity performance and abundance trends of identified key species or trophic groups, and the proportion of selected species at the top of the food webs. Large fish is a good candidate in the later that is meant to decrease with fishing pressure. However, distinguishing anthropogenic pressure from the environmentally influenced variability is not easy.

MS feedback on the review of D4 is very diverse.[34] In general, there is a lack of knowledge about energy transfer between trophic levels and species interactions. This makes D4 one of the most difficult to implement given the difficulty to identify simple indicators (Rombouts *et al* 2013). In the absence of relevant indicators, MSFD reviewers are reflecting whether monitoring changes in the food web instead the 'surveillance indicators'. Thus, D4 will not be included as a candidate indicator in the study.

However, it is difficult to distinguish anthropogenic pressure from the environmentally influenced variability. Likewise the situation regarding D4, MS feedback to the revision is very diverse.[35] In general, there is a lack of knowledge about energy transfer between trophic levels and species interactions. This makes D4 one of the most difficult descriptors to implement since the identification of simple indicators is difficult (Rombouts *et al* 2013). In the absence of relevant indicators the reviewers are considering monitoring changes in the

[33] COM(2014) 388 final

[34] For instance, in the Mediterranean, three MS have indicated that for indicator ´large fish by weight' they will use the same threshold requiring the weight of large fish caught by research vessels that are above a threshold length to be above a percentage of the total weight.

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food web instead of the 'surveillance indicators'. For these reasons, D4 is not considered a candidate indicator in the context of this study.

- Descriptor 6 (D6). Sea floor integrity implies that human pressures on the seabed do not affect the ecosystem components with a view to retain the natural diversity, productivity and dynamic ecological processes, having regard to ecosystem resilience.

The current extent of this descriptor is under full revision. There have been several research activities, at EU level, concerning habitat mapping and seabed classification (e.g. MeshAtlantic[36] and Coral Fish[37] EU Projects). MS feedback is vague and discussions focus on two new concepts, namely, functionality and recoverability of the sea floor.[38] The first step for this includes the identification of distinct substrate types deserving protection, i.e. those most sensitive to physical damage and disturbance. After that, it is key to differentiate between biogenic (including the following habitats, *Posidonia oceanica* meadows, Maerl beds, Coralligenous biocoenosis (reef) and deep corals) and non-biogenic substrates (e.g. sand, mud, mixed sediment, etc). For the second step it is necessary to have a measure the area where fishing activity occurs, to the extent that jeopardizes both functionality and resilience of the bed ecosystems. The relative impact is function of both layers of information. There are few works at EU level in this regard. It is worth noting though, the Italian GES definition of D6 (Milieu 2014b) that sets up a clear threshold when dealing with '*sealing and abrasion by fishing gears on biogenic habitats'*, which '*should be totally absent'*. Nonetheless as to non-biogenic habitats, it is suggested that the abrasion originated from fishing gears is not greater than some percentage of the seafloor surface. The authors criticise the absence of these thresholds in the current EC Decision.

Despite several studies look at fishing pressure (Puig *et al* 2012, Clark & Rowden 2009, Priede *et al* 2011), Member States have not reported information on specific activities that may cause pressure to the seafloor. A recent study describes the different pressure exerted by different gears on the seafloor (FRDC 2014). A key aspect in FRDC study is the calculation of the gear footprint width, mainly for bottom trawling and longlines, and the comparison to the exposure and fragility of benthic taxa. The results are modelled showing the predicted distribution of vulnerable taxa biomass across a geographical area with the footage from deployment of gears. These results could be taken into account for the allocation process by using appropriate thresholds, which are pending to be established.

MSFD reviewers found the work done by the EC has having scientific basis to establish reference points and target pending to be developed yet (ICES/JRC 2010). Suitable candidates for indicators that measure resilience depending on the type of habitat may include, bioengineering communities, species composition and environmental heterogeneity (ICES 2014c).

Furthermore, MSFD reviewers proposed additionally indicators that provide information on seabed recovery capacity. This requires measuring a pristine substrate is needed to establish the natural boundaries, to weigh against any fishing impact. However, 'pressure indicators' alone may not be sufficient for a sound assessment and therefore, it is worth merging them with 'sensitive indicators' (ICES 2014c). Natural impact is also useful to gauge the anthropogenic disturbances, with some exceptions, namely the less resilient habitats such as vulnerable marine ecosystems (VMEs) for which pressure indicators can be sufficient in view of their extreme sensitivity to disturbance.

[36] www.meshatlantic.eu

[37] www.eu-fp7-coralfish.net

[38] MS contributions are available http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/implementation/reports_en.htm

ICES concludes that much work and MS engagement is needed to identify reference points and targets based on impact indicators to measure the maximum amount of impact and / or fragmentation that an area can sustain before both functionality and recoverability is ensured. Notwithstanding, D6 is a potential useful indicator for fishing pressure available at DCF and worth considering for the allocation process.

-Descriptor 10 (D10). Properties and quantities of marine litter not to cause harm to the coastal and marine environment.

Marine litter consists of items that have been made or used by people and deliberately or unintentionally discarded into the sea (Milieu consortium 2014). It may be the case that gears deployed accidentally remain at sea, generating a quantifiable input of litter. From an environmental perspective, the problem worsens since the gears have the capacity to retain fish or shellfish, resulting in 'ghost fishing'. The problem is not only on the *per se* harm of litter or its impact on wild life (ingestion) but also the capture capacity that remains at sea for some time. There may be gears and/or fishing techniques with higher risks in this respect compared to each other (Brown and Macfayden 2007). Besides, retrieval efforts may also be modelled. Finally, whilst all these elements could have been considered in an allocation system, it is worth noting that the expert group reviewing the MSFD has not considered these aspects. This leads the contractor not to include D10.

Environmental allocation criteria: implementing an ecosystem-approach to fisheries management

One important assumption is that the implementation of an ecosystem-approach to fisheries management will properly address the two main CFP environmental objectives. This assumption meets both MSFD and SOCIEC objectives. If commercial species are kept under the MSY framework, there will be a contribution to attain healthy ecosystems. The overarching goals of the MFSD, by achieving GES by 2020, would contribute to the success of the CFP, at least with respect to the environmental dimension.

When assessing different gears or fishing patterns impact, the results show that some gear types may have negative impacts for one aspect and less negative, or positive, for another. Impact trade-offs may be weighed through indicators, calculating, for instance, the impact on the benthic habitats versus the affection on vulnerable species. Direct impacts from fishing activities are well documented by the Marine Stewardship Council (MSC 2010) when setting the standards for sustainable fisheries.[39] The compromise between direct and indirect impacts, if not properly reached, may jeopardize the achievement of GES. So it becomes crucial to determine, as accurately as possible, the likely impact produced by each fishing gear type, fishing technique, and fishing pattern.

In this sense, the categories of direct impact on the marine environment from fishing activities include impacts on:

- Targeted species
- Non-target commercial species retained on board
- Species which are discarded
- Endangered, threatened or protected species
- Habitats
- Ecosystems

[39] http://www.msc.org/documents/scheme-documents/msc-standards/MSC_environmental_standard_for_sustainable_fishing.pdf/view.

Assessing what gear type, fishing technique or fishing pattern produces the highest impact on any of the above categories is not straightforward, at least in most cases. Moreover, the trade-offs demand, to the extent that it is possible, an accurate selection of the indicators representing the impact degree when implementing an ecosystem-approach to fisheries management.

It is important to point out some considerations about discards. As explained in preceding sections, one of the most relevant feature of the new CFP is the objective to gradually eliminate discards. In principle, ranking gear types per volume of discards produced should be deemed as a very straightforward system to lead the allocation system. However, the landing obligation is still on going and what is more worrying its future remains uncertain. According to Article 15 of the CFP basic regulation, fisheries are yet to be defined, which has important consequences in the definition and scope of discards. Moreover, the concept is per se rather dynamic, as what is thrown back to the sea depends on multiple factors, mainly market driven. Therefore, the contractor - whilst recognising the magnitude of the problem as reflected by the CFP - estimates most sensible waiting until this measure is further consolidated before considering allocation criteria / indicators around it.

3.4 Indicators

This section proposes a set of indicators for the criteria introduced in the preceding section. It first presents social indicators (section 3.4.1), then the economic (3.4.2), and finally the environmental indicators (3.4.3).

The OECD defines an indicator as a '*quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor*'.[40] In our case, the indicator will be used to measure achievement of any given criterion at the level of metier.

Since multiple indicators may be linked to a given criterion, the study has faced the challenge having to narrow down the list of candidates to the one or two that best measure the corresponding criterion. Indicators have been formulated following a SMART approach.[41] The indicator has to be concrete, specific, and useful to clearly assess if the criterion has been fulfilled or not. Target values or thresholds for the indicators are beyond the scope of this study, considering the complexity of the matter and the need to adjust the system on a case-by-case basis. The indicator must also be relevant to the criterion with which it is associated.

The type of data needed to populate the indicator will have to be obtainable at the level of métier, with a view to show how the metier rates the criteria. The technique for obtaining the data will be also indicated. The contractor recommends formulating most of the indicators around data considered in the DCF. Alternative data sources are considered when necessary, e.g. for social indicators. The proposed indicators are universally applicable to all metiers. For those cases where an indicator is not suitable for a particular metier, this has been stated and justified.

The contractor has considered both direct indicators, '*which refer directly to the subject they have been developed for*', and indirect, '*which only refer in an indirect way to the subject*'.[42]

[40] http://www.oecd.org/dac/evaluation/2754804.pdf

[41] Specific, Measurable, Achievable, Relevant, and Time-bound.

[42] http://www.undg.org/docs/11652/MDF-Indicators-Brief-(2005).pdf

The latter has been used in cases where it is not possible to measure directly (usually for qualitative aspects, e.g. living conditions) or where indirect indicators are more cost-effective than direct indicators.

Finally a word on the choice of indicators. There has been an enormous amount of work done in recent years on indicators for fisheries management and taking into account ecosystem considerations. One recent example is the EcoFishMan project where significant effort was devoted to indicators (i.e. discussions, identifying, evaluating and ranking them).[43] In this case as in others, it is generally difficult to reach a consensus and it is logical that the choice of indicators depends on the perspective and the specific case. A limited number of indicators are presented in the following sections in an effort to keep this simple and relevant, at least as a starting point. However, it is essential to bear in mind that there many other possible indicators that could be used (Annex V). The proposed indicators may not necessarily be the best or sufficient in all situations within the vast array of different fisheries and métiers in the EU. Thus, it is likely that additional indicators may be required, depending on the context.

3.4.1 Social indicators

Criterion: **Support fishing communities**

Indicator 1: An obvious indicator for social criteria would be employment and its relative importance in local fishing communities – **fisheries dependency**.

Specific: Employment is a specific measure, which gives an indication of whether fishing jobs are being maintained in local fishing communities as well as in the various fleets in general. Employment should be measured in relative terms as fisheries dependency, meaning the number of jobs in fishing in relation to the total number of jobs in the community, thus indicating the importance of these fishing jobs in the local community.

Measurable: Natale *et al* (2013) have recently developed the methodology for fisheries dependency, calculated as a comparison of estimated employment from fisheries at each port with general employment in the areas of accessibility surrounding the port. For example, a total of 388 communities in the EU -total of 1697- were identified as having dependency ratios above 1% in 2010.

Attainable: The data needed for the purpose of calculating fisheries dependency is available and combines various types of data. MS collects fisheries employment under the data collection framework as part of the economic data on the performance of the fishing sector. This indicator makes use of data available in the Community Fleet Register. On the other hand, official employment statistics are available from Eurostat at NUTS-3 level. The methodology involves spatially disaggregating available data so as to be available to estimate fisheries dependency at the community level.

Relevant: Employment and fisheries dependency are particularly relevant when considering the CFP objective of supporting and promoting fishing activities in local communities, including the specific objective of maintaining and creating jobs. The proposed indicator identifies the local communities that are particularly reliant on fisheries, making them potentially the main recipients of support in the context of the CFP as well as social policy support. However, it is important to bear in mind that this includes fisheries employment in general, in small-scale and large-scale fleets.

[43] www.ecofishman.com

Other types of measures could be used to build a composite indicator involving other aspects such as age, wage levels, length of working hours, health and safety, education and training, job satisfaction, etc. These are indicators, which could be used as measures of the quality of jobs created and indirectly identify opportunities for young fishermen. Data on wage levels and profitability are readily available through the DCF and data collected for the annual economic report, but this is not the case for the other measures. This would have to be collected through other means such as questionnaires and surveys. However, the European Commission considers employment and fisheries dependency of special relevance.

Time-bound: This proposed indicator could be made available at the stages of initial allocation, for example in situations where rights-based management are introduced, as well as for continuous monitoring purposes. In the case of initial allocation, the time period available should also coincide with the reference period used to ascertain the historic level of catches[44]. As referred above, this indicator is useful in other contexts such as social policy support and local development, making it essential to have this information on a continuous basis.

Indicator 2: The percentage of local revenue generated by fish catching sub-sector in each NUTS 3 region annually- **revenue contribution to the local economy**.

Specific: In the DCF revenue is defined as the value of production -sale of landed fishery products- and income generated from the use of the vessel in other, non-commercial fishing activities. Income from direct subsidies and fishing rights are excluded. This is then made into relative measure using national statistics on the total revenue generated at the NUTS 3 level, thus becoming a direct measure of fisheries contribution to the local economy.

Measurable: Data on revenue are routinely collected through the DCF in all MS. These are available for fleet segments -vessel classes/gear combinations. The problem is that these data are referenced to fishing area, which in general has no clear linkage to a land area or specific port. A methodology has to be developed to combine various data such as DCF economic data and the Community Fleet Register -indicating fishing port of operation, possibly making use of a similar approach as used for fisheries dependency above (Natale *et al* 2013). On the other hand, revenue data is collected on the basis of the NUTS classification in the EU at MS level.

Attainable: The required data are generally available and collected routinely, although this indicator combines data from different sources. The EC has recognized the need for spatially disaggregated data at more finely defined geographical scale for the purpose of analyses, including the socio-economic characteristics and contributions of small-scale fisheries in local communities (Natale *et al* 2013). This is expected to lead to more spatially explicit data collection in the future, which would facilitate data processing to produce this indicator.

Relevant: As presented in the preceding section there are a number of possible socio-economic indicators that could be used in this context. The proposal to use relative revenue generated from fishing is considered most relevant, as it is a specific measure of the contribution by fishing to the local economy, which is considered as an important issue in the new CFP.

[44] Historic catch levels are another indicator of dependency on fishing, which is commonly used in combination with other information for the purpose of initial allocation. This may be called catch dependency to distinguish from fisheries dependency, which is commonly used to refer to employment in the EU.

Time-bound: This proposed indicator could be made available at the stages of initial allocation, for example in situations where rights-based management are introduced, as well as for continuous monitoring purposes. This indicator is also useful in other contexts such as social policy support and local development, making it essential to have this information on a continuous basis.

Criterion: **Corporate Social Responsibility (CSR)**

Indicator 1: Number of points assigned to persons in the context of the CFP during the last 5 years- **history of fisheries compliance**

Specific: CFP control chapter envisions a point system for serious fisheries infringements committed by persons, either holder of the fishing license or the masters. Serious infringements are enumerated with a specific amount of points to be assigned depending on the type of misbehaviour[45]. Points are cumulative and the system envisages thresholds and quantitative awards. Thus, summing up points there is an unequivocal relation with the final score and the degree of non-compliance by the CFP rules of the person or group of persons.

Measurable: Person committing infractions liaise to a fishing vessel, being its flag state responsible to set up the point system. The system includes a national register of infringements. Wrongdoers' behaviour is then recorded officially, including not only the points assigned but also the sanction imposed per each serious infringement committed.

Attainable: As from 1st January 2012, MS are required to have introduced the point of systems. Blomeyer & Sanz (2014) revised the state of play of the implementation of these dispositions. There was certainly a mismatch between the deadlines to set up the point system and the real implementation. Though, the authors probed that at EU level there are already -very different- national sanctioning systems aiming to ensure that appropriate measures are taken against those breaching CFP rules. Then it is deemed reasonable to count on the existence of official records of individuals' infringements/sanctions beyond the point system, i.e., if that system is yet to be set up, the authorities may score similarly the records.

Relevant: Blomeyer & Sanz (2014) found at EU level that '*to increase the deterrent effect of sanctions, the length of infringement procedures should be kept to a minimum*'. Being deterrent enough is a crucial aspect when enforcing the law. Thus it is important that the National authorities ensure that their sanctioning system works properly, as the CFP control chapter envisages, submitting the systems in place to audits where aspects to evaluate include '*the adequacy of the sanctions imposed, duration of proceedings, economic benefits forfeited by offenders and the deterrent nature of such system of sanctions*'.

Should the amount of infractions committed -whether in a point system or any other national system- be a relevant candidate to measure the level of compliance, data sets must be weighted. The CFP counts on the spot verifications to measure the degree of compliance of fisheries rules, mainly based in risk-analysis[46]. Only an according well-balanced inspection effort deployment in all fishing activities may guarantee the relevancy of infringement statistics as a 'fair' measure of compliance.

[45] Highest scores correspond to fishing prohibited species, fishing without permission, illegal international fishing, and obstruction to inspectors' tasks; the lowest points correspond to shortcomings recording or reporting catch-data.

[46] The process of selection of the operators to be inspected, and the inspection means –terrestrial maritime or aerial- are subjects deserving special attention in controllers' debate. For further details on risk based approach in fisheries inspection visit the EFCA website, http://efca.europa.eu/pages/home/home.htm

Time-bound: By fixing the time period to five years where the record of infringements accounts, and bearing in mind the usual length of sanction proceedings in EU systems (up to 2 years), this indicator contributes to measuring 'good' fisheries behaviour. Besides there should be a limited time period where the dissuasive effect of the sanction imposed prescribe, being those five years a good though subjective candidate.

Indicator 2: History of compliance exceeding fisheries domain during the last 5 years - **CSR index**

Specific: Fisheries behaviour is already considered in the point system, not only per se but also with regard to the existence of rewards to those skippers/license holders voluntarily aligned to certain programmes.[47] If the allocation system also contemplates aspects beyond fisheries, the indicator's scope increases in specificity. Apart from the fisheries points system, a counter of the complementary contribution to compliance –abovementioned- is needed, encompassing clearance with tax payments and social affairs, namely crews' requirements with regard to employment and working conditions[48].

Measurable: Finance Ministry offices of have up-to-date information on individuals with regard to tax compliance. Similarly Social Security / Maritime authorities perform routine inspections on the fishing vessels crew's composition, storing the results in official databases.[49] These records may be used as the rationale for scoring individuals.

Attainable: There is a variety of administrations dealing with fisheries and, in general, maritime and social affairs. Depending on the MS, the division of competences may limit the efficiency and effectiveness of a cross-sectorial procedure. However, access to maritime databases for the authorities setting RBM and access to fishing should not be problematic. With regard to tax records, there is a strong liaison between fisheries authorities and the ministry of finance, as both administrative and criminal systems dealing with sanctions often end up with the payment of fines. Thus it does not seem complicated to strengthen the links between Fisheries Authorities and Finance Authorities in a cost-effective manner.

Relevant: Where appropriate, to use citizen duties alongside good behaviour in a RBM allocation system deserves deep discussions. By contemplating these concerns there will be a measure contributing to a fair standard of living of those depending on fishing and related activities.

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47 It is worth noting the existing awarding criteria for good behaviour of the wrongdoers in the point system of the CFP. This is an attempt to consider aspects of different nature in an overarching system, as pursued in the context of this study. Herewith the actions meaning an award of points:
'a. the fishing vessel which has been used in committing the infringement for which points were assigned uses thereafter VMS or records and transmits thereafter fishing logbook, transhipment and landing declaration data electronically without being legally subject to these technologies; or
b. the holder of the fishing licence volunteers after the assignation of points to take part in a scientific campaign for the improvement of the selectivity of the fishing gear; or
c. the holder of the fishing licence is a member of a producer organisation and the holder of the fishing licence accepts a fishing plan adopted by the producer organisation in the year following the assignation of the points involving a reduction of 10 % of the fishing opportunities for the holder of the fishing licence; or
d. the holder of the fishing licence joins a fishery covered by an eco-labelling scheme that is designed to certify and promote labels for products from well managed marine capture fisheries and focus on issues related to the sustainable use of fisheries resources.'

48 Participation in local discussion forums is already envisaged in the dispositions of footnote 10 (scientific campaigns, POs membership, eco-labelling). Participation in financial planning is more abstractly is in this study in the context of other indicators pertaining economic performance.

49 As an example, Spanish regulation dealing with fishing vessel's crews certificates and other obligations in *RESOLUCIÓN de 29 de febrero de 2008, de la Dirección General de la Marina Mercante, por la que se establece el Rol de Despacho y Dotación para los buques pesqueros y auxiliares de pesca*.

Time-bound: No major concerns of compatibility are envisaged when merging both scorings - fisheries and non-fisheries compliance - in a unique indicator. The same considerations on the appropriateness of the time scale stated for the indicator history of fisheries compliance apply in this case.

3.4.2 Economic indicators

Criterion: **Catch dependency**

Indicator 1: Catches of the targeted stock during the last three years. **Catch records**

Specific: The catches recorded by an individual or group, is a straightforward measure to trace back the history of that player as a participant in the fishery. This provides a specific measurement of the longevity of the operators in the fishery, certainly trying to gauge antiquity or presence in the fishery during a certain period of time or reference period.

Measurable: Catches of fish are countable. Normally they are recorded at the level of the operator for different purposes, namely for business performance. Records may include estimate information about the skippers on board and / or accurate measurements of when catches are unloaded at port. Catches are the main data set of fisheries statistics and used also as a basis to measure compliance. In the EU fleet, there are several ways to find out such records according to the CFP:

i) Different tools are used in the EU to monitor fishing activity. It is worth noting that logbooks were developed primarily as an tool to monitor quota uptake at national level, i.e. for control purposes mainly. The EC control regulation says that '*masters of EU fishing vessels of 10 meters length overall or more have to keep a fishing logbook of their operations'.* Species-specific identified catch estimates is one of the data sets registered in those logbooks. For vessels beyond 12 m length, catch records have to be taken through electronic means and stored at a national validated database. For the smaller fleet, i.e., under 10 m length vessels, these data set are not compulsory but may be inferred from a sales notes database. Registered buyers, responsible for the first sale, need to ensure that sales notes are recorded for each sale. The skipper name and vessel will be then linked to the exact quantity of each fish species sold.

ii) Similarly the CFP also obliges MS to contribute to the DCF though collecting information This information is then used as the basis of the scientific advice to set fishing opportunities according to the biological status of the stocks and other conservation measures. Catches are then gathered by the development of sampling surveys under this other context.

Attainable: The EC control regulation requests each MS to develop a website, including a publicly accessible and a secure part. The website provide access to a database including information on catch records and sales notes that are collected for control purposes. It is worth noting that the DCF includes data gathered for control purposes. MS authorities may make these data sets available for scientific purposes. Most importantly for the context of this study, the DCF aggregates information not at individual but at group level.

Relevant: It is deemed appropriate to have catches as a proxy to measure stakeholder involvement (individual / group) in the fishery harvesting. Possible concerns with regard to operators sharing access to other fisheries, do not affect the validity of this indicator.

Time-bound: Complete and validated catch records are, in general, available with one year delay, although this varies significantly among MS. Catch record is not only time bound, but also flexible, as it can be used as the time scale for which fishing opportunities are allocated. Usually the allocation takes place on a yearly basis, but it can be part of a management plan where the evaluation refers to a larger timeframe. The selection of three years, despite being rather arbitrary, may however result appropriate in the context of the EU legal framework, i.e. three years is the minimum period to store catches and sales notes in the national databases for control purposes.

Indicator 2: Number of trips where catches of the targeted stock took place during the last three years. **Footprint**

Specific: If a vessel is located in a specific area, it is deemed to be fishing or intending to fish. When it is possible to link that presence with records of catches then this is definitely an indicator of fishing activity. If such geo-referenced data is used as a track record it is then another specific -more accurate- instrument to demonstrate longevity of an individual or group of users in a fishery.

Measurable: This information is primarily gathered for monitoring / control purposes. The control regulation obliges the skipper to fulfil a comprehensive declaration of the amount of species landed per each fishing trip. Each landing declaration corresponds to an identifiable individual vessel trip, where the skipper's catch estimates registered in the logbooks are also included. On the other hand logbooks, either in paper or electronic form have to record the location of the fishing grounds where the catches take place with certain accuracy -ICES rectangle statistics. But the control regulation states that vessels beyond 12 meters length must curry on board a vessel monitoring system (VMS) sending vessel positions to the Fishing Monitoring Centre of National authorities. [50] The spatial coverage in account of the frequency to transmit signals, every two hours, is huge compared to the logbooks. Therefore the link of catches per trip and its geographic positions is a countable variable, either in an aggregated format -ICES rectangles- or a more accurate one -VMS positions.

Attainable: The information gathered under the control umbrella is also available in the context of the DCF, though again with similar caveats concerning confidentiality. On the other hand there the only way of obtaining such data for vessels under 10 meters length is by carrying out a sampling ad hoc strategy, which may fail in spatial accuracy. Usually the small-scale fleet may have theoretical radio of action centres in the port base. According to the engine characteristics there might be another method of inference to attain the information needed. The fact that these relies on two data sets, i.e., catches linked to geographical positions, makes the attainability of this indicator more complicated but not at all impossible.

Relevant: To determine the vast area where a fishery takes place may be a relevant aspect especially for those fisheries targeting sedentary species. Fisheries resources move in three dimensions and different time scales -migrations- for different reasons so this approach may have certain caveats depending on the size of the managerial unit. But for fisheries where either the characteristics of the targeted species and/or the size of the geographical unit where the allocation takes place is large enough then it is a pertinent system to measure historicity. In fact some RFMOs have used this indicator as providing access to bottom

[50] In addition to VMS for larger vessels, the recent technological developments allow now monitoring of small-scale fishing vessels through GPS technology (e.g. PRESPO project: 'Sustainable Development of the Artisanal fisheries in the Atlantic Area'; http://atlanticprojects.ccdr-n.pt/project-area/prespo). It is now possible to have geo-referenced landings data for small vessels, at low cost. This will be a major advance, allowing integrated analysis of geo-referenced fishing effort and catch data, which is highly relevant for metier specific allocations.

fishing only for those areas where any track record of fishing activity was demonstrated[51]. Besides the fishery footprint may be a useful indicator when problems of reliability of catch/landing records occur.

Time-bound: As in the case of catch records, such a combination with geographical data is expected to entail more processing time, but should be available with a delay of one year, approximately. Record of geo-referenced catches should cover a referenced time period, which is similar to the catch level indicator. Fixing the time period to three years would be considered a convenient election.

Criterion: **Improve economic performance**

Indicator 1: An obvious indicator for economic performance would be **Gross Value Added** (GVA) - net output of a sector after deducting intermediate inputs from all outputs.

Specific: this is a specific measure of the contribution to GDP made by an individual producer, industry or sector. Thus, it can be used at various levels of aggregation, making it useful in different contexts.

Measurable: The DCF defines GVA as the net output of a sector after deducting intermediate inputs from all outputs. GVA is calculated as revenue minus costs directly attributed to the purchase of inputs, i.e. all operating costs excluding labour and depreciation. Thus:

GVA = revenue – (energy + repair and maintenance + other variable costs + non variable costs)

Attainable: The necessary data is readily available in the context of the DCF. This data is used in annual economic reports with regard to EU fleets performance.

Relevant: As this is a measure of the contribution to GDP, this is also -implicitly- a measure of the benefits to society. It should be noted that revenue – one of the indicators for the socio-economic criteria - is an input for the GVA formula. GVA is however a better measure of performance than revenue.

Time-bound: Data for the indicator are available for a number of years and they can be used in the context of allocation, which would probably be highly contentious. On the other hand, these data are also available for monitoring purposes, i.e. monitoring progress towards objectives such as improving the economic performance of fleets and fisheries.

Indicator 2: Another proposed economic indicator is **fuel efficiency**, which is also related to economic performance.

Specific: Fuel typically constitutes a significant share of cost structure in fishing and is thus related to economic performance of fleets. This becomes particularly evident in times of fuel crisis where costs soar and can result in poor economic performance for fishing fleets. This is another measure of economic efficiency related to and addressing environmental criteria. It is worth noting that the CFP basic regulation defines '*low impact fishing*' as the use of selective fishing techniques that have a low detrimental impact on marine ecosystems, or that may result in low fuel emissions, or both things (Article 4 .11).

[51] NEAFC Recommendation 19:2014, on the protection of vulnerable marine ecosystems in the NEAFC regulatory area.

Measurable: Under the DCF, data is routinely collected as litres of fuel per kg of live fish and shellfish landed.

Attainable: This data is readily available in the context of the DCF

Relevant: Since fishing is one of the most energy-intensive food production methods in the world that depends almost entirely on fossil fuels, improving fuel efficiency has a significant impact on costs, and will translate into notable performance improvements. In this sense it is worth recalling some of the EU commitments on climate change following the Kyoto Protocol, e.g. 20% annual consumption reduction of primary energy by 2020; or the new proposed measures to increase energy efficiency.[52]

Furthermore, the CFP lays down the basis for fishing opportunities allocation according to fuel efficiency, when it defines conservation measures such as, '*incentives, including those of an economic nature, such as fishing opportunities, to promote fishing methods that contribute to more selective fishing, to the avoidance and reduction, as far as possible, of unwanted catches, and to fishing with low impact on the marine ecosystem and fishery resources*' (Article 7.1d).

Time-bound: These data are available for a number of years and they can used in the context of allocation or for monitoring purposes, for example, to measure progress towards objectives such as improving fuel efficiency in fisheries.

3.4.3 Environmental indicators

Criterion: **implementing an ecosystem-approach to fisheries management**

Indicator 1 Proportion of the catch larger than length at maturity (Lm50), aimed at having healthy stocks as part of the marine ecosystem - **large fish**

Specific: In scientific campaigns supported by the DCF, the maturity state is surveyed as part of the data protocols for biological variables. Despite not all the species are sampled, all data for the species affected by the allocation process is certainly stored in the national institutes' systems. It is worth noting that the maturity length is a specific variable, not depending on data source. The specificity of the indicator proposed however, depends on the different age / size structure of the catches per gear type, precisely what matters on an allocation system.

Measurable: As aforementioned, the DCF includes sampling of relevant biological variables. DCF discriminates on gear types and regions so that disaggregation is, in principle, possible. If the allocation system does not work according to DCF standards - fleet segments - a new ad hoc aggregation must be carried out.

Attainable: Further methodological development is needed to use demographic of stocks population. ICES (2014b) points out the areas to explore: size distribution, selectivity pattern and genetic effects of exploitation. However, the indicator identified may result a useful proxy for population status as stated in the DCF.[53]

[52] http://energyefficiency-fisheries.jrc.ec.europa.eu/

[53] Defined as an environmental indicator to measure effects of fisheries on the marine ecosystem in Appendix III of Commission Decision 2010/93/EU adopting a multiannual Community programme for the collection, management and use of data in the fisheries sector for the period 2011-2013, as extended by Commission Implementing Decision of 13.8.2013 extending the multiannual Union programme for the collection, management and use of data in the fisheries sector for the period 2011-2013 to the period 2014-2016.

Relevant: MSFD states that '*healthy stocks are characterized by a high proportion of old large individuals*'. Showing population age and size distribution - with safe biological parameters (F, SSB) - determines the goodness of the status of the target species. In this way the proportion of large fish becomes relevant to assess the goodness of the biological status.

Time-bound: The information captured by this indicator reflects the implicit periodicity of the DCF.[54] However, the information is also subject to environmental variations that affect Lm50. Wright et al (2011) propose significant changes in sampling methodology to take into account other sources driving maturity.

Indicator 2 Volumes of by-catch of protected, endangered or vulnerable species as key species in the structure and functioning of marine ecosystem- Protected Species Index **PSI**

Specific: There are species whose life cycle characteristics make them more vulnerable than others. The International Union for Conservation of Nature (IUCN) sets up the list of threatened species.[55] As such any shift in stocks composition involves a risk of losing vulnerable species that are relevant to biodiversity (Descriptor 1) and likely relevant to the foodweb and functioning ('top predators' and 'functional groups' or 'key species' in Descriptor 4) (ICES 2014b).

The protection of the species is a legal instrument. In the EU, marine protected species are listed on Annex IV of the Habitats Directive, including certain cetaceans, marine birds, turtles among others, large fish.[56]

Measurable: The necessary data to establish metrics on the importance of key species by-catch, is collected through on board sampling. There have been several initiatives to quantify the amount of unwanted catches of some species. In this sense, it is worth noting those demonstrating that fishermen can avoid by-catch of vulnerable species while still targeting other species effectively (Watson and Bigelow 2014). However, the measurability of the proposed indicator is form can't be argued from a theoretical point of view.

Attainable: The DCF focuses on collecting commercial species data, but so far, it is not interested on data beyond the fisheries sector. Certainly, DG MARE is supporting new initiatives to improve the understanding of fisheries impacts on the ecosystem.[57] DCF users, namely ICES, have identified several categories of 'ecosystem' data not covered by the current multiannual DCF Programme, such as data on by-catch for protected, endangered and vulnerable species. ICES initiative includes the identification of new data to be gathered and the establishment of methodology for data collection. This initiative, and others supported by the Environmental Policy, may contribute to the attainability of the proposed indicator.

Time-bound: The timeframe of the programming and methodology developed for the ad hoc surveys should be adjusted to DCF, to make sure that the measurements are feasible.

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54 Note that the DCF facilitates data on an annual basis according to a multiannual programme.

55 An endangered species is one which has been categorized by the International Union for Conservation of Nature (IUCN) as likely to become extinct. A vulnerable species is that one likely to become endangered unless the circumstances threatening its survival and reproduction improve. The list is in: http://www.iucnredlist.org/static/categories_criteria_3_1#categories

56 Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora.

57 Call for proposals MARE/2014/19 Strengthening regional cooperation in the area of fisheries data collection.

Indicator 3 Extension of the bottom surface where relevant fishing activity takes place with respect to key habitats location. The indicator responds to minimising **marine seabed impact**.

Specific: By measuring the extension of the seabed area that has been impacted by bottom fishing a given numbers of times during a certain period, a specific measure is obtained. This information may be deducted from estimating the swept area of the gear, i.e., area covered by fishing gear. The ratio of the swept gear area to a unit (cell) surface area can be related to the proportion of seabed that was impacted by the gear a given number of times.

Measurable: The position of fishing vessels is registered in the Fishing Monitoring Centre (FMC) for vessels beyond 12 m length, according to the CFP control chapter, transmitting geographical positions every two hours through the vessel monitoring system (VMS). These data gathered on board are subsequently stored in the FMC for each vessel. Logbooks on the other hand, also store information per vessel, including gear-type data. The electronic recording and reporting system (ERS) obliges compiling the information in the national central databases, so that both data sets - positions and gear type - are recorded in time series which are then stored.

The area where bottom fishing has taken place may be inferred from VMS positions thanks to different techniques, depending on the gear type. For bottom trawlers, there are two methods to estimate the area impacted: track interpolation of two consecutive VMS points, and summation of points where the vessel was deemed to be fishing. The latter is the best option to estimate trawling intensity (Gerritsen et al 2013). Bottom longlines have also been tested to calculate swept area (Welsford & Kilpatrick 2008). Longlines also deserve special attention when differentiating VMS fishing positions of non-fishing positions (Chang & Yuang 2014), being the bottom trawling more straightforward. Bottom-set gillnets and pots, and other non-mobile gears have been less discussed in literature but estimations of fishing effort are generally approved for all kind of gears (Campbell *et al* 2013).

Attainable: As aforementioned explained, VMS and gear use data is stored in national databases. DCF already obliges MS to gather, store and make these data sets available to scientists and managers beyond control tasks, respecting the confidentiality of the data. In fact, the European Data Protection Supervisor (EDPS) recommended DG MARE to address these concerns by means of setting the legal scope of the availability of these sensitive data sets.[58] Certainly, VMS and logbook data accessibility has kept the scientific community attention for the last decade (Lee *et al* 2010) and remains a subject of discussion nowadays. Nonetheless, some recent cases indicate that the issue is not insurmountable provided there is strong political support.[59]

Relevant: Overlapping fishing activity with habitats type is the more straightforward technique to quantify adverse impact on bottom habitats. The indicator proposed does not characterise different habitats types deserving varied protection status but, for simplicity, it relies on measuring fishing pressure. It does not mean that knowledge on distinct kind of

[58] 2009/C 151/03. Opinion of the European Data Protection Supervisor on the Proposal for a Council Regulation establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy.

[59] DG MARE asked MS and produced accurate data on deep-sea activity, following the EP request to complement the EC legal proposal Com (2012) 371. Subsequently, both the National Institute CEFAS (UK) and IFREMER (France) conducted a public a socio-economic impact analysis where similarly VMS and logbook data was used well beyond control and enforcement purposes.
(www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2012/0179%28COD%29)
(www.seafish.org/media/publications/Cefas_Final_report_Deep_Sea_FishStocks_EIA_FINAL.pdf)
(www.developpement-durable.gouv.fr/Reglementation-applicable-aux,40035.html)

bottom habitats is not relevant, but that it is complementary to the applicability of the indicator, which would definitely rely on the managerial scenario. This is in fact the approach chosen by the DCF, although as explained above, it is currently under revision. Moreover, fishing impact on benthic ecosystems and gear type impact assessment is an ongoing work within the 7th Framework Program (FP7) Benthis project.[60]

Time-bound: DCF establishes one year as the timeframe to check whether the seabed has been impacted by mobile bottom fishing gears. The information is however collected on a continuous basis, and the indicator may be applied according to the scale of the allocation system.

Summary of the criteria/indicators proposed

Finally, and following the above review or criteria and indicators, Table 3 shows a summary of the contractor's proposal.

Table 3: Summary of the criteria/indicators proposed

Social criteria	Indicators	Economic criteria	Indicators	Environmental criteria	Indicators
Support fishing communities	Fisheries dependency	Catch dependency	Catch records	Implementing EAFM	Large fish
	Revenue contribution to the local economy		Fisheries footprint		PSI
Corporate Social Responsibility	History of fisheries compliance	Improve economic performance	GVA		Seabed impact
	CSR index		Fuel efficiency		

3.5 The compatibility dilemma

This section describes the main issues regarding the criteria compatibility dilemma (section 3.5.1), and reflects on possible solutions (3.5.2).

3.5.1 The problem

This section considers aspects such as: the origin of the conflict; the main obstacles to address, e.g. different political views, technical capacity, etc.; and the views and interests of the different key players involved.

Fisheries management is characterized for having multiple objectives, sometimes considered conflicting (Leung *et al* 1998). Originally, fisheries management was mainly based on biological variables, understanding that adequate management may lead to positive

[60] http://www.benthis.eu/en/benthis.htm

outcomes on socio-economic performance. Enshrining environmental objectives within the CFP as a prerequisite will lead to fulfil socio-economical concerns (Grieve 2009). However, the system is much more complex, encompassing resource, harvesting, the processing and marketing sectors, and all stakeholders involved in fisheries. Fishers, scientists, environmentalists, managers and politicians have different perceptions and interests, often with competing and conflicting objectives.

Another major feature of fisheries is the all-pervasive nature of conflicts (Parsons 1993). Competing for the same stock is reflected by disputes on access, followed by allocation of limited fisheries resources, for which there are usually many different voices. For this reason, consultative bodies are key to take all concerns on board. The problem is further complicated due to the multiplicity of objectives and the heterogeneous composition of the managerial structure. Balancing all interests often turns out to be a challenging task, in which the political dimension plays a key role.

During the last two decades there have been several worldwide attempts to establish platforms for the accommodation of conflicting interests in fisheries (see section 2). The idea focuses on separating micro-level decision making on allocation and licensing from the traditional Management Authority (Minister) in favour of boards formed by scientists and the industry. Participatory leadership may produce better acceptance of decisions taken. At EU level, the creation of Regional Advisory Councils in 2004 encouraged the participation of the fisheries sector in the formulation of management. The new CFP is promoting less micro-management, more bottom-up, regional approaches to management, with greater stakeholders involvement and even responsibilities. Currently, Advisory Councils are fully engaged in policy-making and National Management Authorities, industry and NGOs can defend their positions whilst cooperation towards the CFP implementation. However, their decisions are not binding regarding the allocation of fishing opportunities, and the EU is the single competent authority deciding on how to allocate access to fishing among MS via the stability principle.

With regard to the situation within MS, to the question of whether stakeholders are involved in the decision making process for the allocation of fishing opportunities, the results of the survey conducted for this study suggest that the National Systems are mostly centralised under a single Management Authority, as it is also the case in other non EU countries surveyed. MS generally agree with regard to the use of socio-economic and environmental dimensions to allocate fishing opportunities, although not much feedback on functioning of the systems was provided (see Section 2). MS did not report either much detail on what tools they have in pace to bring together the views form different the stakeholder and face with the CFP challenges.

Overall, feedback obtained suggests the main issue revolves around tackling the complexity of fishery scenarios and stakeholders engagement. In this scenario, it may be worth further consultation with stakeholders with regard to what roles should they to play in the decision making process.

This would enable policy makers to justify decisions in a more solid way with a system where the stakeholders' opinion is more explicitly clarified.

3.5.2 Striking a balance

This section reflects on possible ways to strike a balance between environmental, social and economic criteria for the allocation of fishing opportunities. The approaches are based on reviewed literature, stakeholder consultations, and the contractor's own judgment.

Several projects under the EU FP7 programme have looked at how to improve the multidisciplinary decision-making in fisheries management science, considering social, economic and environmental aspects. Projects such as MEFEPO, ECOFISHMAN, SOCIOEC, GAP2 and BENTHIS, propose tools for decision-support management. These range from rights based management to self-governance. Intermediate formulas regard adaptive management – effort and response analysis - and co-management -with share powers (ECOFISHMAN 2011, MEFEPO 2011). But it has been clearly stated that decision-making responsibility for the allocation of fishing rights, falls exclusively under management authorities. Going one step further could involve providing advice to manager, but in no case it should contemplate sharing or delegating power.

In business management science, Decision Analysis is broadly utilized. This provides a logical and systematic process for decision-making in complex frameworks, especially where uncertainties are particularly present. Fisheries, apart from the 'common property' problem and the conflicting interests issues abovementioned, may be defined as a rather stochastic process where predictions are strongly influenced by random components. This contributes to uncertainty. It is well documented that fisheries objectives cannot be simultaneously optimized (Pope 1997). But policy should lead to appropriate trade-offs, at the same time as help better understand the different objectives and reduce uncertainties. Decision Analysis, may contribute to facilitate the work of management authorities by mean of several analytical tools. It is worth remarking that Decision Analysis does not substitute decision-making but facilitates managers choosing the best option.

Analytical hierarchy process (AHP) introduced by Satty (1977) is a practical and reliable method to prioritise options in addition to Decision Analysis. Once a hierarchy of objectives has been set up, the information is obtained from stakeholder consultation by pairwise comparisons, which consists on ranking attributes. In fisheries, there are few examples of AHP application over the last two decades (Leung *et al* 1998, Mardle *et al* 2004, Fitzpatrick 2013, SOCIOEC). AHP mainly consists on three steps:

- Selection of objectives and the corresponding criteria that respond to the fulfilment of those objectives.
- Performing criteria pairwise comparisons by granting weights from a pre-established scale.
- Computing the weighing by different group of interest.

For illustrative purposes, the application of the AHP in the context of this study would have involved the following steps: Firstly, conducting a field survey to obtain stakeholders' view with regard to the allocation of fishing opportunities process and the CFP objectives; Secondly, setting up a matrix, based on the survey results, which would include the different weights allocated by stakeholders to each criterion; Finally, facilitating the matrix to management authorities and policy-makers to adopt the final decision.

4. CASE STUDIES: TESTING THE SYSTEM

The case studies provide qualitative feedback from different stakeholders involved in, and affected by, the allocation of fishing opportunities, with a view to assessing: the relevance of the proposed criteria and indicators; the feasibility of measuring and obtaining the data for each criterion; and feedback on what suitable indicator target values would be, etc. For this purpose, the two case studies selected include Bluefin tuna fisheries in Spain (section 4.1) and the Danish coastal fisheries (4.2).

4.1 Bluefin tuna fisheries in Spain

KEY FINDINGS

- Managers and most of the industry representatives consulted confirmed the validity of Bluefin tuna fisheries as a case study; NGOs consider Bluefin inappropriate in representing the issue of allocation in the EU, as decision-making is mainly driven by **ICCAT**
- An ITQ system operates in Spain engaging the varied fleet segments. Since 2007 **annual distribution** of the national share is performed by the Central Government with the participation of industry representatives, managers and scientists; current allocation reported to ICCAT in National fishing plans is **balanced** among gear-types
- Generally, consulted stakeholders agreed with the proposed set of criteria/indicators; the main shortcoming detected corresponds to the **scale of data gathering**, especially with socioeconomic variables. The extent of the **reference period** to set the initial allocation on the basis of catches was found to be a major shortcoming for the artisanal fisheries representatives; the issue transcends from local to higher governance levels (EU and ICCAT)
- Exceptionally, seines representatives consider Bluefin fisheries as a pure **economic activity**, deserving economic-based management as such, not necessarily aligned with the proposed set of indicators
- **Environmental concerns** in Bluefin tuna fisheries are not considered a major issue; except for rare exceptions it should be considered an asset (active factor) of the allocation equation

4.1.1 Introduction

Bluefin tuna fisheries are frequently in the media. However, they are atypical in terms of business income, the peculiarities of harvesting, and the geopolitical context. The delicate biological situation of the stock has also contributed to the public awareness. A decade ago the stock was almost overfished but government officials, scientists, and environmentalists generally agree that the Bluefin tuna is recovering.

The species migrates and extends over the Atlantic, Pacific and Indian Oceans. However, the main Bluefin tuna fishery was, and remains, the Mediterranean Sea. Bluefin migrate to the Mediterranean every year to breed and it is therefore essential to their survival. Atlantic Bluefin tuna live mainly in the North Atlantic, and the waters surrounding the Balearic Islands are an important spawning area, with frequent vast aggregations of individuals. Most of the Mediterranean Bluefin is exported to Japan. In 2012, Bluefin was auctioned in Tokyo at more than 2000 Eur/kg, although this was exceptional

Atlantic Bluefin tuna is managed by ICCAT and has been under the TAC system since 1998. The introduction of fattening and farming activities in 1997 led Bluefin catches to increase exponentially. In 2007 a 15 years Recovery Plan was launched, with the aim of acquiring B_{MSY} in 2022 with at least 60% probability, which appears close to being achieved. The relevant Scientific Committee stated in October 2014 (SCRS 2014) that '*there are continuing signs of the success of the rebuilding plan*'. As a result, fishing opportunities are set to increase by 20% over the next three years. This supports the selection of Bluefin tuna as a case study in the context of this study.

Reporting on Bluefin is subject to misreporting (MARE 2013, SCRS 2014). In fact catch data availability and reliability have always been considered major shortcomings. There is also limited accurate data on population structure, which remains poorly understood. Nevertheless, the enhanced legal and political framework since 2008 has improved monitoring, control and enforcement, and these in turn have clearly led to a reduction in fishing mortality, and in an increase in spawning stock biomass.

Very different types of gear are used to harvest Bluefin. Some fishing techniques are large scale and involve very large catches, for example purse seines, traps, and pelagic trawling. Others techniques offer smaller catches per operator, such as line gears e.g.: pole lines, hand lines, trolling lines and long lines. Fishing capacity is a function of many variables, primarily vessels size and numbers. Managers could make distinctions depending on the gear used but usually apply general technical measures, such as closed seasons, minimum landing size, and catch trace-back measures. ICCAT has, however, establish some specific rules according to the vessel size and gear type[61].

4.1.2 The fleets

Significantly different types of gears are used in Bluefin fisheries in Spain. National legislation has, for some time, established specific technical measures for all of them, in some cases exceeding the requirements of the ICCAT and EU legal frameworks[62].

Purse seines deserve special attention, as these have been most responsible for jeopardizing fish stocks in recent years (SCRS 2014). Bluefin is captured at sea with purse seines and then moved alive to farming cages close to coast to be fattened for between four months and two years, depending on market requirements. In Spain there are only six purse seine licenses, and these are based in Tarragona Province (Catalonia). However, the enterprises in this region have pioneered the farming approach that has now spread around the Mediterranean to other EU and non-EU countries.

Traps consist of artificial barriers that block the movement of tuna schools crossing migrating near the coast. Traps are traditional type of seasonal gear used for tuna farming. Now, however, the Japanese market is driving the growth of commercial trap net fishery enterprises. In Spain there are four active trap net fisheries ('almadrabas') in the Strait of Gibraltar (Andalucía).

Line gears are traditionally the main type of gear used in Spain for tuna fishing, in terms of the number of operators. Unlike seines and traps, vessels carrying lines target a variety of

[61] Recommendation 14-04 Amending the Recommendation 13-07 by ICCAT to establish a multi-annual recovery plan for Bluefin tuna in the Eastern Atlantic and Mediterranean.

[62] Royal Decree 71/1998 of 23 January (*Real Decreto 71/1998, de 23 de enero, por el que se regula el ejercicio de la pesca de túnidos y especies afines en el Mediterráneo*)

species during the fishing campaign. Mediterranean based vessels carrying long lines target swordfish, albacore and demersal fish. Bait boats with pole lines based in the North Atlantic fachade include Bluefin catches with albacore and so do trolling lines. Both may change gears targeting small pelagic in ICES area VIII. Hand lines in the Mediterranean and the Strait of Gibraltar change gears in season to target large Bluefin individuals. Catching Bluefin with pelagic trawlers is not allowed in Spain.

Finally, recreational fisheries are very well established in Spain and Bluefin catches are traditionally sought by both sea anglers and charter boat skippers.

EU MS are distribute quota according to their own rules and systems (see section 2). Bluefin is one of the key regulated fisheries in the EU, and is under auspices of ICCAT. Table 4 shows the percentage of national quota allocation in 2014 for illustrative purposes.

Table 4: National quota allocated (%)

	% EU TAC	other lines	long lines	almadrabas	seines	trawlers	recreational sport
Cyprus	1	75.00	15.06				
Greek	2		99.79				0.21
Malta	2		58.06		42.24		
Portugal	3			100.00			
Croatia	5	1.92			96.74		1.34
Italy	25		14.28	8.89	78.22		0.54
France	31	12.52	0.95		78.67	6.07	1.01
Spain	32	31.07	13.48	26.20	27.30		0.11

Source: National regulations & websites[63], DG MARE, ICCAT

The case of Bluefin tuna allocation among the different Spanish fleets is described below in order to assess the set of criteria and indicators proposed by the contractor in achieving CFP objectives. Feedback from stakeholders, including the Management Authority, is used to inform the recommendations put forward in this study.

4.1.3 Assessment/validation of the proposed criteria and indicators

Interviewees generally agree with the contractor's proposals. Social, economic and environmental criteria should be taken into account when allocating fishing rights. The selected criteria are accepted and the indicators are seen as valid candidates to measure them. There is, however, some dissent, mainly by those who consider fishing as an activity driven purely by economic rational.

Interviewees included stakeholders from the industry, managers and NGOs (see Annex IV). Most of them provided substantial arguments in favour of the proposal. Some suggested adjustments, and very few were opposed. Not all the fleets, but at least one representative of the eight identified different gear types used for catching Bluefin tuna (Table 5) were

[63] http://www.magrama.gob.es/es/pesca/temas/planes-de-gestion-y-recuperacion-de-especies/plan-de-recuperacion-plurianual-para-el-atun-rojo-del-atlantico-este-y-mediterraneo/atun_rojo_14.aspx http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000028858281&categorieLien=id http://www.gazzettaufficiale.biz/atti/2014/20140148/14A04865.htm http://www.propisi.hr/print.php?id=2524

interviewed. Managers with direct responsibility for allocating fishing grounds were interviewed, not only the Central Authority, but also local authorities and at RFMO governance level (ICCAT). Finally representatives of NGOs completed the range of the field survey.

Table 5: Gear types catching Bluefin tuna: main elements

	Port base	*Area*	*DCF code*	*No vessels*	*% ES quota*
Seines	Cataluña	FAO 37	PS	6	27.30
Almadrabas	Andalucía	FAO 27	FPN	4	26.20
Long lines	Cataluña, Valencia, Murcia, Andalucía	FAO 37	LLD	65 (*)	13.48
Pole lines	País Vasco, Cantabria, Asturias, Galicia	FAO 27	LHM	56	20.95
Trolling lines	País Vasco, Cantabria, Asturias, Galicia	FAO 27	LTL	26	6.15
Hand lines	Cataluña, Valencia, Murcia, Andalucía, Canarias	FAO 27,37 FAO 34	LHP	581	
Small long lines	Cataluña, Valencia, Murcia, Andalucía	FAO 27, 37	LLS		3.97
Recreational	Cataluña, Valencia, Murcia, Andalucía, Baleares	FAO 27, 37	-	25000 (**)	0.11

(*)Hand lines comprising active fishery in the Strait of Gibraltar **Source**: www.magrama.es
(**)Estimations of the *Asociación mallorquina Pesca Recreativa Responsable*

The Spanish management authority explained the system to allocate Bluefin tuna quota between the fleets since the entry into force of the ICCAT recovery plan in 2007. The legal basis is established in article 27 of the Fisheries Act[64] and is based on catch records and socio-economic aspects. In the case of Bluefin tuna the fishing opportunities consist of quotas but this is not the only system provided in law (effort units are a possible alternative). The initial allocation in 2008 distinguished between those vessels actively targeting Bluefin tuna ('active fishing'), and those catching Bluefin tuna incidentally ('incidental fishing'). A third group of vessels categorised as 'others' includes auxiliary, support, processing and towing vessels, alongside purse seiners.

The criterion used to allocate 60% of the quota was fisheries dependency over the preceding years. The indicator used was the total record of Bluefin tuna catches compared to the total catch record. In the case of the so-called '*industrial fisheries*'[65] (purse seiners, bait boats and the almadrabas) a time period of 10 years from 2006 was used as the base reference period for totalling official catch records. For the remaining of the activity ('*artisanal*') the period decreased to five years, although additional sources of information were allowed. Thresholds used to consider active fishing ranged from 5-10%
The criteria used to allocate the remaining 40% of the quota was an assemblage of socio-economic factors. Article 27.4 of Law 3/2001 establishes '*employment*' as the variable

[64] Ley 3/2001, de 26 de marzo, de Pesca Marítima del Estado. Law 3/2001 was amended last 26th December 2014, without consequences with regards to the allocation system.

[65] Spanish managers remarked the exclusion of long liners based in Atlantic ports in the allocation system, vessels performing other important large pelagic industrial fisheries in high seas and third countries sovereign waters.

complementing the allocation system once after consideration of the history of catches. Allocation of Bluefin using this criterion involved an assessment of the number of employees on board fishing vessels, the number of employees in trap net fisheries ('almadrabas') and number of employees in Bluefin fattening enterprises. The seasonality of activity was considered in the assessment.

Finally, the allocation was done to the extent possible at the level of individual fishing vessels, as ICCAT requested (Magrama pers. comm). The one exception was the fleets more recently incorporated into the system, namely the artisanal fisheries with port base in the Canary Islands, which have a single quota for the entire fleet. A buffer or remaining quota of up to 3.71% of the quota is established in case of overfishing and other unexpected circumstances.

Bluefin tuna right-based management is completed with the possibility of transferring quota between operators either for a given period, or per fishing campaign. There is a concentration cap of 30% of total quota deducted the buffer quota, preventing excessive concentration. Additionally, there is a 'use it or lose it' provision allowing participants to receive allocation only if they have fished during the last two years or at least during three of the last five years. Allocations are allocated in perpetuity.

The quota of Bluefin tuna in 2014 was fixed[66] at 2,504.45 tones, corresponding to the application of the percentage assigned to Spain in the EU legal framework[67]. The National quota is allocated based on the system described above and the results are published each year in national Resolutions[68]. In 2015, according to the last ICCAT negotiations, Spain will be assigned almost 3,000 tones, a 20% increase compared to 2014. Successive increases of 20% are assured for 2016 and 2017. The Spanish authorities do not envisage any particular revision of the current allocation system at National level. So the proportion of the quotas per fleet segment will remain steady, as shown in Table 5.

4.1.3.1. Social allocation criteria: support to fishing communities

Interviewees welcome the need to provide benefits to society in general, and in particular to coastal communities. They consider it as almost a duty in the context of allocating fishing rights.

Although the criterion is relevant, problems arise when applying the indicators. The main issue is scaling. Firstly, differentiating Bluefin tuna activity from other fisheries, and secondly making the measures meaningful when selecting the spatial scope. An interesting outcome was obtained: incentives should be given to those vessels or skippers whose revenues contribute to fostering social initiatives for the coastal communities on behalf the fisher's community. For instance, by investing in the development of local museums, foundations and other cultural institutions or activities related to fishing activity. Records of the '*socialization of revenues*' are easily traced by Official Registers, so indicators are also within

[66] Council Regulation (EU) No 43/2014 of 20 January 2014 fixing for 2014 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, to Union vessels, in certain non-Union waters.

[67] Council Regulation (EC) No 49/1999 of 18 December 1998 fixing, for certain stocks of highly migratory fish, the total allowable catches for 1999, their distribution in quotas to MS and certain conditions under which they may be fished.

[68] Resolución de la Secretaria General de Pesca de 2014, por la que se establecen las disposiciones del plan de atún rojo en el océano Atlántico y el mar Mediterráneo. Resolución de 10 de marzo de 2014, de la Secretaría General de Pesca, por la que se publica la asignación de cuotas de atún rojo y del censo específico de la flota autorizada para el ejercicio de la pesca del atún rojo creado por la Orden AAA/642/2013, de 20 de abril, por la que se regula la pesquería de atún rojo en el Atlántico Oriental y Mediterráneo.

reach with simple monitoring, in the opinion of the supporters of this proposal (managers, NGOs).

Findings for the proposed indicators are:

- Indicator 1: FISHERIES DEPENDENCY, a measure of the relative importance of employment in the coastal community. The indicator, as based on employment is considered suitable and relevant in general. Not much detail was obtained on the feasibility of the indicator, although there are different systems to obtain employment figures (for example DCF as function of full time equivalent, STECF 2014).

  The main discussion was around what should count as employment, for example on-board employment and/ or indirect employment generated from fishing. Some stakeholders consider that only on-board employment should count. Lastly, some argued that this indicator is not feasible because the official figures lack reliability or because the available employment databases do not differentiate between Bluefin and other fishing.

- Indicator 2: REVENUES, percentage of local revenues generated in a specific area/region. The interviewees consider this indicator relevant, but did not mention the issue of how to relate the particular revenue to the region. An average value of catches per fisher on board was proposed as an alternative indicator.

Recreational fishing representatives were sceptical about this indicator. They argued that the contribution to the local economy of this sub-sector is not measured by this indicator and should therefore not be taken into account. In terms of the indirect economic activities induced by recreational fishing, the impact of the allocation on tourism (hotels, restaurants) and other services should be assessed, as a potential contributor to fostering the welfare of coastal communities[69].

4.1.3.2. Social allocation criteria: Social responsibility

Are fishermen supposed to provide intangible benefits to society? Is this not going beyond fisheries managers' responsibility, especially when allocating fishing opportunities between operators? The main finding is that this criterion is relevant.

Most of the replies were in favour of the contractor's approach, based on the suggestions of the CFP. Compliance should be a baseline to give preferential access to those who behave well. The issue is when exactly to provide this award: at the moment of issuing licenses, giving authorisation to start fishing, when allocating fishing opportunities.

Survey respondents gave the following opinions:

> Indicator 1: HISTORY OF FISHERIES COMPLIANCE, assessing the state of play of the skipper point system to determine if he/she should be penalised with limited access to or exclusion from fisheries for a specified period. Despite the management authority's duty to enforce the law, regardless of the context of fishing opportunities allocation, some stakeholders do not entirely agree with the contractor's proposal and find this indicator arbitrary. On the other hand, those in favour, went further suggesting to adjust the legal framework to support the Bluefin tuna recovery plan,

[69] Indeed the interviewees referred to the experience in other EU MS or in the USA where non-professional fishing targeting large tuna is a relevant economic activity beyond fishing industry.

paying particular attention to compliance with traceability dispositions (Bluefin tuna Catch Documentation Programme), source of most serious infringements at present.[70]

Indicator 2: CSR INDEX, considering not only fishery infringements but also the responsibility and contribution of fishermen towards a better society. Whilst some stakeholder find this indicator irrelevant in a context -the EU- where human rights are not threatened, others argue that it could contribute fighting IUU and illegal immigration as well as ensure fair working conditions on board.

Some respondents consider the CSR index a step towards strengthening social cohesion. Fulfilment of fisheries rules means an improvement of the Bluefin tuna stock, but ensuring that fishermen comply with social duties may improve their perception. There were more supporters than detractors, as the indicator is not counterproductive but relevant, at the same time feasible. The international context of Bluefin fisheries well beyond the EU context was also quoted as an argument in favour of this indicator.

4.1.3.3. Economic criteria: Fisheries historic-dependence

Fisheries are an economic activity and therefore setting appropriate economic yields of fishing enterprises is an attainable objective. The relevance of the criterion is not questioned. If anything it is considered that it should be balanced with other objectives (social and environmental).

Stakeholders put forward the following opinions:

Indicator 1: CATCH RECORDS, history of relative catches of Bluefin tuna during a reference period. Measuring previous activity is relevant in the sense of assessing operators' customary rights, and is relevant in a social context. However, the approach here is economic, since the catch records are linked to revenues.

Indicator 2: fisheries FOOTPRINT, linking historical catches with historical vessel positions. Spatial analysis of catches may help to determine more accurately the historical catch dependency of operators, especially in an international environment, such as RFMOs. It is however important to retain the linkage between vessel positions, catches, and gear type used, otherwise this indicator becomes irrelevant. It is worth highlighting that no one of the interviewees found here an issue as with the feasibility of the indicator.

4.1.3.4. Economic criteria: Improve economic-performance

Some respondents argued that operators should be free to implement their business models. This strong, but isolated, opinion contrasted with the more generally held opinion. There was some scepticism about the feasibility of the proposed indicators on the grounds that it is very difficult to differentiate Bluefin-only activity from other activity.

The proposed indicators:

- Indicator 1: GVA, as a measure of the economic performance of fishing enterprises. There were no significant views for or against this indicator. Some consideration was given to the need for preliminary assessment of the potential GVA performance under different management scenarios, prior to making allocation decisions. A new indicator was proposed based on the registered average prize per gear type fleet.

[70] http://wwf.panda.org/who_we_are/?233284/Mediterranean-bluefin-tuna-quota-increase-too-much-too-soon

- Indicator 2: FUEL EFFICCIENCY, as a measure of the economic performance of fishing enterprises. Fuel consumption also did not generate discussion, although it was considered a variable best suited to environmental concerns (CO_2 footprint). Most of the replies understood that costs related to fuel consumption affect economic performance.

Some feedback recommended caution regarding the use of economies of scale in assessments. Other costs (e.g. consumption bait-related) besides fuel consumption should be considered in the allocation equation.

4.1.3.5. Environmental criteria: Implementing EAFM

Protection of the marine environment (taking into account the effects of different types of gear) should drive access to fishing. This is generally accepted, although no suggestions were offered as how to proceed, apart from the contractor's proposal. Discards and unwanted catches should be reduced to the extent possible by favouring those gears that are '*scientifically*' proven to have less impact.

Some stakeholders argued that environmental concerns should be assessed on a case-by-case basis, outside the allocation context. They do, however, provide solid arguments for establishing the quality and added value of fish products once on the market. Those who favour setting fishing opportunities using environmental criteria have also suggested technical measures and other CFP management tools.

A preliminary proposal for a new environmental (but also social) criterion could include 'increasing scientific knowledge of targeted stocks'. This proposal came from different stakeholders (industry, managers, and NGOs), which therefore increases its significance. The rational is that there some gear types provide important data series that make the assessments of stocks possible, for instance, gathering data from young age classes. Bait boats have provided outstanding historical data series (SCRS 2014). The so-called *'scientific quota'* for Bluefin is seen as an option in the allocation system as explained in previous sections for other fisheries.

The proposed indicators:

- Indicator 1: Proportion of LARGE FISH, as a measure to increase selectivity and reduce impact on the marine environment. This was welcomed by the interviewees, although it did not generate major debate. Some argued the need to protect ovate females, a concept not implicitly included in this indicator.
- Indicator 2: PSI by-catch of protected species, as a measure to increase selectivity and reduce impact on the marine environment. This was welcomed by the interviewees, but was not further discussed.
- Indicator 3: Proportion of SEABED IMPACTED, as a measure to reduce impact on the marine environment. This was considered not relevant in the context of large pelagic fisheries, such as Bluefin, developed far from the seabed in normal conditions.

4.1.4 Conclusions

Very different fleets and gears harvest Bluefin in Spain. Since 2007, fisheries management authorities have been distributing quotas on the basis of social and economic criteria based on relative employment figures (40%) and historic catch records (60%) at the time of the initial allocation. The Spanish authority takes into account the seasonality of tuna activity, which varies according to the gear used. Moreover, fattening and farming Bluefin were considered as fishing activity, therefore it includes related employment until the first sale takes place. In view of the Spanish managers terms, the different fleets complied equally with the required environmental standards.

In general, consulted stakeholders agree with the proposed criteria and indicators. The main shortcoming relates to data availability and accuracy. Catches and employment figures are accepted drivers for initial allocation at earlier stages. It is generally agreed that the proposed indicators are quite demanding in terms of the corresponding data needed. Moreover, the problem of scaling while ensuring sufficient accuracy to differentiate Bluefin tuna activity from other fishing activity is an issue for most stakeholders. This lack of accuracy affects socioeconomic variables in particular (revenues, employment). Similarly it is considered difficult to quantify the extent to which Bluefin tuna fisheries contribute to promoting coastal communities. Recreational fisheries activities are a solid candidate in terms of current and potential investments.

Environmental concerns in Bluefin tuna fisheries are not considered a major issue. Except for some rare exceptions, these should be considered as part of the allocation equation. In fact this criterion was always cited as relevant for complying with CFP objectives. The principle is to follow selectivity and low impact approaches, by using incentives as part of the allocation of fishing opportunities. Overall, respondents have provided different weights to the environmental criteria.

Complementary criteria responding to CFP goals were obtained from the survey. Some related to less tangible variables, categorised as '*socialization of revenues*' as an attempt to foster the contribution of fishermen to cultural initiatives within coastal communities. The CSR index was notably not criticized in the survey.

Another substantial proposal form the survey referred to rewarding those fleets providing relevant data sets for stock assessment with a '*scientific quota'*. However the situation may reverse beyond the allocation context but within RBM system. Since the bait boat fleet segment is transferring its entire quota share to other fleets, young age class data input is missing for recent years so that the Bluefin stock assessment remains problematic (SCRS 2014).

There is significant criticism in Spain on the Bluefin tuna scheme, as it could be observed, for instance, in the speech of Soto J.M. in the PECH public hearing on 04/12/2014. The initial allocation was set using catch records in different periods according to two different fishing patterns, '*active*' and '*incidental fishing*'. The scheme was labelled as 'unfair', by those not considered active fisherman, with a lesser share.[71] This may have legal consequences in future considering the similar cases where National Government decisions have been questioned.[72] The specific Bluefin context requires a thorough and transparent debate about allocation and annual negotiations.

[71] Proposición no de ley presentada por el Grupo Parlamentario Mixto, sobre el incremento de la cuota de atún rojo para Canarias. Boletín Oficial de las Cortes Generales. Congreso de los Diputados. Septiembre 2014 Num 510.

[72] The local Government of Asturias brought to the Court the decision taken by the Spanish Government when allocating mackerel among fleets as considered unfair and against the CFP.

But this is not only a country issue. When the European Council set the Bluefin allocation key between EU MS, the Republic of Italy argued that the European Council had not applied the Stability Principle, and brought the case to the EU Court of Justice.[73] The main issue was the alleged exception in the application of the Stability Principle by the Council. The ruling of the Court was against the appellants, as the European Community had followed the same criterion invoked by ICCAT, namely choosing the more convenient year, out of a reference period of two. The Court also stated that there is no legal obligation for the Council to fix the extent of the reference period.

Most survey respondents do, however, recognise that the extent of the reference period has to be established clearly and transparently, and it that it must reflect reality. The period must be long enough to take account of distortionary events. It is also important to use reliable time series, as data their credibility has been highlighted as a major issue.

4.2 The Danish Coastal Fisheries

KEY FINDINGS

- A **special scheme** for the protection of coastal fisheries was introduced in Denmark at the same time as the system of vessel transferable quotas was implemented for demersal fisheries in 2007
- This scheme has functioned during the period 2007-2009, 2010-2012, 2013, and 2014-2016. Commercial fishing for vessels up to a maximum length of 17m can participate voluntarily (and leave at the end of the period), benefiting from **additional quota** subject to certain conditions
- In spite of this scheme, coastal fisheries are struggling in Denmark. The latest **revision** of the scheme increased the additional quota provided, but this is not expected to have major impacts in reversing the downward trend of coastal fisheries
- Stakeholders indicate that the key issue is that these coastal vessels are part of the **VTQ system** and thus exposed to the pressures of the market (i.e. sale and leasing of fishing rights). This system was devised with the objective of improving economic performance, so the weaker performers such as smaller coastal vessels are outcompeted and bought out of the fisheries
- There is general agreement with the proposed social and environmental criteria and indicators, which is in line with the considerations and criteria developed by a Ministerial Working Group (2013). It is however important to state that the use of the proposed criteria and indicators is **not considered sufficient** if the objective is to protect coastal fisheries. Other measures are necessary, which are not directly linked to allocation
- In relation to using **economic performance** as a criterion, this is **not considered appropriate**. Instead, coastal fisheries should be managed separately from large-scale fisheries, using a distinct set of socio-economic objectives

[73] Opinion of Advocate General Ruiz-Jacobo Colomer- Case C-120/99

4.2.1 Introduction

Individual transferable quotas (ITQ) were introduced in 2003 for pelagic and industrial fisheries in Denmark. This was followed by the introduction of vessel transferable quotas (VTQ) for demersal fisheries in 2007. The main reason from implementing VTQs or vessel quota shares (FKA[74]) as it is called in Denmark, was the need to improve the economic performance of demersal fleets. A large reduction in fishing capacity was expected, which would thus result in improving the profitability of fishing, as well as solving problems such as discarding and highgrading (MRAG 2009).

The main focus of this case study is the special scheme that was devised to protect small-scale coastal fisheries in conjunction with the introduction of VTQs, primarily through the allocation of extra quota for important target species (cod, sole and plaice – the latter added in 2014). The definition used in Denmark to identify the coastal fleet is all vessels up to a maximum length of 17 m, including all gears (including trawl[75]. However, it is important to point out that all vessels participating in this voluntary scheme are part of the VTQ system (or FKA system) and fall within the category of active commercial fishing vessels (i.e. above a certain limit in terms of turnover).

4.2.2 Coastal fleet production

In 2012, 755 fishing vessels were active out of a total fleet of 1833 (Table xx). Note that the EU Fleet Register includes a large number of vessels that are considered inactive or less active (i.e. not considered commercial fishing) in Denmark[76]. Coastal fishing vessels (≤ 17m) constituted about 573 of the active fleet or 76 %. There has been a significant reduction of vessel numbers in the period 2001 to 2011 (roughly 60%), which is linked to the introduction of the VTQ system. However, the trend for decreasing number of vessels (and fishing capacity) was already evident in the early 2000s, before the introduction of VTQs, mostly because of reduced fishing opportunities and restrictions.

The coastal fleet refers to all vessels up to a maximum length of 17 m, but it is important to point out that coastal fishers refers to those that are managed under the special scheme for coastal fishers (248 vessels or 43% of coastal vessels in 2012). This voluntary scheme is specified in the regulation on fisheries[77] and has been modified several times since 2007.

The total value of catches taken by coastal fishers was estimated to be 29 million Euro (219 mio. kr.) in 2012, which was 10 % of the total revenue by all fleets (Table 6). The value of catches taken by other coastal vessels 31 million Euro (230 mio kr.) in 2012 (i.e. vessels ≤ 17m that decided not to be part of the coastal regulation due to various restrictions imposed).

[74] FartøjsKvoteAndele

[75] Note that the definition for coastal and/or small-scale fleets varies considerably in Member States. The European Commission defines small-scale fleet as vessels smaller than 12 m (LOA) using static fishing gears. STECF 2014

[76] Community Fishing Fleet Register; http://ec.europa.eu/fisheries/fleet/index.cfm

[77] Fisheries regulation; https://www.retsinformation.dk/Forms/R0710.aspx?id=165394

Table 6: Number of vessels participating in the scheme for coastal fishers and their revenue in 2009 and 2013. This is compared with other vessels in the fleet.

	2009	2009		2012	2012	
	Vessel no.	Revenue Dkr	Revenue Eur	Vessel no.	Revenue Dkr	Revenue Eur
Vessels registered scheme	320	238	32	248	219	29
VTQ vessels ≤17m	293	276	37	325	230	31
VTQ vessels >17m	196	2171	291	182	1465	197
Less active vessels	700	40	5	602	35	5
Other vessels	583	192	26	476	264	36
Total	**2092**	**2917**	**391**	**1833**	**2212**	**298**

Source: MWG 2013

Coastal fishing takes place over the whole of Denmark. Most vessels take part in different fisheries during a year and there may be a change targets/grounds using different gear. Vessels with a home-port in one of the west coast harbours will make seasonal visits to the Baltic Sea to fish cod or sprat, and vessels from the inner seas will fish in the North Sea during the summer season.

Most of the catches by coastal fishers are taken by three gears, trawl (50%), pelagic trawl (30%) and gillnets (15%), accounting for about 95 % in volume (Nielsen et al. 2013[)]. The following Table 7 provides a list of the metiers involved.

Table 7: List of metiers where coastal vessels participate

Gear	Target assemblage	Metier LVL6	Main targets
Set gillnet [GNS]	Demersal fish	GNS_DEF_100-119_0_0	Plaice & Sole
Set gillnet [GNS]	Demersal fish	GNS_DEF_110-156_0_0	Cod
Set gillnet [GNS]	Demersal fish	GNS_DEF_120-219_0_0	Cod & Plaice
Set gillnet [GNS]	Demersal fish	GNS_DEF_90-99_0_0	Sole & Plaice
Bottom otter trawl [OTB]	Demersal fish	OTB_DEF_<16_0_0	Sandeel
Bottom otter trawl [OTB]	Demersal fish	OTB_DEF_>=105_1_120	Cod
Bottom otter trawl [OTB]	Demersal fish	OTB_DEF_90-104_0_0	Plaice & Sole
Pelagic pair trawl [PTM]	Small pelagic fish	PTM_SPF_16-104_0_0	Sprat
Pelagic pair trawl [PTM]	Small pelagic fish	PTM_SPF_16-31_0_0	Sprat
Anchored seine [SDN]	Demersal fish	SDN_DEF_>=120_0_0	Plaice & Cod
Anchored seine [SDN]	Demersal fish	SDN_DEF_90-119_0_0	Plaice & Cod

Source: Danish National Programme 2011-2013; DCF

The main targets of these metiers are cod, plaice and sole, accounting for about 65% of the value of landings in 2011. There are significant catches of small pelagics such as sprat and sandeel (42% in 2011) but this account for only about 7 % in value (Nielsen et al. 2013).

4.2.3 Protection of coastal fisheries

Considering the introduction of VTQs in 2007 for the demersal fisheries in Denmark, there were concerns about the smaller vessels in the fleet. A political agreement was reached and additional quota for cod and sole were reserved for coastal fishers. In general, this corresponded to an additional 10% of cod and sole quotas for coastal fishers in the scheme (MWG 2013).

During the three periods of the voluntary scheme for coastal fishers, which are 2007-2009, 2010-2012, and 2013 there were 341, 278 and 178 vessels that participated in the scheme (MWG 2013). This shows a decreasing interest in participating in the scheme. A low and often negative return on ROI is observed for coastal vessels smaller than 17m. Being part of the scheme for coastal fisheries does not show any clear benefits because of extra cod and sole quota. The additional quota given to vessels in the scheme corresponds to an average of 50,000 kr (6,700 Eur) or 6.3% of turnover annually (Nielsen et al. 2013). An evaluation of the scheme during 2007-2009 came to the conclusion that it was ineffective (Kystfiskerudvalget 2009). As the extra quota are allocated on the basis of existing vessel quota shares, the larger vessels will tend to benefit more than smaller.

According to the Danish Fishermen's Association, which represents about 50 local fishermen's organisations, coastal fisheries in Denmark are under pressure, particularly in the case of gillnet fisheries (Lund 2014). The introduction of the vessel transferable quotas (FKA system) has resulted in a restructuring of the Danish fleet, favoring larger vessels. Many of the smaller vessels have sold their quota shares to larger vessels / companies. The protection of seals and cormorants has resulted in large populations which are seen as direct competition with coastal fisheries. Former fishing grounds have disappeared or are much less productive, forcing the vessels to move further from the coast.

In 2013, following extensive consultations and the participation of a broad range of stakeholders, it was decided to change (strengthen) the special scheme for coastal fishers for the period 2014-2016[78]. The additional quota provided was raised by 50% in the case of cod and sole, additional quota were provided for plaice, and an additional bonus of 50% is given to vessels using low-impact gears (excluding trawl). Participants may not lease/sell their cod, plaice, and sole quotas quota shares to vessels outside the scheme and 80% of fishing trips must have a duration of max. 48 hours.

4.2.4 Assessment/Validation of the proposed criteria and indicators

Considering the problems faced by coastal fisheries in Denmark, the Minister decided to set up a working group in 2012 to come up with proposals on how to support coastal fisheries. The vision of the Ministerial Working Group was strengthened sustainable coastal fisheries, taking into account economic, environmental and social factors (MWG 2013).

It is notable how this vision goes hand in hand with the new CFP and in particular, with Article 17 of the Regulation (1380/2013). The introduction of VTQs (2007) for demersal fisheries was based on historical catches (grandfathering method) and the main objective

[78] Fisheries regulation for 2014-2020; Chapter 6 on the Scheme for Coastal Fishers; https://www.retsinformation.dk/Forms/R0710.aspx?id=165394#Kap6

was to improve the economic performance of the fleets. This situation changes in 2012 where there is now emphasis on environmental, social, and economic considerations in relation to coastal fisheries.

In the following we present an assessment and validation of the proposed criteria and indicators, based on the process that was carried out in Denmark for coastal fisheries and consultations carried out in connection with this study.

4.2.4.1. Social allocation criteria: Support fishing communities

Under the social dimension, it should be stressed that coastal fisheries play an important role in small local coastal communities. Fishing provides jobs and contributes to local economic activity in more remote areas of Denmark. This creation or maintenance of employment may be crucial for local communities, as there are a number of associated economic activities upstream and downstream. Other activities such as tourism can benefit to a large extent from the maintenance of a vibrant and active fishing community.

Small-scale fishers tend to be based in smaller fishing ports, thus making a significant contribution in these local coastal communities. It is however necessary to be able achieve a decent standard of living for this to continue. Otherwise, the disappearance of small-scale fishing can have a cascading effect in local communities.

In order for smaller fishing ports to benefit from upstream and downstream economic activities, it is essential that coastal vessels land in these ports. This is linked to the pricing of fish. Local communities also have to offer adequate facilities for this, including auction facilities. Thus, additional support measures may be necessary which are not directly relevant to the context of allocation. For example, the MWG (2013) proposed various crosscutting proposals such as:

1. Strengthened market promotion of coastal fisheries, for example, through a certification scheme
2. Established basis for local marketing of coastal fish and fishery products at landing sites / small ports
3. Strengthened regional cooperation on coastal fishing
4. Reducing administrative burdens on coastal fishing
5. Developed tourism potential for the sale of coastal fish and the development of local communities in smaller ports

Concluding, employment and revenue generation in the local fishing communities are essential and can be used in the context of allocation. The proposed indicators are considered relevant and feasible. They are related to a number of associated knock-on effects that have been introduced above. These are:

- Indicator 1: FISHERIES DEPENDENCY. Employment measured in relative terms as fisheries dependency. Estimated employment from fisheries at each port with general employment in the areas of accessibility surrounding the port
- Indicator 2: REVENUE contribution to local economy. Percentage of local revenue generated by fish catching sub-sector in each NUTS 3 region annually.

In terms of feasibility of applying the proposed indicators, this is not considered a particularly difficult issue as the data are available, although there may be need for some compilation, processing and analysis.

However, the indicator fisheries dependency could be reformulated to take into account fisheries production (i.e. FTE employment per kg/tonne of fish caught). This would generally benefit the smaller scale fisheries. One should bear in mind that large-scale and small-scale fisheries may be based in the same community, thus being able to distinguish types of employment may be important (i.e. taking into working conditions such as ownership of

vessel, types of employment contract, share system, family relations, etc.). The landing of catches locally should also be rewarded.

It is however important to stress that allocation of fishing opportunities using this criteria and indicators is not considered sufficient, if the objective is to protect and promote coastal fisheries. Other accompanying support measures are necessary. One key proposal by the MWG was the establishment of a State Quota Fund for Coastal Fisheries. More detail will be provided in the following, but it should noted that this implies managing coastal vessels in a category of their own within the current VTQ system and managing this under different socio-economic objectives.

4.2.4.2. Social allocation criteria: Corporate Social Responsibility

It is notable that compliance was not taken into account in the considerations of the MWG. The impression is that a level playing field has been created through the introduction of transferable quotas, where a sense of stewardship of the resources has been developed. It is in the interest of the quota owners to safeguard resources, because this guarantees tangible benefits and increases the value of quota assets.

Another aspect that was pointed out is that compliance can be used as a criteria, but there should be some differentiation between small-scale and large-scale vessels. Imposed sanctions do not normally distinguish and can be disproportionately heavy for small-scale vessels. Alternative views considered the importance of including non-serious infringements in the allocation process and rewarding those that choose to implement fully-documented fishing with the use of the latest technology (e.g. video, CCTV, etc.).

There appears to be no objection to including compliance as a criteria and this would be in line with the objective of creating a culture of compliance in the EU. The proposed indicators are:

- Indicator 1: HISTORY OF FISHERIES COMPLIANCE - Number of points assigned to persons in the context of the CFP Point System during the last 5 years
- Indicator 2: CSR INDEX - History of compliance exceeding fisheries domain- during the last 5 years. This indicator combines fisheries compliance with other behaviour (Tax duties; alignment to ILO standards on crew security and enrolment)

However, indicator 2 appears to be going too far, considering that fisheries compliance has generally not been taken into account in the allocation of fishing opportunities. There are some examples of using compliance in the allocation of fishing opportunities and one can argue that this is gradually being incorporated in the EU as well (e.g. in order to obtain fishing authorisation in third countries; access to EMFF). However, taking into account compliance in general, including behaviour outside fisheries would appear to be a sensitive issue that needs more careful legal consideration.

The CFP Point System is under development and it would be relatively straightforward to use this in an allocation context.

4.2.4.3. Economic allocation criteria: Fisheries historic-dependence

In the EU, the initial allocation of fishing rights has normally been according to the historical track record of the owner or vessel. The most common approach to allocating rights was by basing them on historical catches, landings or engine power of vessels throughout fixed reference periods (MRAG 2009). This was also the case in Denmark. It is widely accepted and the least contentious during the initial allocation of fishing possibilities. Depending on

the fishery, it may be adjusted or weighted in different ways (e.g. fixed period, rolling period, length of period, fishing capacity, effort, etc.).

The proposed indicators are:

- Indicator 1: CATCH RECORDS - catches of the targeted stock during the last three years.
- Indicator 2: FISHERY FOOTPRINT - number of trips where any catch of the targeted species occurred, meaning more than 10% of each trip catch.

Concluding, these are considered relevant and feasible in terms of available data for their application. Their possible modification or adjustment will depend on the characteristics of the fishery and has to be evaluated on a case-by-case basis.

4.2.4.4. Economic allocation criteria: Economic performance

As mentioned in previous sections, the generally poor performance of the fleets was the primary motivation for the introduction of ITQs and VTQs in Denmark. This was generally successful as the economic performance improved significantly in the case of larger vessels, measured as the return on investments (ROI). In Denmark, this is expected to be around 6-8% in order to achieve a reasonable return (MWG 2013). However, this is not the case for coastal fisheries, which continue to be characterised by poor economic performance.

This case study shows that economic performance, which can be measured in various ways, is not useful if the objective is to protect and maintain small-scale coastal fisheries. Various proposals were made by the MWG on possible solutions, including one that proposes the creation of a permanent scheme for managing coastal vessels and a state quota fund for the management of coastal fisheries (excluding trawlers).

From a more general perspective, economic performance is clearly an important and relevant objective at the sector level and it entails environmental benefits as a result of reduced capacity and pressure. However, its application at the individual and/or vessel level in connection with allocation of fishing possibilities appears to be inappropriate. Instead, historic catch levels can also be attributed a value and appear to be the most appropriate way of allocating.

The proposed indicators are:

- Indicator 1: GVA - net output of a sector after deducting intermediate inputs from all outputs. It is a measure of the contribution to GDP made by an individual producer, industry or sector.
- Indicator 2: FUEL EFFICIENCY - litres of fuel per kg of live fish and shellfish landed. Another measure of efficiency which links to the environmental criteria.

The second indicator concerning fuel efficiency is related to economic performance, but it is also related to environmental issues. In fact, the MWG proposed this as a goal, which was to take into account low-impact gears in conjunction with fuel efficiency. Thus, this indicator is considered relevant and its application feasible, but it may be more appropriate to place this under environmental criteria.

4.2.4.5. Environmental allocation criteria: Implementing EAFM

One of the goals of the MWG was to achieve environmental sustainability by considering sea bottom conditions, bycatches, CO_2 emissions, and low-impact gears. This is generally in line with the proposed list of criteria/indicators proposed in this study. As mentioned above, the indicator on fuel efficiency is related to CO_2 emissions and could be placed under environmental criteria. The use of low-impact is directly related to bycatch and impacts on the seabed, as proposed below. The proposed indicators are:

- Indicator 1: Proportion of LARGE FISH – the proportion of the catch larger than length at maturity (Lm50), which is linked to maintaining a healthy size structure of stocks. There is scepticism about the use of the indicator 1 (proportion of large fish in the catch). Although this is one of various indicators linked to ecosystem health (size structure of fish populations), its application could have perverse effects such an increase in highgrading (discarding small sizes).
- Indicator 2: Volume/mortalities of by-catch– There are relevant species deserving special protection. Measurement of the amount of protected species (PSI) may be helpful. Considered relevant and its application is feasible, although the available data tends to be patchy and may lead to perverse effects (disincentive to report). Alternatively, an indicator on discards is considered more feasible and its application would be straightforward, as there are currently on-going discard sampling programs in order to obtain relevant data.
- Indicator 3: SEABED IMPACT – To measure the impact on the seabed on identified habitats, especially biogenic ones, a measure of the extension of fishing abrasion is needed. This is also considered relevant but it is interesting to see the way that this criterion was applied by the MWG. Instead of the proposed indicator 3, which is demanding in terms of sampling and data needs, the MWG based their considerations on a qualitative assessment of gear impacts (Gislason et al. 2014). This is the most feasible approach as the alternative of measuring this directly would be costly.

4.2.5 Conclusions

The main focus of this case study is the special scheme devised for the protection of coastal fisheries in Denmark. It is however important to bear in mind that this concerns commercial fishing for vessels up to a maximum length of 17m, thus including some rather large vessels (normally trawlers). The scheme does not consider a large number of smaller vessels with limited turnover/revenue.

A Ministerial Working Group (MWG) was recently established in 2012 to look into the issue of protecting coastal fisheries in Denmark. There continues to be problems of poor economic performance, decreasing number of vessels and fishers, closing down of smaller fishing ports, difficulties in recruiting young fishers, and concentration of rights by larger operators. The deliberations of this MWG considered environmental, social, and economic dimensions to the problem of protecting coastal fisheries, which thus constitute the basis for this case study. Consultations were carried out with key persons, some of whom participated in the working group, to clarify certain aspects.

The scheme was first established for the period 2007-2009 in conjunction with the introduction of vessel transferable quotas (VTQ) in 2007 for demersal fisheries in Denmark. It continued with some modifications in the period 2010-2012 and in 2013. The primary benefit of being part of this voluntary scheme is additional quota of cod and sole, corresponding to an average of an additional 10% vessel quota. In 2014, the additional

quota were increased by 50%, additional quota for plaice was provided, and a 50% bonus was given to vessels using low-impact gears (excluding bottom trawl).

It should be noted that the scheme has been considered ineffective in the protection of coastal fisheries. The latest revision of the scheme in 2014 provides increases in additional quota, but many of the MWG proposals were not taken onboard[79]. Stakeholders indicate that the scheme does not address the key issue, which is that coastal vessels are part of the VTQ system and thus exposed to the pressures of the market (e.g. sale, leasing, speculation, large operators, etc.). The system was devised with the objective of improving economic performance, so the weaker performers such as smaller coastal vessels tend to struggle.

Considering the proposed criteria and indicators to be used in an allocation context, the finding was general agreement on the use of social criteria and associated indicators. The proposed criteria are very much in line with the deliberations of the MWG. However, this case study shows that using the proposed social criteria and indicators is not enough to protect coastal fisheries and additional measures are needed, which are not directly linked to allocation.

In relation to economic criteria, or more specifically economic performance, this should not be used in the context of coastal fisheries (or in more general terms for small-scale fishing). Instead, the historic catch levels can also be attributed a value and appear to be the most appropriate way of allocating. Historic catch levels is thus a useful indicator when considering both social and economic criteria.

In relation to the environment, there was also general agreement on the use of proposed criteria and indicators. This should include fuel efficiency, which was originally classified as an economic indicator. However, using an indicator such as the proportion of large fish in the catch may have the perverse effect of creating problems with highgrading.

This case study provides support to the proposal of introducing differentiated management regimes, one for large-scale fleets and another for small-scale fleets, as proposed by the Commission in the Green Paper for CFP Reform. Although not adopted in the CFP, Member States are free to adopt best practices formally or informally. As pointed out by the Commission, the management of small-scale fleets in coastal communities should have a focus on social objectives (using direct allocation of quotas or effort or through collective schemes).

Although there was disagreement within the MWG, one of the proposals concerning the modification of the scheme for coastal fishers was:

a) max. vessel length of 15m and max. 25 GT
b) only low-impact gears are allowed (passive or semi-passive – seine and Danish seine)
c) no limits on duration of fishing trips
d) make it a permanent scheme and provide additional quota
e) a State Quota Fund is established for managing coastal fisheries
f) financing is provided to develop certification scheme for fish products
g) fiscal incentives
h) establishing protected areas where only coastal fishers are allowed

[79] Also important to note that there was disagreement within the MWG about the key issue of modifications to the scheme itself.

This was promoted by the various NGOs in the MWG as well as fish retailers, but not supported by the Fisheries Authorities or the Danish Fishermen. Højrup (2013) proposed similar modifications to the scheme, although the emphasis was on the creation of fisher communities. There is a specific case where small-scale fishers have come together to manage their quotas (i.e. buying, leasing, etc.) as a community, but they struggle with the financing conditions (Højrup and Schriewer 2012). Additional support is needed for this initiative to gain a stronghold and thus be used as an alternative management regime.

One of the problems identified is that there is only one association that represents all fishermen in Denmark, although there can be conflicting interests/objectives, for example between large-scale and small-scale fishermen. This is the reason why a specific association was recently created in 2014 to take care of the interests of small-scale fishers using low-impact gears[80].

There is heavy criticism against the current system of ITQs and VTQs in Denmark. Along with improved performance there are the perverse effects it has created in terms of concentration of rights, high levels of debt, speculation in the sale and leasing of fishing rights, exclusion of the smaller players, and the high social impacts it is having on fishing in general (Andresen and Højrup 2008, Højrup and Schriewer, 2012, Højrup, 2010, 2011). It is called the tragedy of enclosure as opposed to the tragedy of the commons (or ocean grab in colloquial terms). However, these critics are also aware of how difficult it is to backtrack on the introduction of ITQs and VTQs, which have in the meantime gained considerable value. Although fishing rights are not permanent in Denmark (valid for 8 years), it would be difficult to withdraw even a smaller proportion of existing rights. Thus, the importance of creating effective schemes within the present system.

[80] Forening for Skånsomt Kystfikseri.

5. CONCLUSIONS AND RECOMMENDATIONS

Allocation of fishing opportunities is generally a significant challenge. One of the overall goals in fisheries is addressing the issue of balancing fishing capacity to the available fisheries resources. For this, fisheries management employs different systems, not only allocation but also other crosscutting measures. The proposal of including additional criteria in the allocation process does not make decision-making any easier. It is determinant that any allocation process should involve exhaustive stakeholder consultation and participation, using participatory, transparent and collaborative platforms.

One major concern refers to the governance level. Although this study found that there are various stakeholders and authorities that participate in the allocation process, the final decision is made at one single level, i.e., Central Government. However, it is not always perceived that the liability reposes solely at one level. In the case of Bluefin tuna, ICCAT is driving the initial allocation at the earliest stage according to their own rules. Though this does not mean that -at EU level- first the EC and second National authorities should not count on any other system or rules when allocating fishing opportunities, in this case individual quotas. All levels of governance in setting the rules and performing the allocation may run independently whilst pursuing similar objectives.

Article 17 of the CFP basic regulation obliges MS to count on social, economic and environmental criteria in order to contribute to achieving the CFP objectives at the moment of allocating fishing opportunities. The field survey performed in this study reflects an extremely varied set of systems already in use. Most MS affirm considering these three types of criteria in their systems.

This study proposes a set of social, economic and environmental criteria, which are the key elements of a system for the allocation of fishing opportunities. These criteria were developed on the basis of a review of the CFP, relevant EU-funded research, the scientific literature, and stakeholder consultations. A corresponding set of indicators was developed, taking into account data availability and estimation techniques, for quantifying the performance of fishing vessels in relation to these criteria.

The most widely accepted criterion informing allocation decisions is historic catch records. It is perceived as the fairest recognition of fisheries engagement as a key aspect to initially set the formulas to share fishing opportunities. In EU MS, the usual indicator consists of records of catches measured during a certain period of time. The extent of the reference period is the major shortcoming found by this study. Setting a period long enough to accurately represent fishermen actively participating in the fishery are identified solutions in practice to address the challenge. Others are weighing by fishing capacity -vessels size, engine power- or effort units -fishing trip duration.

Deterrent measures are also informing allocation decisions. The use of penalties or a compensation scheme for those operators exceeding their share is in operation in some MS schemes (e.g. UK). However, using compliance as a criterion in setting the allocation key is a different approach, apparently accepted by EU MS. A call on choosing appropriate indicators is observed from the consultations, especially when dealing with the Bluefin tuna case study. Notwithstanding, including individual behaviour beyond fisheries in allocation may be considered a sensitive issue for which the sector is not ready at the moment, especially in small enterprises. Similarly, stakeholders also proposed considering other less

tangible social aspects as those related to fisherman contribution to cultural initiatives of coastal communities.

The Danish authorities perceive coastal fisheries as a driving force for socioeconomic and environmental sustainability in local fishing communities. An ad hoc scheme was established with the aim to protect coastal fisheries at the same time as vessel transferable quotas (VTQ) were introduced in 2007. The primary benefit of being part of this voluntary scheme is additional quota of cod and sole, corresponding to an average of an additional 10% vessel quota. In 2014, the additional quota was increased by 50%, additional quota for plaice was provided, and a 50% bonus was given to vessels using low-impact gears -excluding bottom trawl.

It should be noted that the scheme has been considered ineffective in the protection of coastal fisheries. Although the latest revision of the scheme in 2014 provides increases in additional quota, stakeholders indicate that the scheme does not address the key issue, which is that coastal vessels are part of the VTQ system and thus exposed to the pressures of the market –for instance: sale, leasing, speculation, large operators, etc. The system was originally devised with the objective of improving economic performance, so the weaker performers such as smaller coastal vessels tend to struggle. This is also a finding in Bluefin tuna fisheries where, under an allocation scheme -part of an ITQ system- operated by the Spanish authorities since 2008, concentration of fishing right have been observed. Vessels employing pole lines, trolling lines and to a lesser extent long lines are selling their quotas to purse seiners and larger operators. Both case studies show that using the proposed social criteria and indicators is not enough to protect coastal fisheries and additional measures are needed, which are not necessarily linked to allocation.

In relation to economic criteria, or more specifically economic performance, the Danish case study indicates that this should not be applied to small-scale fishing. Economic performance is certainly a relevant issue at the sector level and the more lucrative large-scale fisheries, but its application in small-scale fisheries appears to be counterproductive, if the objective is to promote and support the latter. In the Spanish case, as the scheme for Bluefin was designed irrespectively of vessels/enterprises size, this conclusion can not be affirmed. Stakeholders referred to the issue of data availability and accuracy in order to adequately assess the economic performance of the different fleets. Nonetheless, irrespective of the indicator chosen to measure economic performance -GVA, return of investments, and/or catch records, the latter are considered in both cases to be the best candidate informing allocation decisions considering economic criteria.

In relation to the environmental concerns, there was also general agreement from both case studies on the use of proposed criteria and indicators. For instance, from the small-scale case study it was found that Danish managers pursue achieving healthier seabed conditions, reasonable levels of by-catch, reduced CO2 emissions, and fostering low-impact gears. Certainly, a 're-allocation' of fishing opportunities in Danish coastal fisheries came into force in 2014 where, as abovementioned, extra quota were provided for low-impact gears (excluding bottom trawling). This is in fact a pioneer measure in the EU. As with fuel efficiency, originally classified as an economic indicator, it is concluded that this fits better as an environmental criterion as suggested by stakeholders. The findings called for caution with possible perverse effects -highgrading- when using an indicator based on size of fish and non-reporting when using an indicator based on catches of protected and/or threatened species.

Again data accuracy and availability was identified as a major concern to effectively inform allocation decision-making. As with the proposed environmental indicators, an appropriate cost-effective balance among the identified needs should be determined, taking into account the legal framework that is in place for data gathering. This should be optimised with a preference for already and de facto available data.

To conclude on the environmental criteria, the possibility of rewarding fishermen who actively cooperate with scientific campaigns and fully-documented fisheries arose from consultations; being able to demonstrate that from their activity, relevant data series for stock assessment are gathered. In some cases market-based drivers may have perverse consequences. For instance, baitboats traditionally catching young class Bluefin are now selling their share to larger operators -seines- targeting larger individuals, so that these data sets are no longer within the reach of scientists.

Considering the compatibility dilemma, fisheries management is generally characterised as having multiple and sometimes conflicting objectives. Striking a balance between environmental, social, and economic criteria for the allocation of fishing opportunities generally involves extensive consultation and consensus-building, which may take considerable time. Various techniques and tools are proposed to assist in decision-making, involving trade-offs between multiple objectives. It is important to stress that this process (application of proposed system) will have to be carried out on a case-by-case basis, as each fishery has unique aspects.

A relevant finding from both case studies is that these provide support to the proposal of introducing differentiated management regimes, one for large-scale fleets and another for small-scale fleets. The EC Green Paper already proposed this for CFP Reform. The management of small-scale fleets in coastal communities should have a focus on social objectives -using direct allocation of quotas or effort or through collective schemes. A different management refers not only to the already quoted peculiarities on economic performance and social aspects but more generally to preserve small-scale fisheries as the protagonists of coastal communities. Stakeholders advocate for establishing such a differentiation not only for large-scale and small-scale fleets but also regionally, e.g. Mediterranean / Southern Europe, North Sea, Atlantic, Barents Sea; and for the use of various types of measures, not necessarily linked to allocation, such as certification schemes or fiscal incentives.

Recommendation 1: The EP should encourage the EC to prepare common guidelines, in coordination with MS, to facilitate a homogeneous approach in the allocation of fishing opportunities in fulfilment of the CFP objectives. These should include guidance and best practices on the design of rights-based management taking into account conflicting management objectives.

Recommendation 2: Encourage the EC -on behalf of the EU- to lead and promote the development of transparent mechanisms in the allocation process at Regional Fisheries Management Organisations.

Recommendation 3: The allocation process is highly demanding in terms of reliable and accurate data sets. The EP should encourage the MS and the EC to consider existing databases already available -Data Collection Framework, Monitoring, Control and Enforcement Database- or still in progress -Marine Strategy Framework Directive. If deemed necessary, restructuring data sampling strategies should be developed, allowing for instance the aggregation of raw data at metier level.

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ANNEXES

This annex includes the following sections:

- RBM typology (Annex I)
- Overview of MS systems (Annex II)
- Survey to MS (Annex III)
- Stakeholders consulted (Annex IV)
- ECOFISHMAN Project - Recommendations for RFMS potential indicators, to be used by policy makers, scientists and stakeholders in general indicators (Annex V)

ANNEX I – RBM TYPOLOGY

Market-like Instrument	Key features
Territorial Use Rights (**TURFs**)	Allocation of a certain area of the ocean to a single user, usually a group, who then undertakes fishing by allocating rights to users within the group. Usually of long duration and with high degree of formal and informal transferability within the group.
Community-based catch quotas (**CQ**)	Catch quotas are attributed to a 'fishing community' with decisions on allocation of rights within the community taken on a cooperative basis. They are often used in formalising traditional access rights in small-scale fisheries. They provide a high degree of exclusivity, divisibility and flexibility.
Vessel Catch Limits (**VC**)	Restrict the amount of catch that each vessel can land for a given period of time (week, month, year) or per trip. These instruments are characterised by relatively low or moderate levels for most rights characteristics. They provide limited exclusivity and may not reduce the race to fish, while providing some degree of flexibility and quality of title.
Individual Non-Transferable Quotas (**IQ**)	Provide a right to catch a given quantity of fish from a particular stock, or, more usually, a percentage of a total allowable catch (TAC). Relatively high characteristics of exclusivity and flexibility allow rights holders to use their rights in a least-cost way to secure a given quantity of fish. The race for fish that exists under a competitive TAC is largely eliminated, but the lack of transferability restricts the efficiency of harvesting.

Individual Transferable Quotas (**ITQ**)	Provide a right to catch a given percentage of a TAC, which is then transferable. This instrument rates highly on all criteria. The features of the system allow for appropriate long-term incentives for investment decisions as well as optimising short-term use of fishing capacities.
Limited Non-Transferable Licences (**LL**)	These licences can be attached to a vessel, to the owner, or to both and have to be limited in number and applied to a specific stock or fishery to be considered as market-like. By restricting access to a stock, this instrument helps to reduce the race to fish and prevent rent dissipation. However, the lack of transferability and divisibility limits the optimal use of fishing capacity.
Limited Transferable Licences (**LTL**)	By making limited licences transferable, fishers are provided with an increased incentive to adjust capacity and effort over the short to long term in response to natural and economic conditions. They are generally given for a very long duration, but are not divisible.
Individual Non-Transferable Effort Quotas (**IE**)	Rights are attached to the quantity of effort unit that a fisher can employ for a given period of time. They tend to be used in fisheries for sedentary species and are characterised by moderate or relatively high levels of exclusivity, duration and quality of title.
Individual Transferable Effort Quotas (**ITE**)	Transferability makes short and long term adjustment easier and allows for a better use of fishing capacities.

Source: Organisation for Economic Co-operation and Development (OECD)

ANNEX II – OVERVIEW OF MS SYSTEMS

This section presents an overview of the main systems for the allocation of fishing opportunities by MS. The information draws from stakeholder feedback (consultations and surveys) obtained during the study and research from existing literature.[81] (Note, "-" is shown where the contractor could not find information on criteria and / or indicators through interviews, survey or desk research).

Belgium

No vessels (% Trawlers)	82 (98%)
RBM	System of non-transferable licenses and community based and individual quota. Rights are not tradable. Also effort quotas.
Allocation process	Initial allocation is based on engine power.
Criteria	Historic catch levels, contribution to the local economy (real economic link prevail nationals owning fishing rights). Extra allocation was used in acceptance of participating in scientific surveys.
Indicators	Official record of catches. '*Real economy link'*: 50% of crew need to be Belgian, landings in Belgium, and gross earnings in Belgian auction. One third of the landings auctioned in Belgium, by purchasing goods on services in the Belgian coastal area.

Bulgaria

No vessels (% Trawlers)	2053 (6%)
RBM	License system Individual quotas for turbot.
Allocation process	Each year the Government sets the allocation. Fishermen allocate the share among operators.
Criteria	Only historic catch levels are considered.
Indicators	Specific number of points related to number of years engaged to the fishery.

[81] MRAG 2009 and FAO country files 2014. The value for 'No vessels, (% trawlers)' is taken from Facts and Figures of the CFP. EC, 2014.

Croatia

No vessels (% Trawlers)	7621 (13%)
RBM	License system and Individual quotas for Bluefin tuna.
Allocation process	Central authority is in charge.
Criteria	-
Indicators	-

Cyprus

No vessels (% Trawlers)	894 (1%)
RBM	System of non-transferable licenses. Community catch quotas and individual catch quotas.
Allocation process	Only for Bluefin tuna, only share under TACs. Longliners is the only segment affected according to the National Fishing Plan. Quotas are non transferable.
Criteria	Historical catch records is the core criterion, complemented by vessel capacity (size of the vessel).
Indicators	Logbook records, fleet vessels register, licenses.

Denmark

No vessels (% Trawlers)	2682 (25%)
RBM	ITQs for most pelagic, industrial and demersal species. Coastal fishermen scheme.
Allocation process	Quotas are transferred through a non-official legal market, where vessel and quotas are sold together. In pelagic fisheries can be divided.
Criteria	When the ITQ was developed the basis was historical fishing data. The rationale was to strike a balance between capacity and resources, aiming at best economic performance and investing in energy consumption reduction.
Indicators	Catch data in the immediate 3 years preceding the introduction of the ITQs. Basis of extra quota allocation: coastal fisherman scheme consists on extra quota allocation to fishing patterns (short trips, low impact gears versus high impact gears as bottom trawling). Explicit support for <40 years fishermen with extra quota during an 8 years period.

Estonia

No vessels (% Trawlers)	1443 (7%)
RBM	Individual transferable catch and effort quotas.
Allocation process	Yearly quota allocated taken into account the number of gears that a vessel may use.
Criteria	Initial allocation is based on historical track record for companies. Compliance level are considered as well.
Indicators	3 years reference period, not depending on quotas but on the proportion of fishing rights allocated from the national quota to the owner.

Finland

No vessels (% Trawlers)	3210 (3%)
RBM	License system. TURFs (coastal fisheries).
Allocation process	Allocation of salmon is based on track records of family rights.
Criteria	-
Indicators	-

France

No vessels (% Trawlers)	7143 (22%)
RBM	Limited non-transferable licenses and special fishing permit. Catch quotas. Also effort quotas.
Allocation process	Community catch quotas (POs) and non-transferable quota (within POs).
Criteria	Historic Catch records set the main basis. Within POs, market orientation and socio-economic equilibrium are also considered.
Indicators	Catch records have a reference period.

Germany

No vessels (% Trawlers)	1538 (23%)
RBM	License system and individual quotas. Swaps and transfers allowed.
Allocation process	Allocations are carried out annually. Management authority monitors constantly uptake and marketing. In case problems arise, re-allocation is proposed in consultations with stakeholders.
Criteria	Historic catch levels are highly considered, followed by measures to reduce impact in the marine environment and reducing discards/by-catch. Contribution to society and local communities is also included.
Indicators	Catches taken per vessels during a specific time frame. Ratio of catches per employment is presented as a potential indicator.

Greece

No vessels (% Trawlers)	15860 (4%)
RBM	License system. No new licenses are permitted. TURFs under development.
Allocation process	Only reported for Bluefin tuna, only share under TACs.
Criteria	Greece reported not allocating fishing opportunities with respect to article 16 and 17 of the CFP.
Indicators	-

Ireland

No vessels (% Trawlers)	2202 (41%)
RBM	No ITQs, fishing rights capacity based. Quotas are considered a 'public good' and not privatised.
Allocation process	MS feedback states that '*capacity based according to historical records. Quota assigned per vessel and if not used, returned to the state for reallocation. Inshore fisheries are under community quota system. Monthly catch allocation for pressure stocks. The Minister launched a consultation set up the allocation policy framework and amendments to this are always consulted. Allocation to large pelagic fisheries under policies tested in Courts*'.
Criteria	Social criteria are decisive. Local economy contribution and greatest benefit to the society are also key. Additional quota to reduce by-catch is assigned for cod fisheries. Reducing energy consumption is considered a business performance criterion. Compliance is an input for the process.

Indicators	Statistical and databases from scientific bodies. Serious infringements systems points. Providing the greatest benefit to society is regarded a subjective measure. Potential indicators include employment ratios and economic performance in coastal communities dependent on fishing.

Italy

No vessels (% Trawlers)	12698 (30%)
RBM	License system. ITQs. TURFs.
Allocation process	TURFs for clams and ITQs for Bluefin tuna not transferable.
Criteria	Based in historical fishing activity.
Indicators	-

Lithuania

No vessels (% Trawlers)	293 (26 %)
RBM	Individual non transferable quotas.
Allocation process	Quota is annually allocated to enterprises. Reallocation is permitted. 5% of the quota is allocated to the coastal fishery.
Criteria	Historic of catches considered as a social criteria. Other criteria include fishing capacity and level of compliance.
Indicators	National databases of catches.

Malta

No vessels (% Trawlers)	1037 (2%)
RBM	License system. TURFs (dolphin fish).
Allocation process	Only understood for Bluefin tuna, only share under TACs.
Criteria	The feasibility to apply of the criteria is considered limited.
Indicators	-

Netherlands

No vessels (% Trawlers)	848 (69%)
RBM	Transferable license system ITQs and in some fisheries individual transferable effort quotas.
Allocation process	Initial allocation on the basis of historical catches and / or engine power. System reviewed on the basis of economic performance (flat fish).
Criteria	-
Indicators	-

Poland

No vessels (% Trawlers)	832 (20%)
RBM	Individual non-transferable quota and Block quota for coastal fisheries (vessels <10m). Swaps allowed.
Allocation process	Although the allocated quota is not transferable, the Ministry can transfer it to other company / vessel in view of non-compliances and fishing capacity.
Criteria	Historic catch level is considered the best criterion. Additional supporting criteria include compliance and environmental factors. Economic criteria is regarded as potentially discriminatory.
Indicators	Actual records of fishermen's activity by catch statistics.

Portugal

No vessels (% Trawlers)	8236 (7%)
RBM	ITQs and Community quotas.
Allocation process	Central authorities grants licenses, fishing permits.
Criteria	Initial allocation based on historical catch records.
Indicators	-

Romania

No vessels (% Trawlers)	200 (5%)
RBM	License and quota system.
Allocation process	Allocation concerns the small-scale fleet (almost 90%).
Criteria	Main criteria are historic catch levels and level of compliance.
Indicators	Estimate of catches.

Slovenia

No vessels (% Trawlers)	170 (9%)
RBM	System of licenses allocated to full-time fishermen indefinitely. The system of licenses is not transferable and newcomers are allowed.
Allocation process	MS indicated through the contractor's survey not having fisheries under allocation schemas
Criteria	-
Indicators	-

Spain

No vessels (% Trawlers)	9895 (11%)
RBM	System of licenses and fishing permits. ITQs for certain fisheries. Community non-transferable and transferable quotas. TURFs. Effort quota.
Allocation process	Initial allocation carried out by the Ministry considering gear type and socio-economy and regional concerns. Stakeholder consultations launched on a regular basis. The frequency of the negotiations and fishing opportunities allocation depends on management plans.
Criteria	Socio-economic criteria form the basis, mainly historic catch levels and contribution to the local economy. Other criteria are not used due to the difficulties to measure them and because the use of transparent data leads to clear indicators (compliance and environmental criteria).
Indicators	Transparent indicators include employment rates, economy dependence, vessels' size and historic catch records. Database records consulted include

	logbooks, sail notes and employment data.

Sweden

No vessels (% Trawlers)	1390 (19%)
RBM	Individual quotas, ITQs (limited to 10% of National quota) and TURFs, fully transferable. Effort quotas.
Allocation process	Varies depending on the definition of fisheries.
Criteria	Historic catch records. Economic criteria weight more for pelagic and industrial fisheries. Environmental criteria are relatively higher for demersal fisheries. Social criteria are not considered.
Indicators	Data from national databases and catch documentation schemes. The reference period is large enough to take into account temporarily deviations such as change of vessels, time at shipyard, etc.

United Kingdom

No vessels (% Trawlers)	6415 (32%)
RBM	System of licenses and quotas. ITQs quota swaps, transfers, banking and borrowing allowed. Also effort quotas and TURFs.
Allocation process	Main groups affected include two groups, firstly, vessels belonging to POs and secondly, those not in POs with distinct treatment for <10 m. The second group is guaranteed a minimum allocation level (underpinning). Fixed quota allocation is assigned by license. Special allocation regimes are in place. The government, in consultation with stakeholders, allocates any new quota.
Criteria	Fixed quota allocation is based on a reference period of recorded landings, depending on the fishery. Underpinning takes into account vessels' size. System of compensations and penalties.
Indicators	The authority considers that the criteria listed in the survey (extracted from the new CFP) are considered to various extents within the UK methodology.

ANNEX III – SURVEY TO MS

This section presents the results of the survey addressed to Management Authorities of all MS that have sovereign marine waters. A total of 20 MS responded to the survey. For the purpose of this survey, 'criteria', 'operator', and 'fishery' were defined as:

'**Criteria'**: Principles or standards taken into account to allocate fishing opportunities among operators. **'Operator'**: The natural or legal person who operates or holds any undertaking carrying out any of the activities related to any stage of production, processing, marketing, distribution and retail chains of fisheries and aquaculture products (EU Common Fisheries Policy (CFP)). **'Fishery'**: A unit, or combination of units, engaged in raising and / or harvesting fish. We define ten units:
- Demersal
- Pelagic
- Industrial fishery
- Small-scale fishery
- Fish for human consumption - Fish for industrial use
- Migratory/mobile stocks
- Sedentary stocks
- National stocks
- Shared stocks

Q1. Please indicate your country

Q2.

Please indicate how many fisheries does your country allocate fishing opportunities for

Answer Options	Response Percent	Response Count
zero	21,1%	4
1 to 5	36,8%	7
6 to 10	5,3%	1
10 to 15	10,5%	2
15 to 20	0,0%	0
20 to 30	0,0%	0
30 +	26,3%	5
Other (please specify)		2
	answered question	19
	skipped question	1

Q3.

Please indicate whether the criteria to allocate fishing opportunities among operators in your country is different depending on the fishery.

Answer Options	Response Percent	Response Count
Yes, most of the criteria are different from one fishery to	40,0%	6
There is a common set of criteria for all fisheries, but some	20,0%	3
No, most of the criteria are the same for all fisheries.	40,0%	6
Comments		6
	answered question	15
	skipped question	5

Q4.

Please rank the extent to which your country considers the following type of criteria in the process of allocating fishing opportunities

Economic criteria

Answer Options	Very high	High	Medium	Low	Very low	Response Count	Response %
Demersal	0	3	5	0	1	9	69%
Pelagic	1	4	3	1	1	10	77%
Industrial fishery	1	4	1	1	1	8	62%
Small-scale fishery	0	4	3	1	2	10	77%
Fish for human	0	2	1	1	0	4	31%
Fish for industrial use	0	1	1	0	0	2	15%
Migratory/mobile stocks	0	1	2	1	0	4	31%
Sedentary stocks	0	3	0	0	0	3	23%
National stocks	0	1	0	0	0	1	8%
Shared stocks	0	2	1	0	0	3	23%

Social criteria

Answer Options	Very high	High	Medium	Low	Very low	Response Count	Response %
Demersal	0	3	4	0	2	9	69%
Pelagic	1	5	3	0	1	10	77%
Industrial fishery	1	2	4	0	1	8	62%
Small-scale fishery	3	4	2	0	1	10	77%
Fish for human	0	2	1	1	0	4	31%
Fish for industrial use	0	1	1	0	0	2	15%
Migratory/mobile stocks	0	2	1	1	0	4	31%
Sedentary stocks	0	2	1	0	0	3	23%
National stocks	0	1	0	0	0	1	8%
Shared stocks	0	3	0	0	0	3	23%

Environmental criteria

Answer Options	Very high	High	Medium	Low	Very low	Response Count	Response %
Demersal	0	5	2	1	0	8	62%
Pelagic	0	6	2	1	0	9	69%
Industrial fishery	0	4	2	1	0	7	54%
Small-scale fishery	1	3	1	3	1	9	69%
Fish for human	0	2	0	1	0	3	23%
Fish for industrial use	0	1	1	0	0	2	15%
Migratory/mobile stocks	0	1	1	2	0	4	31%
Sedentary stocks	0	2	1	0	0	3	23%
National stocks	0	1	0	0	0	1	8%
Shared stocks	0	3	0	0	0	3	23%

	Question Totals
Comments	8
answered question	11
skipped question	9

Q5.

Please rank the the relevance of the following criteria, and to what extent is your country already taking them into account in the process of allocating fishing opportunities. Note that the below criteria have been taken from the new CFP regulation

Relevance of the criterion

Answer Options	Very high	High	Medium	Low	Very low	None	Response Count
Historic catch levels	8	5	0	0	0	0	13
Contribution to the local economy	0	4	6	1	0	2	13
History of compliance	0	5	1	4	2	0	12
Provide the greatest benefits for society	0	1	7	2	0	1	11
Methods and technology to minimize bycatch	0	6	2	2	1	1	12
Fishing with low impacts on the ecosystem	0	6	2	2	2	1	13
Reduced energy consumption	0	1	6	1	3	1	12

Extent to which the criterion is taken into account in my country

Answer Options	Very high	High	Medium	Low	Very low	Not considered	Response Count
Historic catch levels	8	5	0	0	0	0	13
Contribution to the local economy	0	3	6	0	1	3	13
History of compliance	0	3	2	3	1	2	11
Provide the greatest benefits for society	0	1	7	1	0	2	11
Methods and technology to minimize bycatch	0	4	3	0	2	3	12
Fishing with low impacts on the ecosystem	0	4	3	0	2	4	13
Reduced energy consumption	0	0	5	2	2	3	12

	Question Totals
Please, note any other criteria that you consider relevant	4
answered question	13
skipped question	7

Q6.

Please provide details on the best ways to measure or assess those criteria, from the below list, that you consider relevant:

(a) Historic catch levels

(b) Contribution to the local economy

(c) History of compliance

(d) Provide the greatest benefits for society

(e) Methods and technology to minimize bycatch and discards

(f) Fishing with low impacts on the ecosystem

(g) Reduced energy consumption

Q7.

Please indicate what would be the main constraints / challenges to include the following criteria in the process of allocating fishing opportunities. Political (e.g. conflict with national, regional, local plans or strategies) Legal (e.g. conflict with national, regional legislation) Capacity (e.g. insufficient resources, data availability) Stakeholder reluctancy (i.e. opposition from stakeholders / associations / producer associations)

Answer Options	Political	Legal	Capacity	Reluctancy	Response Count
Historic catch levels	2	4	5	4	8
Contribution to the local economy	2	3	2	3	8
History of compliance	0	5	2	6	10
Provide the greatest benefits for society	2	3	3	4	7
Methods and technology to minimize bycatch and discards	1	4	3	7	10
Fishing with low impacts on the ecosystem	1	4	3	6	9
Reduced energy consumption	1	5	2	5	8
Other constraints (please specify)					4
answered question					12
skipped question					8

Q8.

Please indicate what is the role (none, one or more) of the different stakeholders involved in the process of allocating fishing opportunities.

Answer Options	Set the criteria for the allocation of fishing opportunities	Allocate the share among operators on the basis of the	Consultative role (provide feedback on the criteria)	Response Count
Fisheries Administration or Authority	12	12	3	13
Local government	2	0	2	3
Regional Fisheries Management Organization	0	0	0	0
Producer Organisation	3	1	7	8
Processing sector	0	0	4	4
Vessel owners / operators	1	0	6	7
Fishermen associations	3	2	9	12
Scientific community	2	1	10	12
NGOs	1	0	7	7
Other stakeholders or roles (please specify)				2
			answered question	13
			skipped question	7

Q9.

Please indicate in what ways the system for allocating fishing opportunities is transparent / accessible.

Answer Options	Response Percent	Response Count
The system is published in the National / Regional Official	61,5%	8
The system is publicly available through an official website	69,2%	9
The European Commission is informed on the system	76,9%	10
The system is not available to the general public	23,1%	3
Other channels (please specify)		2
	answered question	13
	skipped question	7

The survey included additional open-ended questions:

Q10. Please note sources of data / information on systems of allocating fishing opportunities (for example websites, documents, etc)

Q11. Please note your view on social criteria and how these could be measured, considering that social criteria have to be accounted for more clearly under the reformed CFP

Q12. Please indicate whether you are taking account of the likely catch composition of vessels for the allocation of fishing opportunities. In other words, are you considering mixed fisheries as an element driving access to fishing?

Q13. Please provide feedback on the relative importance of environmental, economic and social criteria, and the compatibility between them. Do you consider it possible to reach a compromise that is acceptable to all stakeholders? And if so, how should this be approached?

ANNEX IV – LIST OF STAKEHOLDERS CONSULTED

- Ministry of Agriculture, Food and the Environment of Spain. DG Fisheries Resources and Aquaculture, 24 October 2014
- National Institute of Aquatic Resources (DTU Aqua), 6 November 2014
- Unit A2. Common Fisheries Policy and aquaculture, Directorate A - Policy development and coordination, DG Mare, European Commission, 14 November 2014
- NEAFC, 21 November 2014
- European Defense Fund (EDF) (www.edf.org), 24 November 2014
- NAFO (www.nafo.int), 24 November 2014
- European Commission. DG ENV, 26 November 2014
- Unit C 2. Marine Environment & Water Industry, Directorate C - Quality of Life, Water & Air, DG Environment, European Commission, 26 November 2014
- Unit B1. International affairs, law of the sea and regional fisheries organisations, Directorate B - International affairs and markets, DG Mare, European Commission, 26 November 2014
- Coalition for Fair Fisheries Arrangements (CFFA) (www.cape-cffa.org), 1 December 2014
- Lonxanet (www.fundacionlonxanet.org), 10 December 2014
- Islatuna, (www.islatuna.com), 10 December 2014
- LIFE Project (www.myfishproject.eu), 11 December 2014
- Regional Government of Catalonia. Fisheries Resources Service, 11 December 2014
- Regional Government of the Basque Country. Legal Affairs Unit, 11 December 2014
- Grupo Balfego (www.grupbalfego.com), 11 December 2014
- OP-70 Carboneras (www.pescacarboneras.com), 11 December 2014
- Asociación Mallorquina de Pesca Marítima Recreativa Responsable (www.amprr.es), 11 December 2014
- University of Copenhagen. Dept. of Food and Resource Economics, 12 December 2014
- Regional Government of Canary Islands, Fisheries Resources Service,15 December 2014
- EUROPECHE (www.europeche.org), 16 December 2014
- Oceana (www.oceana.org), 17 December 2014
- ICCAT Secretariat (www.iccat.int), 17 December 2014
- European Commission. DG MARE, 17 December 2014
- Forening for Skånsomt Kystfiskeri (Association of Low-impact Coastal Fisheries), 17 December 2014
- OP-51 Tarifa; Barbate; Conil (www.almadrabasandaluzas.com), 18 December 2014
- Ministry of Food, Agriculture and Fisheries of Denmark. Directorate of Fisheries,18 December 2014
- Danmarks Fiskeriforening & Producent Organisation (Association of Danish Fishermen), 18 December 2014
- Greenpeace Oceans Denmark, 18 December 2014
- Ministry of Agriculture, Food and the Environment of Spain, Friday, 19 December 2014
- WWF. Mediterranean Fisheries Programme (www.mediterranean.panda.org), 19 December 2014
- University of Copenhagen. Saxo Institute, 20 December 2014
- Greenpeace European Unit (Brussels). EU Oceans Policy Directorate, 6 January 2015
- Group of the Greens/EFA of the European Parliament, 19 January 2015

ANNEX V – ECOFISHMAN PROJECT - RECOMMENDATIONS FOR RFMS POTENTIAL INDICATORS, TO BE USED BY POLICY MAKERS, SCIENTISTS AND STAKEHOLDERS IN GENERAL INDICATORS

This annex presents relevant ECOFISHMAN Project's recommendations for RFMS potential indicators, to be used by policy makers, scientists and stakeholders in general

A summary list of potential ecological, economic, social and governance indicators are presented in the following boxes, which were developed for use in Responsive Fisheries Management Systems. The project classified these indicators according to four dimensions: ecological, economic, social and governance. These indicators were developed for well-defined fishery outcome targets (OT) of a management plan, but these are likewise applicable in different settings such as the allocation context.

It should be noted that the following recommended candidate indicators are a selection from a high number of existing candidate biological, social, legal and economic indicators, which were reviewed and submitted to a screening process and assessed according to the their SMART properties (i.e. specific, measurable, achievable, realistic and time bound). These are presented in the following according to their ranking.

Ecological indicators
1. Catch structure (time, space, species, length, etc)
2. Catch per unit of effort (time, space, species, length, etc)
3. Landings and discards (time space, species, gears, etc)
4. Biomass and abundance estimate of target species
5. Biomass and abundance estimate of non- target species
6. Exploitation rate/ Total mortality /Fishing mortality
7. Proportion of spawners per recruit (to obtain target and limit of F) in the population
8. Production ratio recruits per spawner in the stock
9. Mean and Maximum length in catch
10. Length distributions in relation to minimum landing size
11. Percentage of overexploited stocks in the area
12. Mean and Maximum weight of fish in population/community/ecosystem
13. Proportion of habitat type area not impacted by mobile bottom gears
14. Biodiversity indices in the area/ecosystem
15. Proportion of large fish in the area/ecosystem
16. Essential species habitats/ Change in area occupied by species/ /overlap with fishery areas
17. Mean trophic level of catch in the area/ecosystem
18. Ratios of pelagic forage fish versus predators /ratios of key trophic groups in the area/ecosystem
19. Fishery in Balance (FiB)
20. Primary production required to support fishery in the ecosystem

Economic Indicators
1. Harvest /Catch/Landings 2. Harvest value 3. Employment in fisheries/vessel 4. Effort/ number of vessels 5. Fisheries contribution to GDP 6. Fisheries exports compared to value of total exports 7. Fishery net revenue 8. Profit 9. Economic performance 10. Income/average wage 11. Earning Before Interests, Taxes, Depreciation and Amortization (EBITDA) 12. Invested capital 13. Rate of return of investment (ROI) 14. Ratio of profit to sales 15. Index of catch stability 16. Fuel and catching efficiency 17. Subsidies per catch value and employment 18. Maximum Economic Yield 19. Global Sea food market performance 20. Carbon budget due to fishery activity

Social indicators
1. Employment rate in fisheries 2. Demography 3. Income in fishing communities 4. Participation 5. Education/training 6. Maintenance of fishery traditions/culture 7. Minorities rights met 8. Number of accidents in fisheries activities 9. Social attractiveness/ acceptance 10. Number of people under poverty 11. Protein/consumption/quality 12. Certification 13. Account of social impact on management plan changes 14. Gender distribution in decision- making 15. Fixation of fishing communities 16. Proportion of younger people in fishery jobs.

Governance indicators
1. Compliance regime 2. Transparency and stakeholder participation ensured 3. Rate of quota taken 4. Existence of management plans 5. Capacity to manage 6. Existence of management body and decision making 7. Property rights 8. Protection of small scale fishing rights 9. Fisheries Policy Resources Index 10. Adequacy of enabling legislation 11. Inclusion of international laws in management plans 12. Sanctions 13. Level of quota exchange 14. Concentration of rights/level of resource conflit 15. Transparent enforcement rules 16. Overshooting TACs/quotas 17. Number of fisheries with certification 18. Legitimacy of fisheries management 19. Proportion of illegal under-reported and under regulated catches (IUU) 20. Code of conduct of responsible Fisheries acceptance

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