134336/EU XXV. GP
Eingelangt am 27/02/17

Council of the European Union

Brussels, 24 February 2017
(OR. en)

6575/17
ADD 3

Interinstitutional File:
2017/0043 (COD)

PECHE 68
CODEC 248
IA 32

PROPOSAL

From:	Secretary-General of the European Commission, signed by Mr Jordi AYET PUIGARNAU, Director
date of receipt:	24 February 2017
To:	Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of the European Union
No. Cion doc.:	SWD(2017) 64 final
Subject:	COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Accompanying the document PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL Establishing a multi-annual plan for small pelagic stocks in the Adriatic Sea and the fisheries exploiting those stocks

Delegations will find attached document SWD(2017) 64 final.

Encl.: SWD(2017) 64 final

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EUROPEAN
COMMISSION

Brussels, 24.2.2017
SWD(2017) 64 final

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

Establishing a multi-annual plan for small pelagic stocks in the Adriatic Sea and the fisheries exploiting those stocks

{COM(2017) 97 final}
{SWD(2017) 63 final}

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Impact assessment on a Proposal for a Regulation of the European Parliament and of the Council establishing a multi-annual plan for the small pelagic stocks and their fisheries in the Adriatic Sea.

A. Need for action

Why? What is the problem being addressed?

There are two main problems concerning small pelagic fish (anchovy and sardine) in the Adriatic: 1) they are severely overfished, due to overcapacity in the fleet, environmental factors (outside the scope), and inadequate management measures. 2) The governance framework is ineffective due to the inadequate management measures (limiting the effort that goes into the fishery, which is not adapted to the characteristics of these fish and the fishery) and the complexity and instability of the current rules. If nothing changes, there is a risk the stocks and the fisheries dependent on them will collapse, which will have negative impacts on predatory fish who eat anchovy and sardine, and negative socio-economic impacts for the fisheries sector and secondary sectors such as the processing industry. The most affected stakeholders are the Croatian and Italian fisheries sectors, and to a much smaller extent, those of Slovenia. The processing sector is the most important secondary sector, primarily in Croatia and Italy.

What is this initiative expected to achieve

The objectives, in order to deliver on the EU's Common Fisheries Policy (CFP), are as follows:

-To achieve and maintain maximum sustainable yield for anchovy and sardine by 2020 at the latest;
-To achieve a sustainable fisheries sector;
-To provide an effective management framework which is simpler and more stable and provides stakeholders with greater ownership.
It will also facilitate the implementation of the landing obligation.
The initiative is expected to ensure recovery of anchovy and sardine by 2020 and to ensure the fisheries sector is sustainable, with improved salaries for fishermen (+4% on average), and increased profitability for the fishing sector (+8% on average).

What is the value added of action at the EU level?

Both anchovy and sardine stocks and the fishing vessels concerned move freely across international boundaries so action at Member State level alone is unlikely to be effective in achieving the objectives. For measures to be effective, these should be taken in a coordinated manner and made applicable to the whole area of distribution of the stock and to all fleets concerned.

B. Solutions

What legislative and non-legislative policy options have been considered? Is there a preferred choice or not? Why?

The policy options considered were:

- 0. Using non-legislative instruments or "soft law" (discarded early on);

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- 1. The status quo (Baseline scenario against which other options were compared);

- 2. The development of an EU Regulation to manage anchovy and sardine, with the objective to have stocks sustainably fished by either 2018 or 2020 (two sub-options). Under Option 2, a new management mechanism is proposed, focusing on the output of the fishery, by setting catch-limits. This approach has been successfully tested in other EU waters, resulting in improved stocks status.

- 3. Attempting to amend the current management framework (national and international legislation), which could result in a best-case or a worst-case scenario.

The preferred choice is sub-Option 2 with the 2020 deadline as it delivers on all the objectives, unlike Options 1 and 3, and is more realistic and more acceptable to stakeholders than the sub-Option 2 with a 2018 deadline.

Who supports which option?

None of the consulted stakeholders have evoked soft law (Option 0) as a feasible option. Only one stakeholder (a national professional organization) responded that the current framework (Option 1) is sufficient. All respondents except Malta felt that amending the current framework would not be sufficient (Option 3). The Mediterranean Advisory Council (consisting of industry and civil-society representatives), NGOs, Public authorities, scientific institutes, and Croatia, Italy and Slovenia support Option 2, with a strong preference for the sub-option "2020".

C. Impacts of the preferred option

What are the benefits of the preferred option (if any, otherwise main ones)?

The key environmental benefit would be that anchovy and sardine, after years of overexploitation, would be fished sustainably by 2020 and the fishing sector would be healthier and sustainable. The current management framework would also be simpler, more stable and transparent and would provide greater ownership to Member States and fishermen as they could be involved in designing some of the management rules. The increase in sardine and anchovy is also likely to benefit larger and valuable predators such as blue-fin tuna.

Concretely, by 2021, an EU multi-annual plan is likely to result in improved stock sizes (by around 20% compared to the status quo) and better working conditions for fishermen (an increase in salary of +/- 5% and in profitability of +/-10%.

What are the costs of the preferred option (if any, otherwise main ones)?

Concretely, by 2021, to ensure fishing levels can be sustained in the long-term and that the fishing sector is sustainable and profitable, catches of anchovy and sardine would need to decrease (+/- 25-30%), which would result in a lower total revenue to the fishing sector (+/- 25%) and a decrease in employment (+/-10%). This concerns Croatia, Italy and to a minor extent Slovenian fishermen fishing with purse seiners or pelagic trawlers. As catches decrease, prices at first sale are likely to increase could compensate to some extent the reduced revenues of the fishing sector due to a decline in catches, but would be negative for consumers and the processing sector (in particular in Croatia and Italy), which may need to increase their imports from other countries.

How will businesses, SMEs and micro-enterprises be affected?

The CFP is a policy specifically geared to deal with SMEs, which are the norm within the fishing sector, rather than the exception. In the Adriatic anchovy and sardine fishery, almost

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all fishing firms and a wide majority of companies in the processing sector are micro-enterprises or SMEs. There is therefore no basis to exclude them from the scope of the initiative on the basis of their size or else the vast majority of the sector would be excluded rendering the initiative pointless. The EU multi-annual plan would therefore apply to all businesses including SMEs and micro-enterprises. All the impacts described above are therefore likely to apply to all enterprises, to a varying degree depending on how Member States will decide to allocate the necessary reductions in fishing to different fleet segments.
Will there be significant impacts on national budgets and administrations?
None expected – relevant monitoring and data collection already takes place and only frequency would need to increase.
Will there be other significant impacts?
Yes – the improved profitability of the fishing sector in the Adriatic will make the sector more competitive and, combined with improved salaries, will make the sector more appealing (Section 6.2).
D. Follow up
When will the policy be reviewed?
The Commission should report to the European Parliament and to the Council on the implementation of the plan five years after the entry into force of the plan and every five years thereafter.

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GLOSSARY

Biomass	Biomass refers to the size of the stock in unit of weight. Often, biomass refers to only one part of the stock (e.g. spawning biomass, recruited biomass or vulnerable biomass, the latter two of which are essentially equivalent).
B_{lim}	A biological reference point. The stock size below which there is a risk of reduced reproduction leading to a reduction in recruitment.
Days at sea	Allowed maximum time for fishing trips allocated to vessels per year, depending on their type of fishing gear. For the purpose of this impact assessment it means the same as 'fishing effort' which is the product of the capacity and the activity of a fishing vessel.
Demersal	Descriptive of a fish which lives at or near the bottom of the water column, e.g. hake or sole.
Discard plan	A plan laying down specifications for implementation of the landing obligation in a given geographical area for given fisheries or species. The proposal for the plan is prepared by the Member States concerned and after scientific assessment adopted as Commission delegated act.
Discards	Unwanted catches returned to the sea during fishing operations either dead or alive.
Exploitation pattern	How fishing pressure is distributed across the age profile of a stock.
Fishing mortality (F)	An expression of the rate at which fish are removed from the stock from fishing operations (including fish subsequently discarded). It is approximately the stock annual removal expressed in percentage.
F_{MSY}	A biological reference point. It is the fishing mortality rate that, if applied constantly, would result in an average catch corresponding to the Maximum Sustainable Yield (MSY) and an average biomass corresponding to B_{MSY}.
Fishing opportunities	Fishing opportunities or Total Allowable Catches (TACs) are catch limits (expressed in tonnes or numbers) that are set for most commercial fish stocks. The Commission prepares the proposal, based on scientific advice on the stock status from advisory bodies such as STECF and ICES.
Harvest control rules	A set of rules which specify what the fishing opportunity for a given stock should be in a given year based on information about the state of that stock and its fisheries.
Landing obligation	The obligation to land all catches in the respective fishery in accordance with relevant rules in the CFP Basic Regulation.
Maximum Sustainable Yield (MSY)	Theoretically the largest yield (or catch) that can be taken from a species' stock over an indefinite period. It is the maximum use that a renewable resource can sustain without impairing its renewability through natural growth and reproduction.
Minimum Conservation Reference Size	The size of living aquatic species taking into account maturity, as established by Union law, below which restrictions or incentives apply

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(MCRS)	that aim to avoid capture through fishing activity.
Mixed fisheries	Fisheries in which several species are likely to be caught in the same fishing operation.
Overexploitation	A situation where observed fishing mortality (or exploitation) rates exceed targets.
Pelagic fish	In relation to fish, the term 'pelagic' refers to fish which live in the upper layers of the water column, near the surface, e.g. sardine, anchovy and sprat (which are small pelagics)
Precautionary approach to fisheries management	An approach to managing fisheries to ensure a high probability of avoiding undesirable outcomes. Typically this involves specifying a limit value of spawning stock biomass, then managing fisheries to make sure the stock stays above this level. A limit reference point may also be specified for fishing mortality, in which case management will aim to keep fishing mortality below this level.
Recruitment	The number of new fish added to the exploitable portion of the stock resulting from growth of juvenile fish into adults, or migration of smaller fish.
Regionalisation	The process by which the Member States with direct interest for fisheries of a given geographical region organize themselves with the aim to agree on common management measures. The agreed measures as joint recommendation are submitted to the Commission and after scientific assessment adopted as Commission delegated acts.
Safeguard	A precautionary measure designed to avoid something undesirable occurring
Spawning Stock Biomass	Numbers (weights) of individual fish which are old enough to reproduce. This generally corresponds to the minimum landing size and so defines the 'fishable' population.
Stock	The population of a given species that forms a reproductive unit and spawns little if at all with other units. The “total stock” refers to both juveniles and adults while “spawning stock” refers to the adult population (see above).
TAC	Total allowable catch; the maximum biomass of fish that can be caught from a given stock in a given year.
Technical measures	Measure establishing conditions for the use and structure of fishing gear and restrictions on access to fishing areas.

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LIST OF ACRONYMS

AC	Advisory Council
CFP	Common Fisheries Policy
DCF	Data Collection Framework
EESC	European Economic and Social Committee
EFCA	European Fisheries Control Agency
EFF	European Fisheries Fund
EMFF	European Maritime and Fisheries Fund
EWG	Expert Working Group
F_{MSY}	Fishing mortality that produces MSY
FTE	Full-Time Equivalent
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
GFCM-SAC or SAC	Scientific Advisory Committee of the General Fisheries Commission for the Mediterranean
GSA	Geographical Sub-Area
GVA	Gross Value Added
IA	Impact Assessment
IAR	Impact Assessment Report
IASG	Impact Assessment Steering Group
ICCAT	International Commission for the Conservation of Atlantic Tunas
MAP	Multi-annual Plan
MCRS	Minimum Conservation Reference Size
MEDAC	Mediterranean Advisory Council
MPA	Marine Protected Area
MS	Member State

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MSFD	Marine Strategy Framework Directive
MSY	Maximum Sustainable Yield
NGO	Non-governmental Organization
PO	Producers Organisation
REFIT	Regulatory Fitness and Performance Programme
RFMO	Regional Fisheries Management Organisation
SAC	See GFCM-SAC
SME	Small and Medium-Sized Enterprise
SSB	Spawning Stock Biomass
STECF	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch
TFEU	Treaty on the Functioning of the European Union
VMS	Vessel Monitoring System

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1. INTRODUCTION: POLITICAL AND LEGAL CONTEXT

This impact assessment (IA) concerns a proposal for a multi-annual plan to manage the small pelagic stocks (fish that live at the surface of the sea) and their fisheries in the Adriatic Sea in the context of the reformed Common Fisheries Policy (CFP) – "the Basic Regulation"[1] – which entered into force in 2014.

1.1. Rationale of the reformed Common Fisheries Policy and its main elements

Fisheries management is the regulation of the activities of fishermen. This involves defining what can and can't be fished (e.g. prohibited species or young fish under a certain size), how much can be fished (e.g. maximum amount of fish that can be caught or maximum number of fishing days); when fishing is authorized or banned (e.g. during spawning seasons) and where fishing is authorized or banned (e.g. in marine protected areas).

Fisheries management is an exclusive policy of the European Union and it is regulated by the CFP. Its primary objective is that fishing and aquaculture activities should be environmentally sustainable and managed in a way that is consistent with the objectives of achieving economic, social and employment benefits (see Section 4).

Fisheries, although accounting for a small segments of the European economy in absolute terms, is of crucial importance in relative terms in many coastal regions. Firstly, fishing provides a source of jobs and income to communities that have few alternative options. Secondly, in many areas the importance of these sectors goes beyond pure economics and touch upon the social fabric of communities, and upon the preservation and promotion of ancient traditions and cultures. While improved fisheries management is unlikely to contribute to an increase in jobs in the sector, it can stem the decline and with more fish available, can help to drive up profits and provide better salaries and better working conditions for fishers - and a more competitive industry altogether.

Together with EU funding through the European Maritime and Fisheries Fund (EMFF)[2], the CFP contributes to the EU's growth and jobs agenda through an emphasis on sustainability and economic competitiveness.

The CFP has the following management toolbox at its disposal:

- How much to catch?
  - Total Allowable Catch (TAC) and quota setting to define the maximum allowable catches for individual species. They form the basis for the allocation of national fishing quotas among Member States but have traditionally not been used in the Mediterranean[3].
  - Discard plans, which lay out the conditions, including exemptions in well-defined cases, of which unwanted fish and what quantities can be thrown back in the sea.

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1 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 639/2004 and Council Decision 2004/585/EC; OJ L354 of 28.12.2013, p.22.

2 Regulation (EU) No 508/2014 of the European Parliament ad of the Council of 15 May 2014 on the European Maritime and Fisheries Fund; OJ L149 of 20.5.2014, P. 1

3 With the exception of Bluefin Tuna.

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- Fishing effort limitations serve to regulate how much to catch (e.g. how many hours or days vessels can spend at sea) which is the traditional way of managing fisheries in the Mediterranean.

- What, how, where and when to fish?
  - Technical measures to set out rules concerning for example gear use, which aim to protect fish stocks (often juveniles) and their ecosystems and to avoid unwanted catches, and thus reduce discards

Given the large number of tools that can be combined to manage fish stocks, the CFP provides for the adoption of **multi-annual plans** which aim to provide a dedicated framework to manage fish stocks in an integrated manner by fishery and by sea-basin. The rationale behind the multi-annual plans is to provide greater transparency, predictability and stability of the management rules.

Multi-annual plans are nothing new and have been foreseen by the CFP since 2002[4]. However, while multi-annual plans were an option in the previous CFP, after the 2013 reform they became a priority[5]. The precise shape and content of future multi-annual plans were the subject of work by an inter-institutional task force involving the Commission, the European Parliament and the Council in order to provide guidelines on the structure and content of these multi-annual plans and to solve delicate issues on the sharing of competences among those EU Institutions[6] (see also Annex V).

Since the entry into force of the current Basic Regulation in 2014, only one EU multi-annual plan has been adopted, concerning the Baltic Sea[7]. Other multi-annual plans are in preparation and the coherence between these initiatives is presented in Annex XIII.

Greater flexibility and simplification was also included in the new CFP, by introducing the concept of **regionalisation**. In essence, regionalisation means involving Member States around sea basins in the conception and design of management rules for the interested parties, with a view to increasing their ownership by fishing operators, and thereby their enforcement and, ultimately, their effectiveness. Concretely, Member States sharing a fishing area can make joint recommendations on management measures, and the Commission can adopt these measures as delegated acts if empowered to do so. Such empowerment would typically be granted in a multi-annual plan.

1.2. Scope of the initiative

The Adriatic Sea (hereafter referred to as the Adriatic) is an important sub-area within the Mediterranean, accounting for 32% of the total landings value and 14% of fishing vessels in the Mediterranean[8]. The most valuable and sought-after small pelagic species in the Adriatic are the European sardine *Sardina pilchardus* and European anchovy *Engraulis encrasicolus* (hereafter referred to as sardine and anchovy), with anchovy

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4 Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

5 Article 10 of the Basic Regulation states: "Multiannual plans shall be adopted as a priority, based on scientific, technical and economic advice, and shall contain conservation measures to restore and maintain fish stocks above levels capable of producing maximum sustainable yield"

6 Council Document No 8529-14 PECHE 117 CODEC 1004, also published by the European Parliament: http://www.europarl.europa.eu/meetdocs/2009_2014/documents/pech/dv/taskfor/taskforce.pdf

7 Regulation (EU) No 2016/1139 of the European Parliament and of the Council of 6 July 2016 establishing a multiannual plan for the stocks of cod, herring and sprat in the Baltic Sea and the fisheries exploiting those stocks, amending Council Regulation (EC) No 2187/2005 and repealing Council Regulation (EC) No 1098/2007, OJ L 191, 15.7.2016, p. 1–15

8 GFCM (2016) The State of Mediterranean and Black Sea Fisheries.

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being the more valuable of the two and considered to be driving the fishery. The Adriatic small pelagic stocks represent a high economic income for the fisheries sector in that sea basin (estimated at 74 million EUR and corresponding to 18% of the total fish production in the Adriatic in 2013[9]). Anchovy and sardine account for over 97% of catches of small pelagic fish in the Adriatic[10] (see Annex VI).

The stocks of anchovy and sardine move between the Northern and Southern Adriatic but the vast majority (94%) of landings (in 2013) of these species in the Adriatic take place in the Northern part (see Annex IV - Tables A8 and A9). In terms of catches, the share caught in the Northern part is considered to be even higher than this given that even some of the vessels whose port of registry is located in the Southern Adriatic actually fish and land in the Northern Adriatic[11].

Anchovy and sardine in the Adriatic are part of a mixed fishery with a higher catch of sardine in the eastern side (Croatian and Slovenian coasts) and of anchovy in the western (Italian coast) side. Mixed fisheries are fisheries in which several species are likely to be caught in the same fishing operation (i.e. using the same vessel and gear): fishers unavoidably catch a mixture of species. They cannot control (or only to a limited extent) the composition of their catches. This means that fishing effort applied to anchovy cannot be separated from that applying to the sardine and accordingly, the two species should be managed together.

Figure 1 Map of the Adriatic Sea.

GSA = Geographical Sub-Area. GSA17 = Northern Adriatic Sea. GSA18 = Southern Adriatic Sea. Areas in blue are covered by national management plans adopted under the Mediterranean Regulation. Areas in white are not covered by national management plans.

9 Sabatella E., Kolitari J., Markovic O., Sabatella R., Zorica B. (2015) Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments (for each country and for the whole Adriatic Region). Specific contract N°10 : Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea (SEDAF). Framework Contract MARE/2009/05-Lot 1 "Scientific advice and other services for the implementation of the Common Fisheries Policy in the Mediterranean Sea". Include hyperlink when published

10 FAO catch production statistics, data downloaded on 10 May 2016

11 STECF (2014) Assessment of Mediterranean Sea stocks - part 1 (STECF-14-17)

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This initiative intends to set the basis for management of small pelagic fisheries, in particular anchovy and sardine, in the Adriatic Sea (Geographical sub-areas (GSAs) 17 & 18 of the General Fisheries Commission for the Mediterranean)[12] (see Figure 1).

This initiative aims to address the problem of overexploitation of small pelagic stocks due to an unsustainable fishery and ineffective governance. The main objective of the initiative is to return the stocks and the fisheries sector to a healthy state by ensuring that the fishery is made sustainable and thereby ensuring that the fishing sector can continue to rely on this resource in the long-term.

This impact assessment will focus on assessing the impacts of introducing a multiannual management plan for small pelagic stocks in the Adriatic Sea compared with other policy options.

1.3. Legal context

Council Regulation (EC) No 1967/2006 (the Mediterranean Regulation or MEDREG)[13] is the framework for fisheries management in the Mediterranean. The MEDREG contains technical measures as well as a set of management measures to be adopted by the Member States (e.g. obligation to adopt national management plans for certain fisheries or specific gears).

Currently, anchovy and sardine are managed in the territorial waters of Italy, Croatia and Slovenia by means of three **national management plans**, adopted under Article 19 of the MEDREG:

- a management plan for surrounding nets and for pelagic trawl nets adopted in 2011 by means of a Directorial Decree in Italy[14];
- a management plan covering different types of fishing gears, including surrounding nets targeting small pelagic, adopted in 2014 in Slovenia[15]; and
- a management plan for "Srdelara" purse seine fisheries adopted in 2014 in Croatia[16].

Each national management plan contains different rules to manage anchovy and sardine but they all focus on limiting the input to the fishery, by limiting fishing effort with specific technical measures (see Annex XI).

At **EU level**, following the entry into force of the new CFP Basic Regulation and the landing obligation, a discard plan covering notably anchovy and sardine in the Adriatic was adopted for the period 2015-2017[17]. This provides for limited quantities of anchovy and sardine to be discarded (thrown back into the sea) despite the landing obligation. In accordance with the CFP, the provisions of this Discard Plan should be integrated into a multi-annual plans for the fisheries concerned if a multi-annual plan is adopted.

Another important tool to manage fisheries in the EU has been to prescribe **technical measures** (see Annex XI). So far, the technical measures in place for fisheries exploiting stocks in the Mediterranean, including in the Adriatic, are enshrined in the MEDREG.

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12 http://www.fao.org/3/a-ax817e.pdf

13 Council Regulation (EC) No 1967/2006 of 21 December 2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, amending Regulation (EEC) No 2847/93 and repealing Regulation (EC) No 1626/94; OJ L36 of 8.2.2007, p.6.

14 Italian Directorial Decree No 6 of 20 September 2011.

15 Slovenian Decision No 34200-2/2014/4 of 13 February 2014.

16 Croatian Government Decision, Class 022-03/14-04/49, No 50301-05/25-14-2.

17 Commission Delegated Regulation (EU) No 1392/2014 of 20 October 2014 establishing a discard plan for certain small pelagic fisheries in the Mediterranean Sea.

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At **international level**, the General Fisheries Commission for the Mediterranean (GFCM) which is the Regional Fisheries Management Organization (RFMO) competent for managing fisheries in the Mediterranean, adopted in 2013 a management plan to regulate the exploitation of sardine and anchovy in the Adriatic[18]. All vessels actively fishing for anchovies and sardines in the Northern Adriatic are subject to the provisions of this plan, including in high seas (i.e. international waters). The plan manages the fisheries mainly by regulating the fishing effort (e.g. number of vessels, number of days they can fish) and by setting a minimum size for catching anchovy and sardine.

On top of this management plan, the GFCM adopted emergency measures for the year 2015 for the Northern Adriatic, whereby the maximum fishing days for vessels targeting anchovy were reduced (by 9%) and spatiotemporal closures were adopted to protect nursery and spawning grounds. For 2016, GFCM again adopted emergency measures, this time for both the Northern and Southern Adriatic. For 2017 and 2018, the GFCM adopted further emergency measures which were based on previous emergency measures but expanded to include a freeze on catches and on capacity as well as an obligation for Parties to close 30% of their nursery area for at least 6 months[19]. In practice, to date the GFCM management plan has not been implemented in full.

2. WHAT IS THE PROBLEM AND WHY IS IT A PROBLEM?

There are two main problems concerning small pelagic fish in the Adriatic: anchovy and sardine stocks are overfished, and the governance framework is ineffective (see Figure 2). Discarding of unwanted catches, which was identified as one of the main problems which the reform of the CFP aims to address, is negligible in the Adriatic small pelagic fishery, with < 1% of anchovy and sardine estimated to be discarded in the Croatian, Italian and Slovenian fisheries targeting these species in the Adriatic (see Annex IV).

This is because the gears involved in the fisheries are fairly selective and because anchovy and sardine occur in schools which make them easier to catch without taking other species at the same time (see Annex VI). Stakeholders in the public consultation also noted that for the management of secondary target species such as horse mackerel and sprat, it was considered that the landing obligation provisions are enough (Annex II).

[18] Recommendation GFCM/37/2013/1 on a multiannual management plan for fisheries on small pelagic stocks in the GFCM-GSA 17 (Northern Adriatic Sea) and on transitional conservation measures for fisheries on small pelagic stocks in GSA 18 (Southern Adriatic Sea).

[19] Recommendation GFCM/40/2016/3 establishing further emergency measures in 2017 and 2018 for small pelagic stocks in the Adriatic Sea (GSA17 and GSA18). update hyperlink to the recommendation itself when Recommendation is published

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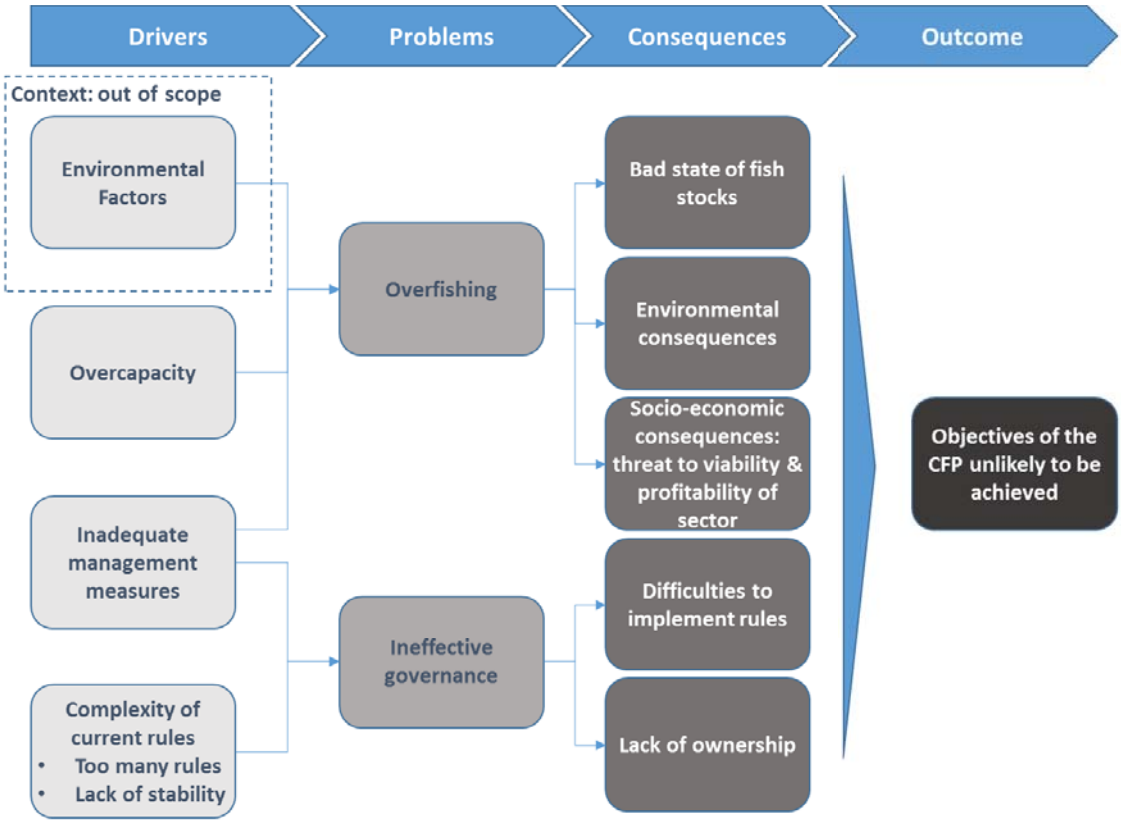
Figure 2 Problem tree for the small pelagic fisheries in the Adriatic



2.1. The Problem: Overfishing

Overfishing is defined in terms of the objectives of the CFP, which is to have stocks at maximum sustainable yield[20]. We therefore consider that overfishing takes place when the mortality caused by fishing is greater than the mortality compatible with MSY. According to the most recent data, around 93% of Mediterranean fish stocks assessed are overexploited whilst for many other stocks, the status still remains unknown[21]. In a broad stakeholder consultation carried out in 2015 in the context of the retrospective evaluation of the MEDREG[85,] stakeholders overwhelmingly agreed that fish stocks in the Mediterranean are severely overexploited. Scientific assessment of the status of the stocks typically calculate a ratio of current fishing mortality levels compared with MSY fishing mortality and if this ratio is above 1 then the stock is considered to be overfished (compared to MSY).

Anchovy and sardine are assessed by both the EU's scientific advisory body for fisheries (the Scientific, Technical and Economic Committee for Fisheries, STECF)[22] and the GFCM's Scientific Advisory Committee (SAC)[23] (see Box 1 in Annex VI). The most

20 The CFP Basic Regulation defines Maximum Sustainable Yield as follows: *'maximum sustainable yield' means the highest theoretical equilibrium yield that can be continuously taken on average from a stock under existing average environmental conditions without significantly affecting the reproduction process;*

21 COM(2015)239 final Communication from the Commission to the European Parliament and the Council concerning a consultation on the fishing opportunities for 2016 under the Common Fisheries Policy.

22 https://stecf.jrc.ec.europa.eu/

23 GFCM (2016) Report of the seventeenth session of the Scientific Advisory Committee. FAO headquarters, Rome, 24–27 March 2015

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recent scientific advice from both of these bodies indicates that anchovy and sardine in the Adriatic are still being overexploited beyond their reproduction capacities and that the situation is getting worse as we are moving further away from sustainable fishing levels. In 2013, anchovy were exploited over 6 times sustainable levels and sardine over 3 times sustainable levels (See Annex VI). In other words, we are far from the target set out in the Basic Regulation, the Maximum Sustainable Yield (MSY).

Both bodies recommended, as recently as 2015, that fishing levels need to be reduced for both species, and that in particular for anchovy this needs to be done immediately (see Annex VI). More specifically, the STECF in 2015 advised that to reach sustainable levels of fishing, catches need to be decreased considerably for both species and that to achieve this, the relevant fleets' effort should be reduced, in order to avoid future loss in stock productivity and landings for the sector. STECF further advised that this should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations[114].

2.1.1. Underlying drivers of overfishing

The key driver for the poor state of anchovy and sardine is overfishing: catches are too high compared to what the stocks can sustain in the long-term. Catch levels depend on several factors, such as how many boats are fishing the stocks, for how long, using what gear etc. (see Annex VIII, Figure 1).

Overcapacity

A fishing fleet that is in overcapacity has the ability to fish more than the fishery resource can sustain or more than a desired reference point (e.g. MSY). Overcapacity is considered as one of the leading causes of overfishing, notably in the Mediterranean Sea. Pursuant to Article 22 of the Basic Regulation, Member States are required to carry out an assessment of the balance between their capacity and the available resources ("fishing opportunities") and to put in place measures to adjust the fishing capacity of their fleet to the available resources. According to this self-assessment, and the planned reductions in capacity, the main fleet segments exploiting anchovy and sardine in the Adriatic are in overcapacity compared to the available fish. Specifically, Italy plans to reduce its capacity by at least 10 %, Croatia by 5-20% depending on the fleet segment. Slovenia carried out a large reduction in capacity in 2013, with a reduction of 38 % (expressed in GT) and for 20 % (expressed in kW) compared to 2010[24].

Environmental factors

Populations of small pelagic species, such as sardine and anchovy, are characterised by short life spans (e.g. 4-5 years for anchovy and sardine) tend to be more sensitive to environmental variability than other fishes, and are subject to substantial changes in abundance over relatively short time periods – so called "boom and bust" population dynamics[25].

The overexploitation of anchovy and sardine stocks is compounded by environmental factors. Environmental conditions (e.g. temperature, salinity, change in nutrients, ocean

[24] The ten fleet segments which account for the greatest share of catches of small pelagics in the Adriatic (See Annex III), are all included in the relevant Member States Action Plans for the fleet segments with identified structural overcapacity [39,40,90] and details on how Member States intend to address this overcapacity are provided in Annex IX.

[25] International Symposium Drivers of dynamics of small pelagic fish resources. Victoria, BC, Canada, 6-11 March 2017.

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currents) can influence the survival and recruitment of fish stocks and can further contribute to the negative status of stocks caused by overfishing. On the other hand, healthier fish stocks are more resilient to environmental fluctuations and thus ensure the exploitation in the long-term. In the case of anchovy in the Adriatic, recent evidence suggests that in particular, oceanographic conditions during winter influence anchovy abundance[26]. This is thought to be linked to the salinity of the water entering the Adriatic from rivers on land, which affects the abundance of food for anchovy.

The notorious collapse of the anchovy stock in the Adriatic during the late 1980s when a severe drop of anchovy catches was registered (catches decreased from over 50,000 tonnes to 7,000 tonnes in 1988), is believed to be related to high levels of fishing during the previous decades and a decrease of the sea surface temperature[27,28]. In fact, the low temperatures during the reproductive period highly reduced the recruitment during the following years, which led to the lowest population size ever observed. Similarly, a decline in river and land runoff may affect the productivity (i.e. lower concentration of nutrient), reducing the primary production and thereby reduce also the amount of food for anchovy and sardine. In the long term, the various environmental factors listed above, together with high fishing pressure, are likely to increase the vulnerability of the system and worsen the state of the fish stocks.

This driver falls outside the scope of this initiative.

2.1.2. Consequences of the overfishing of anchovy and sardine

Bad state of the anchovy and sardine stocks

The poor state of anchovy and sardine has been confirmed by both the STECF[114] and the GFCM SAC[23]. For both species, population levels are currently much lower than they have been in the past: the anchovy stock was at around 400 000 t in 2005 and now it is under 100 000 t (2014) whilst the sardine stock fluctuated between 300 00 t and 500 000 t from 1970-1990 but since then, it has been below 200 000 t for the past 15 years (see Annex VI). Based on the most recent data from scientific surveys, the last 3 years (2013-2015) show a declining trend in abundance and biomass for both anchovy and sardine in the Adriatic, including for juveniles, with some of the recent biomass levels being the lowest in the available time series[29].

Recent increases in sardine stock (since 2000), although low in terms of historical levels, shows that there is still some potential for recovery for this stock. However, to ensure such recovery takes place, exploitation levels needs to be reduced and brought in line with maximum sustainable yield.

In the case of anchovy, as a result of overfishing combined with environmental change, the population collapsed in the 1980s. Since then, the recovery of the anchovy stock has been only partial. Since 2005, the size of the anchovy stock appears to have declined sharply once again (See Annex VI). Catches are currently mostly dominated by juveniles

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26 Kraus & Supic (2011) Impact of circulation on high phytoplankton blooms and fish catch in the northern Adriatic (1990–2004). Science Direct Vol 91(2), pp.198-210.

27 Cingolani N., Giannetti G. and Arneri E. (1996) Anchovy fisheries in the Adriatic Sea. *Scientia Marina* **60** (Supl. 2): 269-277.

28 Gibson R.N., Atkinson R.J.A, Gordon J.D.M. (2009) Oceanography and Marine biology: An Annual Review. *CRC Press*, Volume **47**, 360 pages.

29 Giacomo Chato Osio & Finlay Scott (2016). Trend exploration of MEDIAS acoustic surveys for early warning and prioritization of small pelagics assessments in the Mediterranean. JRC Technical Reports EUR 28018, DOI 10.2788/331072 update hyperlink to report itself when report is published

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and small-sized fish as fishing activity has already removed many of the large-size individuals from the population (See Annex VI). As anchovy stocks continue to decline, the risk is that fishers focus more on sardine and further compound the unsustainable fishing of the latter.

Environmental consequences

Overall, excessive levels of fishing, as well as damage to fish habitats, have caused major losses of biodiversity, changes in the structure of fish populations (e.g. fewer large individuals), appearance of invasive species, food web modifications (e.g. decline of top predators with cascading effects). Small pelagics in the Adriatic Sea and play an important role in the food web and their abundance is likely to control the abundance of larger predatory fish, marine mammals and seabirds[30]. For example, the overexploitation of anchovy and sardine, and their historical declines, may cause knock-on effects in the food chain as these stocks serve as food to larger fish such as Blue-fin Tuna which is one of the most valuable fish species worldwide. Another environmental consequence of fishing, and overfishing, of fish stocks is the impact on other, non-target species which get caught during the fishing activity. Some of the vessels involved in the small pelagic fishery, such as pelagic trawlers, have unwanted catches of certain protected species including bottlenose dolphins, marine turtles, and sharks and rays[31].

Socio-economic consequences: threat to the viability and profitability of the sector

As a consequence of this unsustainable overexploitation of anchovy and sardine in the Adriatic, and the associated decline in resource, the whole catching sector dependent on these stocks are at risk of also declining and even collapsing.

Evidence of a decline in the catching sector is already visible, as witnessed by a decline in the salaries and profitability of the catching sector targeting anchovy and sardine in the Adriatic. Employment in several fleet segments has also been declining or stagnant (Annex XII).

In addition the secondary sectors that rely on small pelagics such as the processing industry (canning and salting) have also been showing worrying signs, including a strong decrease in production recent years in Italy and Croatia[32]. Reduced availability of anchovy and sardine for the fresh fish market in the Adriatic may be difficult to compensate as these species are too low value and too fragile to be transported by air from other sea basins[33].

Ensuring that fish stocks remain within biological limits is therefore crucial not only for the ecological balance of the ecosystems, but also for the social and economic well-being of coastal communities. Healthy stocks provide a security to the fishing sector in terms of their economic activities and therefore guaranties in socio-economic terms.

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30 Scientific, Technical and Economic Committee for Fisheries – 49th plenary meeting report (PLEN-15-02), 6-10 July 2015, Varese.

31 Fortuna *et al.* (2010) By-catch of cetaceans and other species of conservation concern during pair trawl fishing operations in the Adriatic Sea (Italy). Chemistry and Ecology, Vol. 26, Supplement, June 2010: pp. 65-76.

32 DG-MARE-EUMOFA (2016) Contribution to the impact assessment of EU multi-annual plan for small pelagics in the Adriatic. European Market Observatory for Fisheries and Aquaculture Products.

33 Currently only frozen anchovy and sardine are imported into Adriatic Member States for the processing sector – see Annex III.

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2.2. The Problem: Ineffective governance

The second problem which faces the anchovy and sardine fisheries in the Adriatic is ineffective governance, which is defined as a governance set up (in particular management measures) which is not achieving the desired objectives. The Basic Regulation lays out the principles of good governance which should be followed under the CFP (Article 3). This includes: *taking into account of regional specificities, through a regionalised approach, the establishment of measures in accordance with the best available scientific advice, a long-term perspective, administrative cost efficiency, appropriate involvement of stakeholders, in particular Advisory Councils, at all stages, consistency with other Union policies, the use of impact assessments.*

Despite the numerous management tools that have been adopted for anchovy and sardine in the Adriatic (see Section 1.3), all these actions have not been sufficient to ensure the sustainable exploitation of these stocks. Furthermore, the problem of ineffective governance for small pelagics in the Adriatic is getting more serious over time, as witnessed by the fact we are moving further away from our objectives as the extent of overfishing is getting worse in recent years. There is a need to improve and simplify the management framework to ensure it effectively manages these shared resources. The specific drivers of this problem are detailed below.

2.2.1. Underlying drivers of ineffective governance

Inadequate management measures

Fisheries can be managed in different ways, essentially by managing either the effort that goes into the system (how much fishing takes place), which is referred to an input control, or by managing what comes out of the system (i.e. quantity of fish caught or landed), referred to as output control. To date, as presented in Section 1.3, anchovy and sardine in the Adriatic, under both the national plans and the GFCM management plan, have been managed through input control, and primarily through effort limitation. Given the on-going overexploitation of these stocks, it is evident that this approach has not succeeded in restoring stocks to a healthy status. This driver also contributes directly to the problem of overexploitation of the anchovy and sardine stocks.

The current fisheries management system for small pelagics in the Adriatic has problems at several levels:

- The management plan adopted at **international level**, under the GFCM, has not been implemented fully since it was adopted in 2013. The management measures under the GFCM have also been modified annually since 2013 and are not sufficient to achieve the CFP targets of sustainable fishing by 2020 at the latest.
- The measures adopted at **national level**, to implement the international obligations and to implement the obligations under the EU's MEDREG have been modified regularly in recent years, are not sufficient to achieve the CFP's sustainability objectives, and differ between the Adriatic countries rendering them in some cases less effective.
- At both international and national level, management measures focus on input control and the **reductions in input do not translate directly into reduced catches and fishing mortality**, and make it very complicated to determine what a sufficient level of input control is to guarantee fishing mortality compatible with maximum sustainable yield. In the Adriatic small pelagic fishery, vessels tend to make short trips and to fish quite close to the coast, sometimes only fishing a few hours per day. If the number of days when fishing is allowed is reduced (as it has been under international measures), the vessels could compensate this to some

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extent by fishing more hours in the given days thus catching as much as they used to.

- For **fishing sector** who need to follow these rules, this instable framework and the different rules in the different areas of the Adriatic make it more complicated to comply with the rules.

In several other parts of the European fishing sector, which were faced with similar problems of overexploitation and stock declines, there have been recoveries in the fish stocks and the fishing sectors following implementation of multi-annual management plans[34] and a system of catch-limits (see Annex VIII).

STECF has advised that managing fisheries targeting small pelagics using effort limitation implies a high risk due to the particular characteristics of the species[35] and fisheries targeting them[36] and has recommended that catch limits would be a more effective management tool for fisheries of small pelagic species in the Mediterranean[37,38].

Complexity of current rules

Consultations have shown that, among stakeholders, there has been strong criticism of the complexity of the existing legislation. Several stakeholders, including the fishing industry, have complained about the many different management measures in place during the public consultation (see Annex II). An additional problem is the fact that the management framework is unstable, with management measures changing regularly over time (see Annex XI).

There is currently no comprehensive framework to manage small pelagics in the Adriatic: these stocks are subject to **management measures at different policy levels**. Currently, there are three national management plans in place, using different management measures, as well as technical measures established under the MEDREG, a GFCM management plan, GFCM emergency measures since 2015, and a discard plan under the CFP.

The national plans and the GFCM plan are similar in that they focus on input control to manage the stocks. However, there are **inconsistencies between the existing management measures,** which add to the complexity (see Annex XI). This is due in part to the fact they have been adopted in different contexts (EU measures vs GFCM international agreement) and also due to the fact that the reform of the CFP and adoption of the new Basic Regulation, in 2014, took place after both the adoption of the MEDREG (and of the national management plans adopted thereunder) and of the adoption of the GFCM plan.

For example, the periods when fishing is not allowed differ between the three Adriatic Member States. Therefore, a fisherman moving from one Member States' territorial waters to another will face different rules about when he can or cannot fish. This makes it more difficult to know and therefore to follow the rules, and it also means that closed seasons (which are designed to provide the stock with a period of no fishing mortality)

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34 These multi-annual management plans were adopted under the previous CFP.

35 In particular the fact they occur in groups, of shoals of fish, and that a large number of individual can therefore be caught in a short space of time if a fishermen encounters a shoal of fish.

36 Due to the fact that generally the same fleet segments fish either anchovy or sardine (or other small pelagic species) and the fishermen can therefore adapt their target species as available and appropriate ie even if a vessel heads out to target sardine, if they come across a shoal of anchovy they may decide to fish the latter.

37 STECF (2011) Assessment of Mediterranean Sea stocks -part 2 (STECF-11-14).

38 STECF (2016) 51st Plenary meeting Report (PLEN-16-01)

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are less effective, as fishers can go and fish the same stock in a different part of its range, where there is no closed season. In addition, the objectives of the national plans and the GFCM plan are incompatible: the GFCM plan is based on the precautionary approach and, since 2016, includes the objective of sustainable fishing (MSY) by 2020. The Italian plan does not include either MSY, or a deadline (2020), or the precautionary approach. The Italian and Croatian plans have defined targets for fishing mortality and biomass (Italy) as well as biomass safeguards (Italy) which are not compatible with MSY by 2020 and hence incompatible with the GFCM objective.

Finally, the scope of the different management instruments are also different, with national management plans being adopted on the basis of fishing gears (e.g. a plan for purse seiners), whilst the GFCM management plan is developed on the basis of stocks (anchovy and sardine).

There has also been a lack of stability in the measures adopted both at international level (GFCM rules) and at national level (national management plans adopted under the Mediterranean Regulation). The international rules have changed on a yearly basis since the GFCM management plan was adopted in 2013. The national measures have also changed frequently in Croatia, Italy and Slovenia in particular spatiotemporal closures (see Annex XI). This instability over time comes on top of the differences in rules set by different countries but which add an additional layer of complexity for fishers who may fish in several parts of the Adriatic, and be subject to several different sets of national rules (and international rules in international waters)

As described in the Section 2.5, the provisions in the three national management plans and the emergency measures currently implemented under the GFCM will not enable sufficient reductions in catches to reach the sustainability targets of the CFP by 2020 at the latest.

Finally, **monitoring** of whether, under the management framework, the 2020 sustainability objectives and target would be met is very complicated due to the variety of measures in place to reduce fishing mortality, which need to be assessed together to determine overall mortality. Indeed, assessing whether the combination of three sets of (possibly different) management measures, applied each to only a part of the stock would ensure sustainable fishing levels is much more complicated and uncertain compared to a single instrument and management approach.

2.2.2. Consequences of ineffective governance

Difficulty to implement the rules

This **constantly evolving, complex, and inconsistent management framework** makes it harder for the fishing industry to remain aware of the rules currently in force and therefore to implement them. Such a situation, in which the management measures change on a yearly basis also makes it very difficult for the fishing industry to adapt and predict what the situation will be like in the coming years e.g. how much they will be able to fish, at which times of year, in which areas, whether to invest in their vessels and equipment etc.

There have also been **shortcomings in the implementation and enforcement** of the existing management framework. For instance, national management plans were only adopted between 2011 and 2013 (i.e. 4-7 years after the deadline set in Article 19 of the MEDREG). The GFCM Management Plan is not being fully implemented (e.g. the harvest control rules are not being followed, as scientists showed some concerns about

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the way reference points were calculated) and emergency measures – which are less comprehensive and far-reaching than application of the plan – have been applied instead.

Difficulties for the sector to plan ahead

The lack of stability also results in difficulties for the sector to predict when and how much they will be able to fish making it more difficult for the sector to carry out business planning such as deciding on whether to carry bout investments in their vessels or business.

Lack of ownership

Another consequence of the rules being so complex and in particular, changing so frequently, is that there is less ownership by stakeholders, in particular those that need to comply with the rules governing this fishery.

Furthermore, Croatia, Italy and Slovenia feel that their regional specificities are not being taken into account and they have been urging for the **specificities of the Adriatic** to be taken into account in the management of the fish stocks there, and that this be done on the basis of the new tool, **regionalisation**, which was introduced by the 2014 CFP reform. This position was expressed notably in response to the public consultation (Annex II).

However, implementing regionalisation, is not possible under the current framework that regulates anchovy and sardine in the Adriatic, as there is no legal framework to enable adoption of regional management plans or measures proposed by regional groupings of Member States (see Annex V). The current management tools are introduced either by each Member State (national management plans) or at international level by the competent Regional Fisheries Management Organisation (GFCM management plan).

2.3. The affected stakeholders

The primary sector affected by the problems described above is the fishing sector from the countries fishing anchovy and sardine in the Adriatic, which is primarily Croatia and Italy, and to a very limited extent, Slovenia, Albania and Montenegro (together accounting for under 2% of the total catches) (see Annex III). Other upstream and downstream sectors that are linked to the primary (fishing) sector would also be affected by changes in the catch sector e.g. the processing sector that relies on sardine and anchovy, as well as the retail sector and consumers of these fish. Within this impact assessment, the focus is on the stakeholders affected by the problem in the primary sector, and in the processing sector which is the most important secondary sector in this region in terms of income (see Annex III - Table 1).

The importance of the different sub-sectors[44] as a proportion of the total fisheries sector (i.e. not only small pelagics) varies by country: In Croatia, the catching sector is the most important fisheries sub-sector in terms of income, accounting for over 60% of total fisheries income. In the Italian Adriatic and in Slovenia, processing is the most important sub-sector, accounting for over 70% (Italy) and 90% (Slovenia) of total fisheries income in the area (see Annex III – Table 1).

The following section focuses on the EU stakeholders affected, on the basis that this impact assessment concerns an EU initiative and also given the fact the role of third countries is negligible in this fishery.

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2.3.1. Fishing sector

Two types of fishing gears are currently used to catch small pelagic species in the Adriatic: the mid-water pelagic trawl net towed by two vessels, which are used by Italy, and the purse seine, which are used in Croatia, Italy and Slovenia.

Italy and Croatia take over 99% of EU catches of anchovy and sardine in the Adriatic (in terms both of quantity and value), and Slovenia less than 1%. Landings of anchovy are dominated by Italy (70% of total landings) whilst those of sardine are dominated by Croatia (77% of total landings) (see Annex III – Table 2).

In the Adriatic, around 400 vessels target these stocks[11] and just over 2000 employees are involved in the fishery (see Annex III – Table 4). In both **Italy and Croatia**, there are around 200 vessels fishing for pelagics in the Adriatic and the majority of vessels involved are large (over 18m in length) [90,39]. In **Slovenia**, there are only 4 vessels active in this fishery and these are all over 12m in length[40]. Overall, 99% of landings of anchovy and sardine in the Adriatic are made by vessels over 12m in length[41].

Regarding the **importance of Small and Medium Enterprises (SMEs)** in the fishing sector, data on the number of employees are only available at the Member State level, and not by region (i.e. not for the Adriatic specifically) nor by species or type of fishery (i.e. anchovy and sardine). However, if the number of vessels per enterprise is taken as a proxy for enterprise size, then the vast majority of enterprises in the catching sector can be considered as micro-enterprises[42]:

- In Croatia, 77% of enterprises have only 1 vessel, and 96% have fewer than 5 vessels;
- In Italy, 87% of enterprises have only 1 vessel, and 97% have fewer than 5 vessels;
- In Slovenia, 71% of enterprises have only 1 vessel, and 99% have fewer than 5 vessels[43]

2.3.2. Processing sector

In terms of secondary sectors that are dependent on fisheries, the processing sector is the most important one, accounting for over 60% of total value generated by all fisheries sectors[44] in the Adriatic[45] and above 70% and 90% in Slovenia and Italy respectively[9].

Specifically for small pelagics, the processing sector (canning and salting) generates a significant activity in Italy and Croatia, where it represented around EUR 150 million in sales in 2014. However, production of canned anchovy and sardine has strongly decreased in recent years, from 20 500 t in 2009 to 13 000 t in 2014[32].

Figures for the numbers of enterprises and employment within the sector in each of the Adriatic Member States are given in Annex III – Table 3[46]. In terms of full time

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39 Croatian Annual report on balance between fishing capacity and fishing opportunities for 2014.

40 Slovenian Annual report on efforts to achieve a sustainable balance between fishing capacity and fishing opportunities for the year 2014.

41 Based on data collected by Croatia, Italy and Slovenia under the Data Collection Framework Council Regulation (EC) No 199/2008 for the year 2013.

42 Due to the way in which the data are collected and provided by Member States under the DCF Regulation (Council Regulation 'EC) No 199/2008) it is not possible to provide figures on the fraction of total catches that enterprises of different sizes account for.

43 The 2015 Annual Economic Report on the EU Fishing Fleet (STECF 15-07)

44 The fisheries sectors include the following sub-sectors: fishing, fish processing, aquaculture and ancillary activities (e.g. boat building and repairs, service industry, feed supply etc.).

45 This refers to all fisheries in the Adriatic, not just small pelagics.

46 Note that the enterprises may be processing catches (of all species) from other areas as well as the Adriatic, this is particularly the case for Italy which fishes in several sea basins. Therefore, the level

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equivalents (FTE), the three Adriatic Member States have a total of over 6700 FTEs, with the vast majority being situated in Italy (77%) followed by Croatia (18%).

In both Italy and Slovenia, 100% of these enterprises meet the definition of SMEs in terms of number of employees[47] (i.e. <250 employees) whilst in Croatia this figure is 95% (Annex III – Table 3).

2.3.3. Markets

Fishery and aquaculture products in the Adriatic are distributed by wholesale fish traders and only a minor part is sold directly by fishers or farmers. There are at present 28 Adriatic fish markets, divided into production and mixed markets[9]. Small pelagics in the Adriatic are partly sold to fish processors and fish-farming establishments (e.g. for Blue-fin tuna farming) or are placed on the fresh fish market[9,32].

Italy is the key market in volume for both anchovy and sardine. Croatia exports most of its production and Slovenia accounts only for negligible volume in landings and trade flows (below 1000 tonnes)[35]. Annex III presents greater detail on the trade balance and trade partners of these Member States.

The trends in volumes of anchovy and sardine landed in Italy and of prices of first sale in recent year show an inverse correlation between the two: prices decrease when landings increase and vice versa (see Annex III – Figure 1 and 2).

2.4. Evolution of the problem

How would the problem evolve, all things being equal? This is the situation that would occur if sardine and anchovy continue to be managed according to the current regulatory structure (presented in Section 1.3) and to be exploited at current levels.

The modelling of the evolution of the problem in terms of environmental and socio-economic impacts by 2021 (as presented in Table 1 and detailed below) is based on the study on Management scenarios for the preparation of multi-annual management plans in the Mediterranean and the Black Sea"[66]. This study was conducted by a consortium led by COISPA Tecnologia & Ricerca[48] and is presented in more detail in Annex IV including assumptions of the model and input data.

In addition, the modelling of the evolution of the problem in terms of stock status, over a longer time period, was carried out in a GFCM bioeconomic assessment of management measures for sardine and anchovy fisheries in the Adriatic in 2015[50] (see Section 2.5).

2.4.1. Environmental impacts

Under these two options, if current fishing levels are maintained, both stocks would remain overfished and outside safe biological limits. In the medium-term (2021), the anchovy stock would not recover and would remain around recent levels (2014). For sardine the stock would decline slightly in 2021 compared to 2014 (-7%).

However, if current fishing levels are maintained, simulations over a longer time period (until 2030) have found that current fishing mortalities[49] are too high and if continued,

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of employment in the processing sector in the Adriatic is likely to be less than the values per Member State in Annex III – Table 3.

47 Based on data from the Report of the STECF Expert Group on: Economic Performance of the EU Fish Processing Industry (STECF-14-21). Data tables available here: https://stecf.jrc.ec.europa.eu/data-reports

48 http://www.sinab.it/istituto-ricerca/coispa-tecnologia-ricerca

49 Average of 2012-2014

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anchovy and sardine stocks could collapse between 2020 and 2030, with a 47-75%[50] chance of sardine stock falling below the critical point (Blim) by 2028 and a 70-75% chance for sardine[51]. Typically, collapses are characterized by a reduction in catch to less than 10% of the maximum and by a long recovery time after reaching a biomass minimum[52]. Such a collapse would have negative knock-on effects for predator species which feed on anchovy and sardine.

2.4.2. Socio-economic impacts

If business continues as usual, based on past socio-economic trends for the main fleet segments exploiting small pelagics in the Adriatic, average salaries, profitability, overall revenues and employment are expected to decline or remain stable in the majority of fleet segments. Taking the fleet as a whole, in the medium-term (2021), catches of anchovy are expected to decrease very slightly compared to recent levels (2014), whilst catches of sardines are expected to increase by 17%. In 2021, the level of employment in the fishing sector, the average salary for an employee, and the total revenue of the fishing sector are expected to remain very similar to 2014 levels (between 2-5% increase). The profitability of the fishing sector, and therefore its competiveness, are expected to increase by 14% between 2014 and 2021.

In the longer-term, if the Adriatic anchovy and sardine stocks collapse to very low levels, as happened e.g. in the 1980s, and as appears highly probable if current fishing levels are maintained (see Section 2.4.1) this would have serious consequences in terms of loss of employments, revenue and profitability for the sectors and communities depending on it (see Section 2.3 for the stakeholders affected by this problem). In terms of secondary consequences, a reduction or collapse in fish stocks is likely to result in reduced supply of fresh anchovy and sardine for consumers in the Adriatic. It would also result in a reduction in primary material for processing industries in the Adriatic, in particular in Croatia and Italy, which would be required to increase their imports of small pelagics from other areas (and possibly to switch species). Prices for consumers for fresh fish or canned products may increase as a result of a decrease in supply but this is unlikely to be significant (see Annex III).

2.5. Retrospective evaluation of the existing policy framework

An on-going **retrospective evaluation of the MEDREG**[85] found that, despite many of the MEDREG measures being implemented, the MEDREG appears to be failing on the majority of its objectives in the Northern Adriatic region, or results on effectiveness are inconclusive due to limited supporting evidence. For example, all National Authorities that were consulted in the context of this retrospective evaluation perceived little and no impacts of the MEDREG in reducing fishing effort in the Northern Adriatic region and that the MEDREG has had a limited impact on number of vessels and employment in Italy and Croatia.

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50 Depending on assumption on stock-recruitment relationship

51 GFCM (2016) report of the workshop on bioeconomic assessment of management measures (WKMSE), 1-3 February 2016.

52 There have been several complete collapses of fish stocks resulting in the collapse of large, profitable fisheries, such as the Californian sardine fishery in the 1950s, the Atlanto-Scandian herring fishery in the late 1960s, the Peruvian anchovy fishery in 1972, the Northern cod fishery off the East coast of Canada in 1992 and the North Sea cod fishery (Kjellrun *et al.* (2009) Fisheries Depletion and Collapse. This case study accompanies the IRGC report "Risk Governance Deficits: An analysis and illustration of the most common deficits in risk governance")

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National management plans adopted by Member States **have been thoroughly analysed** by the STECF[30] based on a dedicated study[53]. STECF concluded that under the existing national management plans, reductions of the catches are **insufficient to reach sustainable fishing levels by 2020** and therefore, STECF considers that, unless changes in the above aspects are made to the national management plans, it is very unlikely that the objectives of the CFP will be achieved.

The main problems with the national management plans are the following:

- they do not contain the CFP objective of reaching sustainable fishing levels by 2020 at the latest;
- they take a national approach to management (by definition) which means the reference points (eg minimum biomass level) were determined at national rather than stock level which makes little sense biologically;
- different countries apply different management measures so different parts of the stock are managed in different ways;
- the plans only cover national waters whereas the two fish stocks are found also in international waters: the national plans therefore have gaps in their coverage and don't cover the activities of all fleets exploiting the resources (see Figure 1).

STECF considers that for **stocks shared by several countries**, regional management plans are more appropriate and that a management plan which covers all fisheries for sardine and anchovy in the Adriatic should be developed[50] (see Annex XI).

Regarding the international measures implemented under the GFCM, **a bioeconomic assessment of management measures** for sardine and anchovy fisheries in the Adriatic was carried out by the GFCM in 2016[50]. Simulations show that current fishing mortalities[54] are too high, including under the emergency measures adopted by the GFCM, and if continued, anchovy and sardine stocks would remain outside biological safe limits or even collapse between 2020 and 2030 (see Annex XI).

The **reference points in the GFCM Management Plan** have also undergone numerous reviews by the scientific community since the GFCM management plan was adopted in 2013 and there is agreement that the values in the plan are not appropriate[23].

The **objectives of the GFCM plan are not fully aligned with those of the CFP**: the GFCM plan is based essentially on biomass levels but CFP focuses on managing fishing mortality. The GFCM plan also does not include 2020 (at the latest) as a deadline to achieve sustainable fishing levels, as required under the CFP.

In addition, in other parts of the EU, almost all important stocks and fisheries are managed by means of a **multi-annual plan**, adopted before the latest reform of the CFP. Almost all these plans were species-specific[55]. Key lessons learned from implementing these plans include the fact that long-term planning works: many stocks under multi-annual plans have recovered including iconic species such as cod (depleted in the 2000s). These plans have also shown that managing a stock as a whole (rather than different measures for different countries fishing a shared stock) makes most biological sense.

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53 MAREA: MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE - SPECIFIC CONTRACT n° 9, Task 4 - Ad hoc scientific advice in support of the implementation of the Common Fisheries Policy, "Scientific advice on the conformity of management plans with the requirements of the Common Fisheries Policy in the Mediterranean Sea"- Revised report 08.08.2014.

54 Average of 2012-2014

55 http://ec.europa.eu/fisheries/cfp/fishing_rules/multi_annual_plans/index_en.htm

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3. WHY SHOULD THE EU ACT?

The principle of proportionality requires that the involvement of the institutions must be limited to what is necessary to achieve the objectives of the Treaties.

According to Article 3.1(d) of the TFEU[106], the EU has exclusive competence for the conservation of the marine biological resources under the CFP, managed directly through EU regulations. Furthermore, both the fish stocks and the fishing vessels concerned move freely across international boundaries so action at Member State level alone is unlikely to be effective in achieving the objectives. For measures to be effective, these should be taken in a coordinated manner and made applicable to the whole area of distribution of the stock and to all fleets concerned. The initiative respects the principle of subsidiarity and fulfils its requirements.

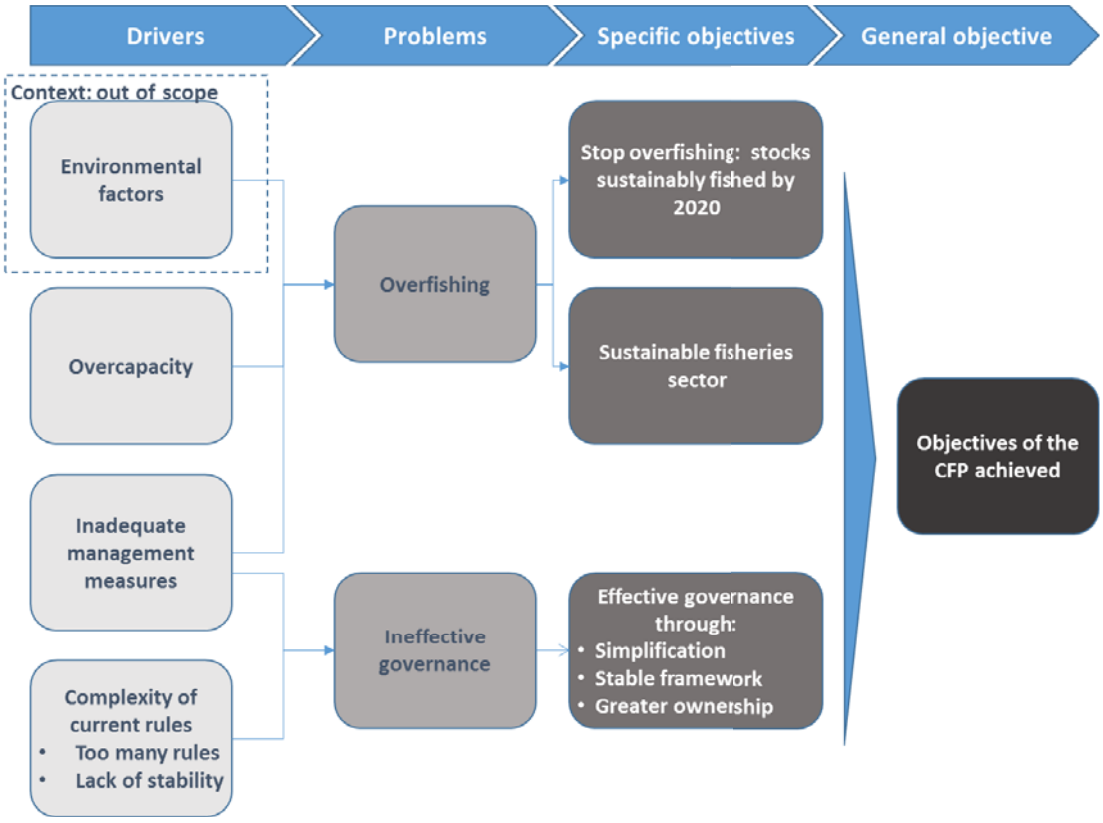
In addition, most contributors to the public consultation agreed that EU intervention is necessary, in the form of an EU management plan (see Annex II).

However, it should be noted that one of the objectives of this proposal is to strengthen the regional governance mechanisms, as provided for under Article 18 of the Basic Regulation. The aim of Regionalisation is to increase the involvement of the Member States affected by regulation and thus their ownership of the measures. The Commission's role is to ensure that the adopted measures fulfil the objectives of the Basic Act. Regionalisation thus constitutes an important shift from instrument-based to results-based management (see Annex V for more details).

4. WHAT SHOULD BE ACHIEVED?

The general objective and specific objectives and their relation to the problems being addressed by this initiative are presented in Figure 3 and detailed below.

Figure 3. Specific and general objectives and their relationship to the problems



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4.1. General objectives

The main objective is to contribute to the objectives of the common fisheries policy listed in Article 2 of Regulation (EU) No 1380/2013, namely:

1. The CFP shall ensure that fishing (...) activities are environmentally sustainable in the long-term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies.

2. The CFP shall apply the precautionary approach to fisheries management, and shall aim to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above levels which can produce the maximum sustainable yield (...) by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks.

The CFP shall provide conditions for economically viable and competitive fishing capture and processing industry

4.2. Specific objectives

Specific objectives are as follows:

- To achieve and maintain maximum sustainable yield for anchovy and sardine in the Adriatic by 2020 at the latest;
- To achieve a sustainable fisheries sector for small pelagics in the Adriatic;
- To provide an effective management framework for small pelagics in the Adriatic which is simpler and more stable and provides stakeholders with greater ownership.

The initiative will also facilitate implementation of the landing obligation established under the Basic Regulation, by providing a basis for derogations for small pelagics in the Adriatic in certain circumscribed situations.

The initiative shall be coherent with the Union environmental legislation, in particular with the objective of achieving a good environmental status by 2020 as set out in Article 1(1) of the Marine Strategy Framework Directive (MSFD)[56].

Measures under this initiative should be taken in accordance with the best available scientific advice.

5. WHAT ARE THE VARIOUS OPTIONS TO ACHIEVE THE OBJECTIVES

5.1. Discarded policy option

A potential policy option which was discarded early on was that of using non-legislative instruments or "soft law" to address the problems identified in Section 2. Under such an option, the EU would try to address the problems of overfishing and ineffective governance by using tools such as guidelines, or communication campaigns. These could aim for example at promoting better fishing practices or improving awareness regarding the existing problems, to orient consumer choice and market demand, to improve ownership of fishing operators.

[56] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (Text with EEA relevance). OJ L 164, 25.6.2008, p. 19–40

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However, such elements of soft law, while they could contribute to the objectives of the CFP, are by themselves insufficient to actually reach those ambitious objectives of the CFP and of this initiative. This is due, in part, to the specific nature of one of the problems this initiative aims to address, namely overfishing. Overfishing occurs in an open, unmanaged fishery as every fisherman tries to maximise his catch without paying attention to the long-term consequences for the state of fish stocks. An individual fisherman simply does not have an incentive to catch less than he can. In the end, when stocks decline, the outcome is unsatisfactory for all fishers. This situation is often referred to as "the tragedy of the commons"[57]. Additionally, without regulation, there is no incentive for fishers to avoid the young fish which have not yet had the chance to reproduce; this further deteriorates the state of the fish stock in question[58]. Given this situation, regulation is needed to prevent overfishing and, for some fisheries, discarding.

Not a single contribution during the consultation work that took place in the context of this initiative put forward soft law as an option to address the problems faced by the Adriatic small pelagic fishery (Annex II).

Another policy option which was discarded was that of managing the small pelagic stocks purely through international measures, under the GFCM. The international level would in fact be the most appropriate given that anchovy and sardine stocks in the Adriatic are fished by EU Member States but also – to a minor extent – by third countries. In Regional Fisheries Management Organisations, such as the GFCM, decisions are taken by the Contracting Parties and the EU therefore has no guarantees that the measures which it proposes will be adopted. And even if sufficiently ambitious measures were adopted by the GFCM, there is always the potential that another Party could reopen these in future. There is also reason to doubt whether measures at international level would be properly implemented, given that in the specific case of anchovy and sardine in the Adriatic, an ambitious management has been adopted under the GFCM, but three years on it has still not been implemented in full. Therefore, this option was considered to contain too high a risk that the objectives of the CFP would not be met, in particular given the urgency (2020 at the latest) of having the stocks fished sustainably.

5.2. Retained policy options

A screening of different policy options, of the outcomes of consultation work, and intensive discussion with the Impact Assessment Steering Group (see Annex I) led to the retention of three main policy options, including sub-options for one of them. These policy options aim to address the problems identified in Section 2 and thereby to meet the policy objectives set out in Section 4. The policy options must also be considered in the context of the time limitation set by the CFP: stocks should be fished sustainably by 2020 at the latest.

The Baseline option (Option 1), against which the other options are compared, is the status quo, in which there is no policy change and management of anchovy and sardine in the Adriatic continues as it has in recent years.

Option 2 involves the development of new EU legislation, in the form of an EU multi-annual plan to manage small pelagics and their fisheries in the Adriatic. The choice of an EU multi-annual plan is based on the fact that the Basic Regulation states that

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57 Hardin (1968) The Tragedy of the Commons. Science Vol. 162(3859), pp. 1243-1248.

58 See, for example, Grafton, R.Q., Kirkley, J., Kompass, T. & D. Squires. 2006. Economics for Fisheries Management. Ashgate Studies in Environmental and Natural Resource Economics, 176 pp.

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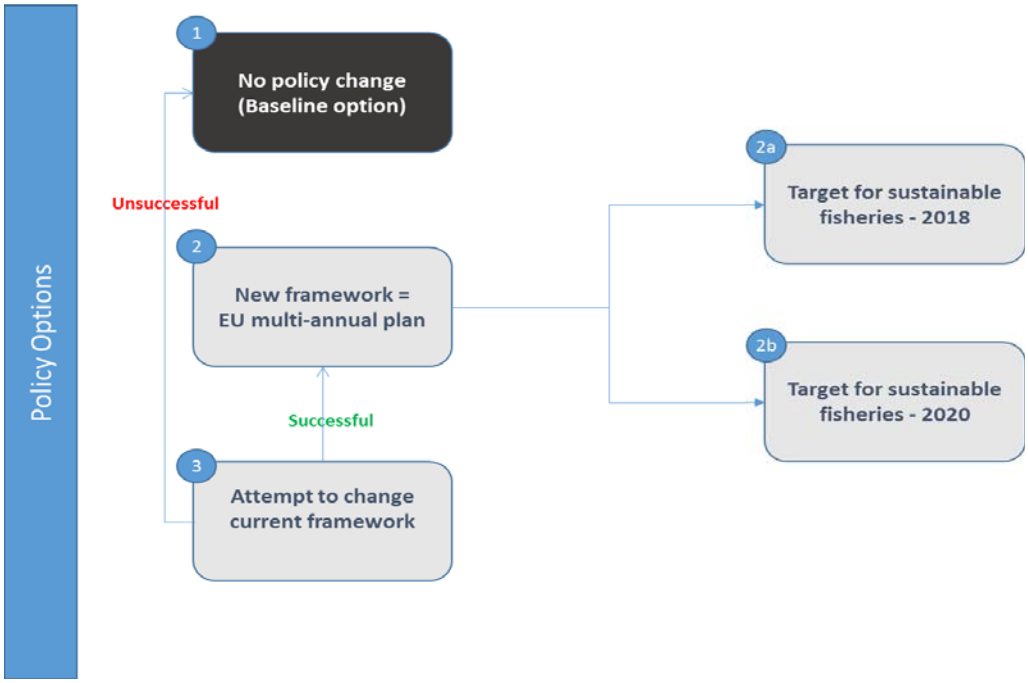
"Multiannual plans shall be adopted as a priority, based on scientific, technical and economic advice, and shall contain conservation measures to restore and maintain fish stocks above levels capable of producing maximum sustainable yield" (Article 10). The contents of multi-annual plan is framed in large part by the Basic Regulation as well as an inter-institutional agreement and the first such multi-annual plan that has been adopted (for the Baltic) as detailed in section 5.2.2. Under such a plan, the key policy choice concerns the deadline for achieving sustainable fishing: two sub-options are therefore compared, with 2018 and 2020 as the deadlines.

Option 3 involves an attempt to amend the current management framework in order to ensure that it would enable the stocks to be fished sustainably by 2020 at the latest, and thereby to ensure a sustainable fisheries sector and to deliver on those specific policy objectives. Because the current framework consists of national and international legislation, the EU cannot guarantee the outcome of the process and two possible outcomes are considered: if the EU does not manage to amend the current framework, the fisheries will continue to be managed under the current framework (Option 1) whilst if the current framework is successfully amended such that the sustainability objectives of the CFP can be achieved, the outcomes would be those expected under Option 2 (see Figure 4). These policy options are detailed below.

The modelling of the impacts of the policy options, as presented below, is based on the study on Management scenarios for the preparation of multi-annual management plans in the Mediterranean and the Black Sea"[66] which is presented in more detail in Annex IV including assumptions of the model and input data.

The stakeholders targeted by each policy option are the same for the different policy options, namely Member States' authorities and the fisheries sector as the key stakeholders.

Figure 4. Retained policy options to achieve the objectives of this initiative



5.2.1. Option 1: No policy change - Status quo (Baseline option)

The first Option consists of the situation in which **no new EU legislation is introduced** and **management of the stocks is based on existing tools (i.e. Status quo).**

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Under this Option, anchovy and sardine in the Adriatic would continue to be managed under the three national management plans adopted under the MEDREG, an EU discard plan covering small pelagics in the Adriatic until end of 2017 and the management measures internationally agreed within GFCM (see Section 1.3).

Member States would be subject to the obligations stemming directly from the CFP Basic Regulation, including the obligation to manage stocks sustainably by 2020 at the latest and the obligation to land all catches.

Regarding the implementation of the **landing obligation**, under Option 1 – no additional EU legislation - it would not be possible to replace the discard plans after they have lapsed i.e. at the end of 2017. The landing obligation would thus be applicable to the whole fishery without the current exceptions[65].

Regarding the implementation of **regionalisation** (see Annex V), as a mechanism to adopt e.g. conservation measures, this would not be possible under Option 1, as regionalisation for conservation measures, as for derogations to the landing obligation, can only take place in the context of EU multi-annual plans[59].

5.2.2. Option 2: EU multi-annual plan

Contents of the multi-annual plan

Under this option, EU fishing activities targeting anchovy and sardine in the Adriatic are regulated by a dedicated EU management framework in the form of an EU multi-annual plan. The Basic Regulation contains provisions on the objectives and contents of multi-annual plans (in particular Articles 9 and 10) which therefore frame what can be included in such a plan (see Annex V & XIV for more details). Certain provisions of the EU fisheries Control Regulation[60] may also be adapted in a multi-annual plan (see Annex XI & Annex XIV). Furthermore, the precise shape and content of future multi-annual plans were the subject of work by an inter-institutional task[6] and the Adriatic small pelagic multi-annual plan should follow this as well as follow the approach taken in the Baltic Sea multi-annual plan (see Annex XIII).

Each multi-annual plans based on the new Basic Regulation will therefore contains the same core elements, but tailored to each particular fishery. Nevertheless, when tailoring a multi-annual plan to the specific fishery there are potentially a number of choices to be made:

i) the scope of the proposal in terms of species and geographical coverage;
ii) deadline for achieving sustainable fishing;
iii) conservation reference points including the sustainable fishing mortality range;
iv) the management measures to ensure the targets are reached;
v) how to introduce measures in the multi-annual plan relating to the landing obligation.

In the case of the small pelagic fishery in the Adriatic, the contents of a multi-annual plan is presented below, including aspects for which choices need to be made and others for which this is not relevant due to the particular nature of this fishery:

i) Scope of the multi-annual plan in terms of species and geographical coverage

[59] with the exception of one three-year discard plan which can be adopted through regionalisation

[60] Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy *(OJ L 343, 22.12.2009).*

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Which species should be included? Anchovy and sardine account for over 97% of catches of small pelagic fish in the Adriatic and are the only Adriatic small pelagic species which have been assessed by scientists (and therefore for which conservation reference points are available). Furthermore, anchovy and sardine are caught in relatively 'clean' fisheries, where there is minimal by-catch of other species the level of discarding is considered to be negligible, because the gears involved in the fisheries are fairly selective (see Annex IV). It is therefore not relevant or possible to manage other small pelagic species under this multi-annual plan on the basis of conservation reference points such as fishing mortality targets and biological safeguards. Stakeholders during the public consultation considered that the measures of a possible multi-annual plan should be focused on anchovy and sardine and considered that for the management of secondary target species the provisions of the landing obligation are sufficient. The scope of the current discard plan covering small pelagics in the Adriatic covers anchovy, sardine as well as mackerel and horse mackerel – these are the small pelagic species for which the landing obligation applies and for which specific derogations were considered necessary to facilitate the implementation of the landing obligation

Why not manage anchovy and sardine under separate plans? Anchovy and sardine in the Adriatic are part of a mixed fishery which means that the same fishers and vessels (and gear) are used to catch both species and to a very limited extent, also secondary species such as mackerel or horse mackerel. It therefore makes sense to manage these species together rather than under separate multi-annual plans. Both anchovy and sardine are already managed together under the international GFCM management plan (see Section 1.3). This also follows STECF's recommendation, that a management plan which covers all fisheries for sardine and anchovy in the Adriatic should be developed for these shared stocks[30].

What should the geographical scope be? The anchovy and sardine that occur in the Adriatic are distinct stocks (i.e. populations) which are different to stocks in other parts of the Mediterranean. The anchovy and sardine stock move within the Northern and Southern parts of the Adriatic and are caught by vessels fishing in both parts of the Adriatic. In terms of geographic scope, the most appropriate management unit for these stocks is the whole Adriatic, to ensure the stocks are managed in their entirety. Developing a broader plan covering other stocks of anchovy and sardine in neighbouring sea basins does not make sense because the fleets targeting these stocks are different, and the stocks would have different statuses and biological reference sizes (e.g. target fishing mortality levels).

The EU multi-annual plan would cover all EU vessels fishing within and beyond EU waters hence the full coverage would be ensured in terms of the EU fishing sector.

ii) Deadline for achieving sustainable fishing levels

Article 2(2) of the Basic Regulation provides for a binding obligation to reach sustainable fishing levels but leaves some flexibility regarding the timeframe for reaching this target (*by 2015 where possible and […] at the latest by 2020*). A multi-annual plan should specify this deadline for the Adriatic small pelagic stocks.

This deadline may have different impacts on the state of the stocks and the speed of recovery, as well as socio-economic impacts for the sector. The environmental, economic and social impacts of different timeframes should therefore be assessed.

Two main sub-options in terms of deadline under an EU multi-annual plan have therefore been considered: by **2018** or by **2020** (see Figure 4). These dates were chosen for the following reasons: 2018 appears to be the earliest date by which the EU multi-annual

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plan could be adopted and measures thereunder could be implemented. 2020 if the latest date by which sustainable fishing levels need to be reached under the Basic Regulation.

iii) **Conservation reference points including the range of sustainable fishing mortality**

On the basis of Article 10 of the Basic Regulation, the multi-annual plan would contain the following reference points for anchovy and sardine[61]:

- A range of target fishing mortality which is considered compatible with sustainable fishing ($\mathbf{F_{MSY}}$ range).
- Safeguard values in terms of fish biomass which serve as triggers for management action: when the stocks concerned fall below these pre-defined sizes, safeguard measures should be adopted.

As the multi-annual plan should be based on the best available science, the conservation reference points would be based on the latest scientific advice. At the time of drafting this impact assessment the latest scientific advice from the STECF, the Commission's scientific advisory body for fisheries, was that of their September 2015 meeting[114] and these values were used to model the impacts under Option 2 (Annex IV).

iv) **Management measures to ensure the targets are reached**

As demonstrated by the scientific advice (Annex VI), current fishing mortality and hence catch levels will need to be adapted to reach sustainable levels by 2020 at the latest. This can be achieved in several ways, of which the main choice is whether to use input or output controls (see Annex VIII).

Outside the Mediterranean, many EU fish stocks are managed using catch-limits (=output control), whereby a total allowable catch (TAC - for the whole stock) and national quotas (per Member State) are fixed annually or biennially (see Annex VIII). This allows fishing mortality to be controlled directly, through catches, rather than the current indirect methods based on input controls i.e. effort management. The use of TAC & quota in the Atlantic is thought to have contributed to the overall improvement in stock status, with an increasing number of stocks being fished sustainably in recent years[62].

Given that the measures used to manage anchovy and sardine in the Adriatic to date (effort and selectivity = input control) have not been sufficient to ensure sustainable exploitation of the fishery (see Section 2.4), it seems necessary to propose a new management approach. Stakeholders during the public consultation were quite divided on the subject of catch limits (Annex II). The STECF, however, has recommended that output controls (catch limits) would be a more effective management tool for fisheries of small pelagic species in the Mediterranean[37,38].

For these reasons, the multi-annual plan would include catch-limits as the management approach. In practice, the plan would set the range of fishing mortality for anchovy and for sardine (at stock-level) that needs to be respected to ensure sustainable fishing levels are reached by 2020. Each year the Commission would adopt a proposal for TAC and quotas compatible with these target fishing mortality ranges, based on scientific advice.

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61 As these species drive the fishery, and they are the only Adriatic small pelagic stocks for which a stock assessment has been carried out and for which conservation reference points are available.

62 Between 2006 and 2014, the stocks number fished sustainably (at MSY) increased from 2 to 26. COM (2015) 239 final - Communication from the Commission to the European parliament and the Council. Consultation on the fishing opportunities for 2016 under the Common Fisheries Policy

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The Council should then adopt annual TAC and quotas in line with these fishing mortality ranges.

The TAC and quota can be considered as a safeguard, i.e. a level of catches not to be exceeded. This approach would provide Member States with the flexibility, either nationally or on a regional basis, to choose the measures they want to implement to stay within their national quotas, such as reducing their fleet or limiting the days vessels will fish, or allocating quotas per vessel, or closing areas/periods to fishing etc. If Member States want to make regional decisions, they can do so, in line with the new mechanism of regionalisation introduced by the CFP, and for which there has been such a strong demand from all stakeholders, including Member States.

The choice of the mechanism to achieve sustainable fishing levels would therefore be set in the multi-annual plan (annual TAC and quota) but the exact management tools to deliver on this would be left to Member States. This is in line with the request during the public consultation that the multi-annual plan focus on the orientation and determination of the objectives.

v) **Choice of how to introduce measures regarding the landing obligation**

As described in Annex V, the Basic Regulation allows the adoption of so-called "discard plans" through Regionalisation to adopt exemptions from the landing obligation for no more than three years. After the expiry of these discard plans, exemptions may still be needed, in order to allow for the discarding of species that survive discarding (i.e. it makes more sense for them to be thrown back in the sea if they will survive) and to allow for exemptions in situations where the landing obligation is a disproportionate measure (e.g. in terms of the cost of implementing the landing obligation). The Basic Regulation itself foresees in Article 15(5) that such exemptions should be adopted as parts of a multi-annual plan and could be done on the basis of Regionalisation.

When drafting a multi-annual plan, the Commission will have to decide which elements of the future exemptions from the Basic Regulation will be included in the multi-annual plan itself and which elements will be adopted as a part of a Delegated Act to be adopted on the basis of Joint Recommendations by Member States.

However, the option of including exemptions in the plan itself does not make sense, as the contents of the discard plans that are adopted on the Basic Regulation may need to evolve. So far, Croatia, Italy and Slovenia have brought forward a Joint Recommendation concerning small pelagic fisheries in the Adriatic that is in force until end of 2017. Further Joint Recommendations could be submitted by Member States for these fisheries on the basis of new scientific research for example on survivability of species after discarding (something on which there are still large gaps in knowledge). In addition, respondents during the public consultation expressed a preference for not fixing measures in the multi-annual plan but leaving this to be decided through regionalisation. The adaptive, flexible approach of regionalisation would therefore be the preferred option for this element of the plan rather than having to amend the multi-annual plan through the ordinary legislative proposal.

The choice of how to introduce provisions to implement the landing obligation is not considered to affect the possible environmental, social or economic impacts of an EU multi-annual plan or on the effectiveness in achieving the objectives. It has therefore not been considered in the different sub-options.

Sub-options for an EU multi-annual plan

On the basis of the section above, the key choice to be made by the legislators concerns the deadline by which stocks should be managed sustainably. Two possible deadlines

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were therefore considered as sub-options: **Sub-Option 2 (2018)** and **Sub-Option 2(2020)**. For both sub-options, in terms of modelling of the likely impacts, it was assumed that a mixture of reduction in fishing activity and fishing capacity take place to ensure the required reduction in catch levels and fishing mortality (to achieve sustainable fishing levels)(see Annex IV).

The way in which Member States choose distribute the reductions in fishing effort throughout their fleet will result in different impacts on different fleet segments. On this basis, for each sub-option, the range of possible impacts has been evaluated, based on the manner in which the reduction in activity/capacity is distributed throughout the fleets concerned. The reduction is either applied **proportionally to the fleets' impact** on the stocks (such that fleet segments having a greater impact on the stocks have to reduce their activity and capacity more than segments with a lower impact) or it is applied **equally across all fleet segments (**see Annex IV).

The way in which reductions in fishing effort would be shared between fleet segments will not be specified through an EU multi-annual plan (and hence not a choice for the legislators), but is up to the Member State to decide. However, the information on the range of impacts of these sub-options may prove useful for Member States in taking decisions on how to allocate reductions in fishing mortality within their fleet.

Accompanying measures under this option

The Commission would invite the Member States concerned to repeal or adapt[63] their national management plans given that the provisions on small pelagics therein would be superseded by the EU plan.

Under this Option, the EU would make proposals to amend the GFCM management plan to align it with the EU multi-annual plan.

The EU multi-annual plan, which would be adopted under the Ordinary Legislative Procedure, would translate the provisions of the Basic Regulation relating to the maximum sustainable yield objectives, regionalisation and the landing obligation into a specific geographically targeted proposal, while taking into account the most up–to–date scientific information about the small pelagic fisheries in that area.

5.2.3. Option 3: Attempt to change the current framework

Under this option the current management tools, namely the combination of national management plans and of GFCM recommendations, would have to be revised in order to integrate the objectives of the revised CFP Basic Regulation.

Regarding the **national management plans:** Under Article 19(3) of the MEDREG, Member States should ensure adequate scientific monitoring of the management plans and should revise management measures when required. Member States should therefore update their plans, on the basis of their scientific monitoring as well as the retrospective evaluation that was carried out by the STECF (see Section 2.6). The plans should be amended to incorporate the CFP sustainability targets by 2020 at the latest and the management measures should be adapted to ensure that these targets are met. In practice this would mean that fishing levels would need to be reduced and each Member States would choose how best to do this under their respective national plan.

However, in practice the revised CFP and its obligations on Member States entered into force over 2 years ago, but to date none of the Member States involved in this fishery

[63] Some national management plans cover other species than small pelagics as the national management plans focus on gears not species.

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have revised their national plans, despite the fact that they are not fully in line with the Member States' obligations under the new CFP (see Section 2.5). Therefore, under this Option, the Commission would most likely need to intervene by asking Member States to update their national plans on the basis of Article 19(9) of the MEDREG[64].

Under this Option, it is difficult to predict what the exact contents of the updated management plans would be and by when they would be adopted, given that these plans are national legal acts adopted by Member States, and that the exact content and the revision process do not depend on the Commission which can only have a steering role. Commission guidelines could be envisaged to guide the revision process. The Commission could also recommend that Member States co-ordinate the revisions of their plans with one another, to try and ensure that there is regional coherence in the measures adopted. The revised plans could be evaluated by STECF to verify that they are fully in line with the CFP's sustainability objectives.

There could be a range of outcomes of the revision process, ranging from a situation in which the plans are not updated in time, or are not updated in a sufficiently ambitious manner to achieve sustainable fishing levels by 2020, to a situation in which the plans are updated rapidly and fully in line with CFP sustainability objectives.

Even in the best case scenario, the geographic scope of the national plans would not cover the full distribution of the fish stocks, as the plans only apply to fisheries conducted within Member States' territorial waters but not to international waters.

Therefore, given that the small pelagic stocks move freely within the Adriatic and are not limited to territorial waters of EU Member States, for this option to be effective, a revision of the international management plan (i.e. the relevant GFCM recommendations) would also be needed, as GFCM has jurisdiction in international waters. Such a revision should aim to fully integrate the objectives of the CFP into the GFCM recommendations.

In terms of process, the EU would need to make a proposal at one of the GFCM Annual Sessions to amend the GFCM Recommendation GFCM/37/2013/1 (the GFCM management plan), which would then be open for negotiation/modification and then adopted or rejected by the other GFCM Contracting Parties. It is impossible to foresee which modifications would be introduced into the GFCM management plan and when a revised plan would be adopted. Ultimately, if the Commission succeeds therein and a proposal to amend the GFCM recommendation was adopted, the revised GFCM recommendations would have to be transposed into EU law, via the ordinary Legislative Procedure. If the proposal is not adopted by the GFCM, then the EU could make the proposal again the following year.

As explained above, as the current measures do not depend directly on the Commission, but instead on Member States (for the national plans) and on an international organization and its Contracting parties (the GFCM plan). Therefore, there could be a range of outcomes under Option 1 depending on the extent and timing of the amendment of the current framework. Therefore, for the purpose of this analysis, two extreme outcomes are considered under Option 1: a **best-case scenario** in which all current management tools are updated rapidly and fully in line with the CFP sustainability objective, and **a worst-case scenario** in which the national management plans are not

[64] According to which, if the Commission considers, for example on the basis of new scientific advice, that a national management plan is not sufficient to ensure a high level of protection of resources and the environment, it may, after having consulted the Member State, ask that State to amend the plan

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updated fully and in time to reach the CFP sustainability objectives of 2020 and in which the EU would fail to amend the GFCM Recommendation in time to reach the CFP sustainability objectives of 2020. In such a case, the small pelagic fisheries would continue to be managed under the current framework (**Status quo**) (see Figure 4).

Regarding the implementation of the **landing obligation**, under Option 3 it would not be possible to replace the discard plans after they have lapsed i.e. at the end of 2017. The landing obligation would thus be applicable to the whole fishery without the current exceptions[65] (see Annex V).

Regarding the implementation of **Regionalisation** for conservation measures, and for derogations to the landing obligation, this would not be possible under Option 3, as regionalisation, can only take place in the context of EU multi-annual plans[59] (see Annex V).

6. WHAT ARE THE IMPACTS OF THE DIFFERENT POLICY OPTIONS AND WHO WILL BE AFFECTED? IMPACTS

On the basis of the study on Management Scenarios[66], the following indicators have been used to assess impacts of the different Options and sub-options in 2021 which is the first year after the CFP objectives of sustainability should be reached (at the latest – 2020):

1. Socio-economic impacts: **catches** of sardine and anchovy, the average **salary** (per employee), **total revenues, net profit,** the **ratio between current and break-even revenues** (CR/BER)[67].

As some of these indicators have both economic and social dimensions (e.g. salary, profits) the social and economic impacts are considered together in one section.

2. Environmental impacts: The **stock size** of anchovy and sardine has been used to assess quantitatively the impacts of the different sub-options. The **knock-on effect of this stock size on the broader ecosystem** (food chain) is also discussed.

The socio-economic indicators focus on the fishing sector on the basis that:

- This is the primary sector that would be affected;
- The impacts would be more directly relevant to the fishing sector, and therefore the outcomes of the modelling is more precise than knock-on effects on secondary sectors where there is substantially more uncertainty in likely impacts;
- Detailed data at the required scale (in terms of geographic scope (only the Adriatic) and fisheries/species, including by fleet segment) is available through the EU's Data Collection Framework[129] for the fishing sector only.

In addition, an assessment of possible knock-on consequences in terms of **market effects** is included based on a report carried out by DG MARE and the EU Market Observatory for Fisheries and Aquaculture products (EUMOFA)[32]. This includes impacts on imports and exports, on prices at first sale of anchovy and sardine and on the processing sector (see Annex III). This assessment in done on a qualitative basis, based on general trends observer in the Adriatic small pelagic fishery and markets, and based on a comparable

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65 Specified in the Discard Plan for certain small pelagic fisheries in the Mediterranean Sea[17]

66 Bitetto I., Facchini M.T., Accadia P., Carpi P., Ligas A., Musumeci C., Pinello D., Scarcella G., Lembo G., Spedicato M.T. (2015) Study on the evaluation of specific management scenarios for the preparation of multiannual management plans in the Mediterranean and the Black Seas. Include hyperlink when published.

67 This is an indicator of profitability indicating whether current revenues are superior to the variable and fixed costs (value > 1) or whether the fleet is operating at a loss (value < 1)

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case study using sardine fisheries off the Spanish and Portuguese coast. Because of the uncertainty surrounding the way in which markets could react to changes in availability of anchovy and sardine from the Adriatic fisheries and the difficulty in modelling this accurately, the information should only be taken as indicative of possible future impacts.

Small- and medium-sized enterprises (SMEs)

All the impacts described below are expected to be particularly applicable to SMEs, as almost all fishing firms involved in this fishery and a wide majority of companies in the downstream supply chain (processing sector) are in fact micro-enterprises or SMEs:

In terms of the fishing sector for small pelagics in the Adriatic, enterprises with fewer than five vessels account for 96% of the Croatian fishing sector, 97% of the Italian sector, and 99% of the Slovenian sector.

In terms of the processing sector, in both Italy and Slovenia, 100% of processing enterprises meet the definition of SMEs in terms of number of employees[68] (i.e. <250 employees) whilst in Croatia this figure is 95% (see Section 2.3).

The CFP is a policy specifically geared to deal with micro-enterprises, as indeed SMEs are the norm within the fishing sector, rather than the exception. There is therefore no basis to exclude from the scope of the CFP firms on the basis of their size or else the vast majority of the fishing sector would be excluded and having a CFP would be effectively pointless.

The environmental and socio-economic impacts of the different policy options are presented below and in Table 1 and in Annex VII in graphical format, including past trends and prediction of future trends until 2021.

6.1. Option 1: Status Quo (Baseline)

The environmental and socio-economic impacts of Option 1 are presented in Section 2.4 and in Table 1.

[68] Based on data from the Report of the STECF Expert Group on: Economic Performance of the EU Fish Processing Industry (STECF-14-21). Data tables available here: https://stecf.jrc.ec.europa.eu/data-reports

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Table 1 Overview of the performances of the Options by 2021, in terms of % change with respect to the Baseline. For reference purposes, the current situation (in 2014) is also included.

Option or sub-option	Scenario	Salary (euros)	Profitability (CR/BER ratio)	Rev. (million euros)	Empl. (units)	Catch Anchovy (tons)	Catch Sardine (tons)	Anchovy stock size (tons)	Sardine stock size (tons)	When will F_{MSY} be reached for both stocks?
Current situation (2014)		11 727	0.77	75.5	2011	24 969	73 423	68 298	383 710	N.A.
Option 1: Baseline (Status quo)		12 146	0.88	78.4	2057	24 318	85 789	68 879	358 387	Never
Option 2 ***Sub-option 2 (2018)***	Fishing reduction proportional to fleet segments' impact	9.7	17.1	-25.4	-12.8	-30.1	-32.2	24.0	22.8	2018
	Equal reduction in fishing for all fleet segments	0.9	-1.0	-25.4	-6.4	-29.4	-31.5	18.8	19.8	2018
Option 2 ***Sub-option 2 (2020)***	Fishing reduction proportional to fleet segments' impact	6.4	13.2	-27.1	-12.8	-31.3	-36.0	21.2	22.0	2020
	Equal reduction in fishing for all fleet segments	-2.1	-4.7	-27.2	-6.4	-29.8	-35.2	22.2	17.6	2020
Option 3	Worst-case	0	0	0	0	0	0	0	0	Never
	Best-case	-2.1 to 9.7	-4.7 to 17.1	-27.2 to –25.4	-6.4 to -12.8	-29.4 to -31.3	-32.2 to -36.0	18.8 to 24.0	17.6 to 22.8	2018 to 2020

Key: Rev. = revenues, Empl. = employment, CR/BER = ratio between current and break-even revenues. Fmsy = sustainable fishing levels. The green values are higher than +5%, the red ones are smaller than -5% and the yellow ones are between -5% and +5%.

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6.2. Option 2: EU multi-annual plan (including sub-options)

Environmental impacts

Under Option 2 (2018), the **anchovy stock size** would be between 82 000 t and 85 000 t in 2021, equivalent to 19-24% higher than under the Baseline Scenario. The **sardine stock size** would be around 429 000t to 440 000t in 2021, equivalent to 20-23% higher than under the Baseline Scenario (see Table 1 and Annex VII Figures 1 and 2).

Under Option 2 (2020), the **anchovy stock size** would be between 83 000 t and 84 000 t in 2021, equivalent to 21-22% higher than under the Baseline Scenario. The **sardine stock size** would be around 437 000t to 422 000t in 2021, equivalent to 18-22% higher than under the Baseline Scenario.

This increase in biomass of anchovy and sardine under Option 2 would result in **more food being available to larger (and more valuable) predatory fish** such as Blue-fin tuna, which should have a positive impact on their stock sizes and hence on the levels of catches and the profitability of those fisheries. Increased biomass of anchovy and sardine should also benefit the populations of as well as for marine mammals and seabirds which predate on them.

Socio-economic impacts

Under **Option 2 (2018), catches of anchovy** that could be sustained would be between 16 998 t and 17178 t, equivalent to a decrease of 29-30% compared to the Baseline Scenario. **Catches of sardines** would be between 49 780 t and 50 294 t, equivalent to around a 32% decrease compared to the Baseline Scenario (see Table 1 and Annex VII Figures 3 and 4).

The level of **employment** would be between 1793 and 1924 workers in 2021, equivalent to between 6-13% lower than under the Baseline Scenario. The **average salary** would be between 13 318 Euros and 12 254 Euros in 2021, equivalent to between 1 and 10% higher than under the Baseline Scenario.

Total revenue would be around 58.5 million Euros in 2021, equivalent to a level of revenues 25% lower than under the Baseline Scenario. P**rofitability** would be between 1.037 and 0.876 in 2021, equivalent to an increase of 17% or a 1% decrease compared to the Baseline Scenario. The increase in profitability is likely to contribute to the improved competiveness of the sector.

Under Option 2 (2020), catches of anchovy would be between 16 706 t and 51 542 t, equivalent to catches around 30-31% lower compared to the Baseline Scenario. **Catches of sardines** would be between 46 990 t and 47578 t, equivalent to 35-36% lower levels than under the Baseline Scenario (see Table 1 and Annex VII Figures 3 and 4).

The level of **employment** would be between 1793 workers and 1924 in 2021, equivalent to 6-13% lower than under the Baseline Scenario (see Table 1 and Annex VII Figure 7). The **average salary** would be between 12 928 Euros and 11 987 Euros in 2021, equivalent to between 2 and 10% higher than under the Baseline Scenario (see Table 1 and Annex VII Figure 6).

Total revenue would be around 57 million Euros in 2021, equivalent to a level of revenues 27% lower than under the Baseline Scenario (see Table 1 and Annex VII Figure 5). P**rofitability** would be between 1.001 and 0.843 in 2021, equivalent to an increase of 13% or a 5% decrease compared to the Baseline Scenario (see Table 1 and Annex VII Figure 6). The increase in profitability is likely to contribute to the improved competiveness of the sector.

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It therefore appears that the year (2018 vs 2020) by which sustainable fishing is achieved does not affect employment levels, but rather the important factor is the way in which the adaptation of fishing levels will be distributed between the fleet segments. Furthermore, the total revenue from this fishery depends more on the year by which sustainable fishing levels would be reached and not on the way in which the fishing level adaptations are spread throughout the fleet segments.

Market effects

The trends in volumes of anchovy and sardine landed in Italy and of prices of first sale in recent year show an inverse correlation between the two: prices decrease when landings increase and vice versa. Therefore, as catches are predicted to decrease under Option 2 (both sub-options), landings would also decrease and prices at first sale are likely to increase, possibly to such an extent as to mitigate any lost revenue due to decline in landings. This was the case in a sardine fishery in Portugal where, following the introduction of catch limits and a decrease in landings, fishers' revenues from sardine increased by 20% despite them fishing less sardine[36]. The retail price, however, is unlikely to increase, but the profit margin for retailers is instead expected to decrease, based on a similar situation with anchovy and sardine in the Atlantic (see Annex III).

However, for secondary sectors dependent on anchovy and sardine, such as the processing sectors or exporters in Croatia and Italy, an increase in prices and a decrease in their primary material (anchovy and sardine) is likely to have a negative economic impact and could result in Croatia and in particular Italy needing to increase their imports from other countries (see Annex III).

6.3. Option 3: Attempt to change current framework

Under Option 3, in a **worst-case scenario**, in which small pelagic fisheries would continue to be managed under the current framework, the environmental and socio-economic and market impacts would therefore be the same as those under **Option 1 (Status quo/Baseline)** as presented in Section 2.4.

In a **best case scenario**, the stocks would be returned to sustainable levels by 2020 at the latest and therefore the outcomes in terms of stock status would be the same as those under an EU management plan (**Option 2**). The catch levels that would be possible under **Option 3 (best-case)**, and the associated socio-economic and market impacts, would therefore also be similar to those forecast under **Option 2**, with the exact impacts depending both on the timing at which **Option 3 (best-case)** would allow stocks to be fished sustainably (e.g. by 2018 or by 2020 or in between) and on how the adaptation of fishing levels are spread throughout the fleet (which would be a decision taken by Member States). The range of possible impacts is presented below.

Environmental impacts

Under **Option 3 (best-case),** the **anchovy and sardine stock sizes** would be around 19-24% higher than under the Baseline scenario and for sardine around 18-23% higher than under the Baseline scenario (see Table 1 and Annex VII Figures 1 and 2).

This increase in biomass of anchovy and sardine under **Option 3 (best-case)** would result in **more food being available to larger (and more valuable) predatory fish** such as Blue-fin tuna, which should have a positive impact on their stock sizes and hence on the levels of catches and the profitability of those fisheries. Increased biomass of anchovy and sardine should also benefit the populations of as well as for marine mammals and seabirds which predate on them.

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Socio-economic impacts

Under **Option 3 (best-case)**, **catches of anchovy and sardine** that could be sustained would be around 29-31% lower than under the Baseline scenario and for sardine around 32-36% lower than the Baseline scenario (see Table 1 and Annex VII Figures 3 and 4).

The level of **employment** in the fishing sector in 2021 would be around 6-13% lower than under the Baseline scenario (see Table 1 and Annex VII Figure 7). The **average salary** in the fishing sector in 2021 would be between 2% lower and 10% higher than under the Baseline scenario (see Table 1 and Annex VII Figure 6).

The **total revenue** in the fishing sector in 2021 would be around 25-27% lower than under the Baseline scenario (see Table 1 and Annex VII Figure 5). The **profitability** in the fishing sector in 2021 would be between 5% lower and 17% higher than under the Baseline scenario (see Table 1 and Annex VII Figure 8).

Market effects

The trends in volumes of anchovy and sardine landed in Italy and of prices of first sale in recent year show an inverse correlation between the two: prices decrease when landings increase and prices increase when landings decrease. Therefore, as catches are predicted to decrease under **Option 3 (best-case)**, in line with Option 2, the market effects expected would be similar to those described under Option 2 (see Section 6.2).

7. HOW DO THE OPTIONS COMPARE?

7.1. Assessment against the objectives: effectiveness

The section below, including Table 2, provide a comparison of how effective the different options are in achieving the objectives identified in Section 4.2.

To achieve and maintain Maximum Sustainable Yield for anchovy and sardine by 2020 at the latest.

This objective would be achieved under both Option 2 (2018) and Option 2 (2020) but the former has the advantage that this objective would be reached sooner. The multi-annual plan under Option 2 would also introduce biomass safeguards that would require action to recover stocks that fall outside safe biological limits and therefore the likelihood of staying at sustainable fishing levels is also increased.

Under the current management set up (Option 1 and Option 3 (worst-case)), this objective will not be achieved as fishing mortality would remain above sustainable levels by 2020 and beyond. Under Option 3 (best-case), this objective would be reached.

However, achieving this objective under Option 3 (best-case) is inherently **more risky** than Option 2: not only are there far more conditions that need to be met under Option 3 (best-case) to get to a management framework that could achieve sustainable fishing levels by 2020 at the latest, but even if the EU succeeded in amending the current framework, there is no guarantee that the GFCM plan would be implemented – indeed, for the past two years the GFCM Contracting Parties have not been implementing in full the existing plan. In addition, national plans could be open to further modifications by Member States and the GFCM plan could also potentially be further amended/weakened if a non-EU GFCM Party decides to propose this.

To achieve a sustainable fisheries sector

This objective is directly related to, and depends on the achievement of the objective of having fish stocks exploited sustainably: to have a sustainable fisheries sector, the resource needs to be exploited sustainably. Therefore, in terms of achieving this

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objective, Option 2 (both sub-options) and Option 3 (best-case) are more effective than Option 1 or Option 3 (worst-case). Under the latter two Options, the fisheries sector would remain in the medium term in imbalance compared to the available fish resource, and in the longer-term, the fisheries sector would risk collapse along with the resource they depend on (see Section 2.4).

To provide an effective management framework which is simpler and more stable and provides stakeholders with greater ownership.

Simplification

As described in the problem definition, the current management framework is complex and also constantly changing and simplification, as well as increased stability and transparency would therefore provide important improvement to the current situation. **Option 1** and **Option 3 (worst-case)** do not provide any **simplification** as, by definition, they represent the status quo.

In terms of simplification there is no expected difference between the sub-options under Option 2. In the medium term, **Option 2** would not lead to simplification, compared to the baseline scenario, as the Member States and fisheries sector would need to adapt to a new management instrument in the form of the EU multi-annual plan. However, after this transition period, Option 2 should provide for simplification compared to the Baseline, as the EU management plan would replace provisions currently spread out between three national plans and a discard plan and would ensure coherence between the different management tools used for this fishery.

Option 2 would also provide for a simpler and more transparent system than the Baseline scenario in terms of translating scientific advice into management measures: scientists would provide their scientific advice on a yearly basis, including what the catch limits for each stock should be to ensure sustainable fishing levels, and this would then be translated into a yearly Commission proposal for TAC and quotas. With an output-control system, the required reduction in fishing mortality is directly translated into reductions in catches (see Annex VIII).

Option 3 (best-case) does not provide any simplification but rather further complications in the short-term as once again the management measures, both at national and international level, would need to be changed. The revision of the current management framework is complex in terms of process and could imply an increased degree of complexity and of administrative burden on both the Commission services and Member States' national administrations.

Even if the current framework is improved, under Option 3 (best-case), the number of management instruments would still remain as high as under the Baseline scenario (3 national plans, an international plan and a discard plan until the end of 2017).

Greater stability

As described in the problem definition, under the current management framework (Option 1 and Option 3 (worst case) there is a distinct lack of **stability and predictability** of the management measures in place at both national and international level which is a serious problem for the fishing sector. Option 2 would provide **more stability and predictability** to the Member States and the industry compared to Option 1. With an EU plan, the process would be clearer and predictable, through the annual TAC and quota setting exercise. Option 2 would also provide more transparency regarding the respective share of catches that each Member State can fish in a given year.

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Under Option 3 (best-case), the national plans and the GFCM plan, even if improved, would still be open to modifications and therefore there would be no improvement in stability compared to the Baseline.

Improve ownership

One of the corner-stones of the new CFP is to enable the process of regionalisation, with the aim of improving ownership of the management measures.

Under the current management framework (**Option 1 and Option 3 (worst-case)**), even if improved (**Option 3 – best-case**), regionalisation cannot be achieved: at best, the existing management plans adopted under the MEDREG could be updated based on regional consultation and agreement, pending the goodwill of Member States to take part in such a voluntary exercise or regional consultation, and to update their national plans in line with regionally agreed measures. Within the GFCM, however, the decision-making process is based on agreement with all GFCM Parties, and there is no framework in place to enable decisions to be taken solely by regional groups of countries. Therefore, Option 1 does not provide a basis for regionalisation as it is intended in the CFP, on the basis of joint recommendations by Member States that are then enshrined through EU legal acts.

Option 2 (both sub-options) would enable Member States to make full use of regionalisation within the framework of an EU multi-annual plan, to agree on things such as conservation measures for fish stocks, including where to establish fish stock recovery areas (protected areas), or measures to gradually eliminate discarding. In turn, this is likely to result in greater ownership of the adopted management measures as they will have been developed taking into consideration the regional specifies of the Adriatic.

Table 2 Comparison of options in terms of effectiveness

Options	***Option 1 – Status quo (Baseline)***	***Option 2 - EU multi-annual plan***		***Option 3 – Change current framework***	
		2018	***2020***	***Worst-case: Status quo (Baseline)***	***Best-case***
To achieve and maintain maximum sustainable yield for anchovy and sardine in the Adriatic by 2020 at the latest	0	++	++	0	++
To achieve a sustainable fisheries sectorfor small pelagics in the Adriatic	0	++	++	0	++
To provide an effective management framework for small pelagics in the Adriatic which is:					
-simpler	0	+/-	+/-	0	-
-more stable	0	+	+	0	0
- provides greater ownership	0	+	+	0	0

Key: 0 = neutral impact, + = positive impact, ++ = very positive impact, - = negative impact, -- = very negative impact, +/- = both positive and negative impacts

Overall, considering **effectiveness in achieving the objectives,** Option 2 delivers on all four objectives although for the objective of simplification there are both positive and negative impacts compared to the Baseline (see Table 2) Option 2 is therefore considerably more effective than both Option 1 and Option 3 (worst-case), which do not deliver on any of the objectives. Option 2 is also more effective than Option 3 (best-case)

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which only delivers on the objectives of sustainable fishing and a sustainable fisheries sector but not on the objectives concerning an effective management framework.

Within Option 2, both options are equally effective, the only difference being that under sub-option 2018 the sustainability objective would be reached sooner than under sub-option 2020.

7.2. Assessment against the environmental, economic and social impacts

Table 3 provides a comparison of the options and sub-options in terms of their environmental and socio-economic impacts based on the analysis presented in Section 6.

Option 2 (2018 and 2020) and **Option 3 (best-case)** will provide substantially higher levels of **stock biomass** for both species compared to **Option 1** and **Option 3 (worst-case)**. Option 2 (2018) provides marginal advantages over Option 2 (2020) in terms of stock biomass.

To reach sustainable fishing levels by 2018 or 2020, however, will inevitably require **catches** to decline substantially in the medium-term under **Option 2 (2018 and 2020)** and **Option 3 (best-case)** compared to **Option 1 and Option 3 (worst-case)**. This is not surprising given that current fishing mortality is considered to be substantially higher than what can be sustained by the stocks in the long-run.

Given the overcapacity in the sector, it seems inevitable that capacity will need to be reduced to reach sustainable fishing levels and to ensure a balance between the resource and the capacity. This will lead to reductions in **employment and revenue** in the medium-term (2021) under **Option 2 and Option 3 (best-case)** compared to **Option 1 and Option 3 (worst-case)**. Indeed, under both **Option 2 and Option 3 (best-case),** revenue to the fishery would decrease by around 25%-27% compared to Option 1 and Option 3 (worst-case). Employment would decrease by between 6-13% compared to the Option 1 and Option 3 (worst-case) depending on how reductions are allocated within the fleet (no difference between 2018 vs 2020). However, for the remaining 87-93% of fishers who would remain in the fishery under **Option 2 and Option 3 (best-case),** conditions are likely to be better on average than under **Option 1 and option 3 (worst-case),** in terms both of **profitability** and **salary.**

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Table 3 Comparison of options and sub-options in terms of their environmental and socio-economic impacts.

Options	*Option 1 – Status quo (Baseline)*	*Option 2 - EU multi-annual plan*		*Option 3 – Change current framework*	
		2018	*2020*	*Worst-case: Status quo (Baseline)*	*Best-case*
Environmental impacts	0	++	++	0	++
Socio-economic impacts – overall	0	+/-	+/-	0	+/-
- Salary	0	+	+	0	+
-Profitability	0	+	+	0	+
-Revenue	0	-	-	0	-
-Employment	0	-	-	0	-

Key: 0 = neutral impact, + = positive impact, ++ = very positive impact, - = negative impact, -- = very negative impact, +/- = both positive and negative impacts.

Option 2 (2018) provides slightly higher profitability and salary benefits compared to Option 2 (2020), and the decreases in overall revenue under Option 2 (2018) are slightly lower than under Option 2 (2020).

In the longer-term, however, given the high risk of stocks collapsing under Option 1 and Option 3 (worst-case), it can be considered that Options 2 and Option 3 (best-case) could perform better socio-economically than the former.

Overall, in the medium-term **Option 3 (best-case)** and **Option 2** (both sub-options) have positive environmental impacts, but a mix of positive and negative socio-economic impacts compared to the Baseline (see Table 3).

7.3. Efficiency, coherence and acceptability

Efficiency

Efficiency is considered in terms of cost-effectiveness of the different options in terms of delivering on the objectives. The **effectiveness** is based on how well the options deliver on the objectives (based on the analysis above). The **costs** are considered in terms of socio-economic impacts (discussed above in detail) as well as in terms of administrative burden. In terms of administrative burden there is no expected difference between the sub-options under Option 2 and hence these are discussed together.

In terms of **effectiveness,** Option 2 is considerably more effective than Option 1 or Option 3 (worst-case) with respect to meeting the objectives of this intervention (see Section 7.1).

There is little point in considering the **efficiency** of Option 1 or 3 (worst-case) as neither of the sub-options are sufficiently effective to be considered as serious candidates. Within Option 2, the more efficient sub-option would be Option 2(2018) as the socio-economic costs are slightly less than Option 2(2020).

In terms of medium-term socio-economic **costs**, Option 2 and Option 3 (best-case) appear to result in overall greater costs than Option 1 and Option 3 (worst-case), in particular in terms of overall revenue to the sector and employment. Within Option 2, sub-option 2(2018) appears to be slightly better in terms of socio-economic impacts than

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sub-option 2(2020). In the longer-term, on the other-hand, there is a risk of the fisheries collapsing under Option 1 and Option 3 (worst-case).

In terms of **administrative burden,** under Option 2, the Commission to develop and adopt a legal proposal for TAC and quota on an annual basis, and would require Member States to negotiate this in Council. This will create some additional burden compared to option 1 but as this would fit in to the broader annual exercise of TAC and quota setting (for dozens of other EU stocks in different sea basins) for which Member States already need to meet in Council for negotiations, including two stocks in the process should not represent an important additional burden. The Member States would also need to negotiate the allocation key for their share of the overall TAC at the start of the process which may be burdensome depending on how easily an agreement is reached. However, as only three Member States and two stocks are concerned, and as historical data on catches is readily available, this should facilitate the process.

In terms of compliance costs, fishers who do not yet have these systems in place (e.g. those of vessels under 12m typically) would be required to install and use VMS and electronic logbooks which will create some additional cost and burden (although costs are eligible under the EMFF). Fishers would also be required to land in designated ports (when fishing above a certain threshold) to facilitate control.

Member States administrations would need to provide their landing data for anchovy and sardine on a monthly basis to the Commission as required under Article 33 of the Control Regulation (for species under a TAC and quota regime)[60] as opposed to on a quarterly basis as in the Baseline Scenario (see Section 8.1 and Annex XI). However, this would only represent a minor increase in administrative burden given that it does not require setting up a new reporting system but rather changing the frequency of reporting.

In terms of the management measures to be implemented, Option 2 does not introduce any substantial new administrative requirements – the EU plan would set a target in terms of sustainability by 2020 or 2018 and the mechanism to reach this (annual TAC and quota setting) but Member States could continue to apply the concrete management measures (e.g. reducing number of vessels, or fishing days) which they consider most appropriate to stay within their quotas.

In terms of monitoring effectiveness of management measures, under Option 2 (in which provisions spread out in three national management plans would be replaced by a single EU plan), the three Member States concerned by the fishery would no longer be required to ensure adequate scientific monitoring of their management plans (required under the MEDREG). Instead, the Commission, with scientific input from the STECF, would be in charge of monitoring whether the EU plan is delivering on its objectives. As STECF already carries out annual assessment of the stock status, this would not create an increase in burden for them, but would reduce the Member States' burden. Option 2 would therefore provide a reduction in administrative burden compared to Option 1 and 3.

Under both options 2 and 3, the EU would need to develop a proposal to strengthen the measures adopted by the GFCM to either align them to the EU multi-annual plan (under Option 2) or to ensure they deliver on the CFP objectives of sustainability by 2020 (Option 3)

Option 3 would require Member States to amend their national management plans and improve their management measures to ensure they deliver on the CFP objectives of sustainability by 2020.

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Overall, in terms of administrative cost and burden- Option 2 and to a lesser extent Option 3 (best-case) create some new administrative burden with also some reductions in burden expected under Option 2 compared to the Baseline.

Coherence

International measures

The TAC & quota regime, which is a specific form of output control, which is proposed under Option 2, would be coherent with the recently adopted catch limitations for Adriatic anchovy and sardine (for 2017 and 2018) under the GFCM[19].

EU fisheries policy

As the overarching policy for managing fisheries in the EU, **the CFP** is the primary policy with which the initiative should be coherent. **Option 1 and Option 3 (worst-case)** are not coherent with the overarching objectives of the CFP as they do not ensure long-term sustainability of small pelagic fisheries in the Adriatic and do not provide an appropriate legal framework for regionalised decision-making. **Option 2** (both sub-options) is fully coherent with the CFP, whilst **Option 3 (best-case)** is coherent with some of the CFP objectives (sustainability) but not all of them (e.g. regionalisation).

On 11 March 2016, the Commission adopted a proposal for a new **framework for technical measures** in line with the logic of the reformed CFP[69]. This proposal aims to bring together in a single framework the provisions relating to fisheries technical measures (i.e. relating to use of fishing gear, mesh size, spatiotemporal closures, minimum conservation reference sizes etc.) which are currently spread out in many pieces of legislation, and to set minimum standards in this respect. The proposal also puts in place the process of regionalisation whereby the technical measures set out in this proposal can be modified on the basis of joint recommendations by Member States which, if scientifically justified and valid, and in the context of EU multi-annual plans, are then adopted through Commission delegated acts. Therefore, given that the technical measures regulation would provide the basis for technical measures to be adopted through regionalisation, the EU multi-annual plan for small pelagics in the Adriatic would not contain provisions on technical measures, to avoid duplication and ensure coherence between both instruments.

Another relevant initiative is the on-going process to recast the EU's **fisheries Data Collection Framework Regulation** (DCF)[107], which aims to ensure that the DCF is the principle EU legislation under which data for implementation of the CFP should be collected, and that the DCF covers all the data needs relating to the CFP. To ensure coherence between the multi-annual plan for small pelagics in the Adriatic and the Commission proposal to recast the DCF, the multi-annual plan would not contain additional requirements for Member States to collect data on these stocks, as this will be achieved through the recast DCF and the multi-annual programme for data collection thereunder which will contain details of the exact data to be collected by Member States. Both initiatives introduce regionalisation as a new way of making certain decisions under the respective frameworks[70].

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69 Proposal for a Regulation of the European parliament and of the Council on the conservation of fishery resources and the protection of marine ecosystems through technical measures. COM/2016/0134 final - 2016/074 (COD).

70 In the case of the DCF, regional groups of Member States would be in charge of agreeing on details concerning how data will contribute to the process of deciding what data should be collected

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Other EU policies

Another important and related EU policy is the **Marine Strategy Framework Directive (MSFD)**[56] and its objectives of reaching Good Environmental Status of EU marine waters by 2020. In particular, the MSFD aims to ensure, amongst other, that the population of commercial fish species is healthy (Descriptor 3) and that elements of food webs ensure long-term abundance and reproduction (Descriptor 4). **Option 1** and **Option 3 (worst-case)** would not be coherent with these policy objectives, as they would not enable fish stocks to recover to a healthy state and to be fished at sustainable levels. **Option 2 (both sub-options)** and **Option 3 (best-case)** would be fully coherent with the objectives of the MSFD.

A key overarching EU policy, of relevance to initiatives in all policy areas, is the **Charter of fundamental rights of the EU**[71] and in particular Article 37 according to which a high level of environmental protection and the improvement of the quality of the environment must be integrated into the policies of the Union and ensured in accordance with the principle of sustainable development. **Option 1 and Option 3 (worst-case)** would not be coherent with this policy objective, whilst **Option 2 (both sub-options)** and **Option 3 (best-case)** and would be fully coherent.

Acceptability

Regarding acceptability, it is particularly important to consider the outcomes of the public consultation, in addition to other considerations already discussed above such as environmental and socio-economic impacts of the different options and coherence with other EU policies.

In the **public consultation**, the majority of stakeholders, including the MEDAC, the three Member States involved in the fishery and the fishing industry, agree that a multi-annual plan (Option 2) would be preferable to the current management framework (Option 1 and Option 3 (worst-case) (see Annex II). The majority of contributors think that modifications to the current management framework would not suffice to attain the CFP objectives. This indicates that overall Option 2 would seem more acceptable than the other options.

In terms of the two sub-options within Option 2 (reaching sustainable fishing levels by 2018 vs 2020), the latter sub-option (Option 2 (2020)) seems by far more acceptable based on the results of the public consultation: all the contributions considered 2020 as a realistic target date for reaching MSY 2020, with the option of 2018 being quickly dismissed (Annex II). In all cases, respondents considered that the transition towards sustainable fishing levels should be gradual.

Shifting from input to output control in this fishery is a paradigm shift. Nevertheless, the GFCM adopted output control for Adriatic anchovy and sardine in 2016 (catch freezes for 2017 and 2018) and Italy and Croatia also have had several years of experience implementing the Blue-fin tuna TAC and quota system which should facilitate the introduction of a similar system for anchovy and sardine.

In terms of **coherence** with other EU policies, Option 2 also provides greater coherence than Options 1 or 3 which suggests it would be more acceptable.

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[71] Charter of Fundamental Rights of the European Union.(2012/C 326/02). OJ C 326, 26.10.2012, p. 391–407

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In terms of **socio-economic impacts**, Option 1 and Option 3 (worst-case) have a risk of leading to the collapse of the fishery in the longer-term. Option 2 (both sub-options) and Option 3 (best-case) all have substantial socio-economic impacts in the medium-term compared to the Baseline scenario. It is also important to consider possible mitigation measures to address these negative socio-economic impacts.

The EU has, and continues to provide **financial assistance** to Member States to the fishing industry and coastal communities to help them adapt to changing conditions in the sector and become economically resilient and ecologically sustainable. For the period 2014-2020, the European Maritime and Fisheries Fund (EMFF)[2] provides funding for the EU's fisheries and maritime policies.

The EMFF specifically provides the possibility for funding to help fishermen in the transition to sustainable fishing, and contains provisions whereby support can be provided to fishermen to stop fishing temporarily or permanently, to retrain into a different job, to diversify their sources of income (away from fishing) and to replace gears to be more selective. Some of these measures are conditional on the fishery being covered by an EU multi-annual plan The EMFF also provides the possibility for funding to establish and manage a system of quota allocation for fisheries under TAC and quota and to develop or improve equipment and systems for control (Annex XI).

Croatia, Italy and Slovenia have already taken measures to reduce their impacts on anchovy and sardine in the Adriatic, including by reducing the capacity of their fleet, and plan to carry out more measures in this regard in the coming years using EMFF funding (see Annex IX).

However, the planned reductions alone may not be sufficient to restore the stocks to sustainable levels. In addition, it is important to note that planning measures in the context of the EMFF enable such actions to be eligible for financial support (subject to the provisions specified in that legislation) but does not bind Member States to carry out these planned reductions. As such, therefore, these planned measures can be taken as an indication that the Member States are willing to accept certain reductions in their fishing levels, but are not a sufficient guarantee, on their own, that the objectives of this initiative will be achieved.

7.4. The preferred option

Choosing the preferred option

In order **to determine the preferred option**, the following process was followed:

The options were assessed first in terms of the extent to which they deliver on the objectives: only options that deliver on all or most of the objectives can be considered (see Table 2).

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Table 4 Comparison of the options with the Baseline Scenario in terms of effectiveness, efficiency, coherence and acceptability in achieving the objectives.

Options	***Option 1 – Status quo (Baseline)***	***Option 2 - EU multi-annual plan***		***Option 3 – Change current framework***	
		2018	***2020***	***Worst-case: Status quo (Baseline)***	***Best-case***
Effectiveness	0	++	++	0	+
Efficiency	0	++	++	0	+
Coherence	0	++	++	0	+
Acceptability	0	+/-	+/-	0	+/-

Key: 0 = neutral impact, + = positive impact, ++ = very positive impact, - = negative impact, +/- = both positive and negative impacts (compared to the Baseline)

The socio-economic impact analysis and considerations relating to efficiency, coherence and acceptability can then serves to choose between several options (if several options enable the achievement of the objectives) and also serve to inform us of the possible impacts of the preferred option so mitigation measures can be considered (Table 4).

Following this step-wise approach, **Option 1 and Option 3 (worst-case)** cannot be considered as they do not deliver on any of the objectives. **Option 2** enables the achievements of all the objectives. **Option 3 (best-case)** could deliver on the objectives relating to sustainability of stocks and of fisheries by 2020 at the latest, but not the objective of improving the effectiveness of the management framework.

It is also important to highlight that the effectiveness of **Option 3** depends on whether the process of modification of the current legal and management framework is successful in introducing the changes required to reach the new CFP objectives and hence on whether we reach a worst-case or best-case scenario (or possibly somewhere in between).

Broadly speaking, the **anticipated impact of Option 2** - implementing the multi-annual plan - will be an improved conservation status of anchovy and sardine, as well as larger predators of these species, which would ultimately result in a healthier and more sustainable fishing sector dependent on this resource, with better salaries for individual fishermen and greater profitability overall. The transition to this more sustainable state of the fisheries is likely to require a reduction in the fishing sector including the level of employment, but there are specific financial instruments and measures available to assist the concerned sectors in this transition.

Option 2(2020) is preferable over Option 2(2018) in terms of acceptability by stakeholders, who overwhelmingly expressed a preference for 2020, and is also the more realistic considering the likely timing of the EU multi-annual plan entering into force. **The preferred option would therefore be Option 2 (2020).** A more detailed overview of the main elements of an EU multi-annual plan for small pelagics in the Adriatic is included in Annex XIV.

Synergies

The Adriatic multi-annual plan, if adopted, would co-exist with the GFCM Management Plan. The Commission would try to align the measures adopted under the EU multi-annual plan to the GFCM to ensure a level playing field with third countries and to

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ensure the EU Member States' obligations under both instruments were aligned. However, until that is possible, the GFCM measures as they currently stand contain synergies with the proposed EU multi-annual plan: the GFCM management plan specifies certain types of measures which Contracting Parties should apply eg closed-areas, effort limits, capacity and catch freezes. These measures will all contribute to member States' efforts to remain within the TAC& quota that would be proposed under the EU Multi-annual plan, although Member States would probably need to do more than the GFCM measures to stay within their quotas.

7.5. Limitations in the impact assessment

There is some uncertainty in the likely evolution of the stock status under different options, as stock evolution is harder to predict with small pelagics than many other stocks as they are short lived and are affected more by recruitment of young fish, which in turn depend partly on climatic conditions. Hence greater fluctuations take place in stock sizes for small pelagics than for other groups of fish. A big downturn in food supply and hence recruitment could increase the chance of collapse

Forecasting future impacts is not an exact science and the actual impacts of the preferred option, in the medium and longer-term are likely to vary to some extent to what can be predicted based on the information available today. It is therefore often more meaningful to compare likely impacts of different options, rather than to assess the absolute values of the forecasts. Furthermore, it is important to consider not only the outcomes of the quantitative forecasting but also qualitative aspects such as those considered under sections 7.3.

Impacts on secondary sectors also contain more uncertainty that the modelling of impacts on the primary (fisheries) sector as impacts are less direct and there are intrinsically more uncertainty.

The forecast of possible market effects was carried out on a qualitative basis, based on general trends observer in the Adriatic small pelagic fishery and markets, and based on a comparable case study using sardine fisheries off the Spanish and Portuguese coast. Because of the uncertainty surrounding the way in which markets could react to changes in availability of anchovy and sardine from the Adriatic fisheries and the difficulty in modelling this accurately, the information should only be taken as indicative of possible future impacts. The economic forecasting that was carried out is based on numerous assumptions, which are presented in Annex IV, and the actual impacts that would take place under the different options are likely to vary to a small or larger degree depending on how accurate these assumptions turn out to be. Furthermore, the social and economic forecasting cover the ten main fleet segments involved in this fishery, treated as a whole. Individual fleet segments and even vessels and fishers will be subject to varying impacts, such as future changes in revenues or profitability, but this depends in large part on how each Member State will decide to allocate its national quota within its fleet and what additional specific management measures each Member State may adopt, if any, alongside the catch limits.

Environmental impacts in terms of changes in stock size are also likely to affect different parts of the fleet to a different degree, as the stock not only moves but may also improve or decline to different extents in different parts of its range.

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8. HOW WOULD ACTUAL IMPACTS BE MONITORED AND EVALUATED?

8.1. Monitoring

The Basic Regulation anticipates that multi-annual plans may be subject to periodic monitoring and assessment of progress in achieving the plan's objectives (Article 10(2)).

The **operational objectives** and the **monitoring indicators** would be the following:

Operational objectives	**Monitoring indicators (and frequency)**
1. Ensuring that the stock size state for anchovy and sardine is above the minimum levels (biomass safeguard values) specified in the plan (which trigger remedial action);	Anchovy and sardine stock size (annual)
2. Ensuring that the level of fishing mortality is line with the F_{MSY} targets prescribed by the plan;	Total catch levels by species (annual)
3. Ensuring that Member States catches remain within the national quotas they are allocated under the TAC and quota system, as set out in a Council decision.	Catch levels by species, by Member State (monthly)

Monitoring of some of the effects of management measures is done as part of the routine work associated with the implementation of the CFP (see Annex X) and the necessary data required to monitor the three operational indicators are already collected by Member States under other EU legislation[129].

The Commission's fisheries advisory body, the STECF, already carries out annual assessments of anchovy and sardine stocks, including estimating their stock size (operational objective 1). The Commission determines the tasks of the STECF on an annual basis and would ensure that the STECF work programme continues to include an annual stock assessment for sardine and anchovy.

Member States are required to submit to the Commission on a monthly basis catch data for species managed under a TAC and quota regime, which enables monitoring of operational objectives 2 and 3 above.

The Commission also has procedures in place through the EU fisheries Control Regulation[60] and a specific control and inspection programme for anchovy and sardine in the Northern Adriatic, which provide information on the extent to which Member States comply with the current rules (Annex X).

In addition, the **socio-economic impacts** of the plan should be monitored. Since 2010, STECF carries out an annual assessment of the economic performance of the EU fleet[72] on the basis of Member States' data collection under the DCF (including assessment of employment, profit, salary). The Commission would ensure that this annual assessment continues so that the socio-economic impacts of the plan can be monitored.

Impacts of the plan on markets (prices, trade patterns) will also be monitored by the Commission on a biennial basis through EUMOFA[73].

Therefore baseline data are available and a process is in place to monitor the three operational objectives above as well as socio-economic impacts of the plan.

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72 https://stecf.jrc.ec.europa.eu/reports/economic

73 http://ec.europa.eu/fisheries/cfp/market/market_observatory/index_en.htm. EUMOFA enables direct monitoring of the volume, value and price of fishery and aquaculture products, from the first sale to retail stage, including imports and exports.

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There are however some aspects whose monitoring is not done routinely, such as **administrative burden**, which may need an *ad-hoc* system. The plan could include a specific provision to monitor administrative burden. Monitoring the **satisfaction of the fishing industry** could also be done for example through occasional or recurrent opinion polls which may be *ad hoc* or inserted in other wider polls.

8.2. Evaluation

As far as evaluation is concerned, Article 10(3) of the Basic Regulation stipulates that multi-annual plans shall provide for their revision after an initial ex-post evaluation, in particular to take account of changes in scientific advice.

The plan, and its impacts, should be evaluated by STECF just under five years after its entry into force so that the Commission can report to the European Parliament and Council within five years of the entry into force of the multi-annual plan. Thereafter, the Commission would report every five years.An earlier evaluation is not sensible, due to fact that there is an important time gap between implementation of the plan and when the data required for evaluation are available[74].

Indicators to be used for the evaluation do not need to be specified in the legal acts setting the MAPs; instead, they can be developed subsequently in consultation with the relevant stakeholders and scientific bodies. They should be environmental (such as fishing mortality and stock size for all relevant stocks), economic (such as net profits, return on investment, gross value added, etc.), social (total employed (FTE), average wage, etc.) and cost-efficiency related (administrative burden). Disaggregated analysis should be preferred in order to find out whether there are fleet segments or fish stocks for which specific action would be required.

8.3. Compliance and control

Option 2, gives Member States the possibility to develop management and conservation measures regionally. The process of regionalization per se provides an incentive for Member States to take part in regionalisation by submitting joint recommendations and for other stakeholders such as the industry to contribute to this process (via the MEDAC). The fact that the Commission is empowered to make its own proposal in certain areas covered by regionalization, if no joint recommendations are proposed also provides an incentive for Member States to agree amongst themselves. And finally the scope of topics that can be decided through regionalization is broader than those for which the Commission can make proposals: for example in the case of a discard plan: if no joint recommendations are received, the Commission may only adopt a discard plan containing some de minimis exemptions (cases where small amounts can be discarded on the basis of disproportionate cost of handling the discards) whilst if joint recommendations are made, these can cover de minimis exemptions but also permitted discards on the basis of survivability, and also provisions on minimum conservation reference size.

Regionalization also provides an incentive to comply given that the stakeholders who will need to apply the rules developed through regionalization will have greater

[74] The STECF recommended that an evaluation of multi-annual plan should be based on 3 years-worth of data after implementation of the plan. The timing of evaluations of plans needs to be linked to the availability of data, which takes a few years to be available. For example 3 years of biological data become available at approximately month 48 and 3 years of economic data at approximately month 60. Thus a full 3 year evaluation cannot be conducted until 5 years from the commencement of the plan. Report of the STECF Study Group on the Evaluation of Fishery Multi-Annual Plans (SGMOS 09-02).

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ownership of these. In particular, ownership comes from the fact that under regionalization, only the Member States concerned by a measure are involved in agreeing on it (as opposed to in Council where potentially 28 Member States take decisions). Similarly in GFCM, all Contracting parties may have a say in determining measures.

Given that such measures would be developed regionally, using a bottom-approach, and including consultation with the sector and civil society (through the Advisory Council), as required under the Basic Regulation (Article 18(2)), it is expected that stakeholders will have greater ownership of these measures and that compliance will improve. The Commission usually attends meetings of the MEDAC and thereby follows developments within that forum.

Furthermore, measures adopted through regionalization are developed regionally but then enshrined in EU legislation (Commission delegated acts) and as such compliance mechanisms stemming from EU obligations apply. Furthermore, the provisions of the fisheries Control regulation continue to apply, with in some cases additional measures being introduced under the multi-annual plan to facilitate control by the Adriatic Member States' authorities. This includes, for example, the obligation for vessels fishing anchovy and sardine (above a certain threshold) to land only in so-called 'designated port's and to issue a priori notification to announce their arrival.

In terms of recording the catches, to minor whether the national quotas and the overall TAC is complied with, the mechanisms and obligations are already in place in the Adriatic Member States as these stem from the EU fisheries Control Regulation. The vast majority of vessels involved in this fishery are not small-scale, and already have the IT equipment on board to both record and transmit information on catches electronically to their national authorities (electronic logbooks) and vessel monitoring system (VMS) to enable control authorities to locate vessels – as required under the fisheries Control Regulation. Introducing TAC & quota under a multi-annual plan will only change the frequency of reporting from quarterly to monthly. Furthermore, under the multi-annual plan, the obligation to have VMS and electronic logbooks, to facilitate control for the member States, will be extended to vessels from 8 to 12 m.

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ANNEX I: PROCEDURAL INFORMATION

Actors involved in the process

DG MARE is the lead DG for this initiative. Other departments involved are*:* DG ENV, DG GROW, Legal Services and the Secretariat-General

The proposal for a multi-annual plan for small pelagic stocks in the Adriatic is provided for in the "Agenda Planning" (2016/MARE/001), as well as in the 2015 Management Plan of the Directorate General for Maritime Affairs and Fisheries (DG MARE).

Organisation and timing

The IA has progressed in several steps following the September 2014 High Level Meeting of Mediterranean Member States (MSs) fisheries administrations on the way forward for the implementation of the reformed CFP in the Mediterranean Sea basin. The conclusions of this meeting were that EU multi-annual plans should be developed for stocks shared among EU countries and the Adriatic was selected as the first priority area.

An Impact Assessment Steering Group (IASG) covering all the upcoming proposals for multi-annual plans was set up by DG MARE in January 2015. The following Commission departments have been invited: Secretariat General, Legal Service, DG Employment, Social Affairs & Inclusion, DG Environment, DG Regional Policy, DG Economic and Financial Affairs and DG Internal Market, Industry, Entrepreneurship and SMEs.

The IASG were consulted in writing on a draft Impact Assessment on 22/12/2015, following which the IASG met again on 17 March 2016 to discuss a second draft Impact Assessment. The main discussions within the IASG focused on clearer definition of the options, improving the problem definition, as well as the link between the problem definition, the objectives and the options. The IASG also identified the need to improve the sections on affected stakeholders in order to enlarge the focus to include secondary sectors and to simplify the language and technical contents of the IA. The IASG were consulted again in writing on the final draft Impact Assessment on 21 April 2016. In between these consultations, regular contacts were maintained with the members of the IASG.

In addition, in February 2016 DG MARE set up a working group dedicated to coordination of the DG MARE multi-annual plans and Impact Assessments. The group contains DG MARE staff working on multi-annual plans in different sea basins, as well as DG MARE economists, experts in impact assessments and in markets and trade, and representatives from the Commission's Secretariat General. The group has already met 3 times and has made good progress on topics such as improving the problem definition, the choice of the options, what indicators to use in the modelling of impacts etc. We have aim to develop some common text for IA on DG MARE MAPs, which could be reused in all MAPs, eg describing the CFP, the concept of MAPs.

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Consultation of the Regulatory Scrutiny Board

The draft Impact Assessment Report (IAR) was submitted to the Regulatory Scrutiny Board (RSB) on 17 May 2016. The RSB met to consider the IAR on 8 June 2016 and issued a positive opinion on the draft IAR on 13 June 2016[75].

The final IAR was revised based on the RSB's Opinion as well as their comments provided in the Impact Assessment Quality Checklist (IAQC)[76], as follows:

RSB recommendation	How this was addressed
1) The problem definition should be made more specific to the Adriatic Sea and include a broader time perspective. The relations between the management arrangements at national, regional and international level and related shortcomings should be further elaborated on.	The problem definition, for both the drivers and consequences of the problems, has been quantified where possible, including definitions for the problems and information on how the problem has evolved over time. For example, the levels of overexploitation, of overfishing, of overcapacity and the risk of collapse have been detailed, and the risk of collapse has been quantified. New information has been included on recent trends in stock status of anchovy and sardine. In section 2.2.1, the shortcomings of the current management measures have been presented for each management level and clarifying the bias between input and output control. More detail and examples have been provided regarding the instability of the management framework. Text was included to clarify why discarding is not a problem in this fishery. The synergies and discrepancies between the different instruments has been elaborated on, and tables presenting the instability over time and the discrepancies between the different instruments have been included in Annex XI. The policy context has been refined, e.g. information has also been included on the preparation of other EU multi-annual plans under the new CFP, and on lessons learned from implementation of pas multi-annual plans adopted under the previous CFP. More detailed information on the specificities of small pelagics in terms of lifespan and sensitivity to environmental fluctuations, and their trade dynamics and supply issues has also been included in the report.
2) The policy objectives and corresponding options should be clarified and better linked, underlining the Adriatic Sea specificities. The report should make evident what	In Section 4, the specific objectives have been rephrased to focus on small pelagics in the Adriatic Sea. In Section 5.1, a section was included to clarify why the option of managing small pelagics solely on the basis of international measures (GFCM) was discarded early on, as it was considered too risky. In Section 5.2, a stronger

[75] WILL INCLUDE REFERENCE TO OPINION ONCE PUBLISHED
[76] Provided to DG MARE on 3/6/2016 but not published.

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are the limitations in the options design set out by the CFP. It should further specify what is the flexibility regarding particular elements of MAP and what policy decisions are to be made on the individual elements at the EU and Member State level.	link is made between the retained policy options and the policy objectives, including by clarifying that the CFP identified multi-annual plans as the priority tool to achieve the objectives of the CFP and that the CFP objective of sustainability is time bound. Furthermore, in section 5.2.2.2 (details on Option 2 - EU multi-annual plan), the limitations on the policy choices that can be made regarding the contents of a multi-annual plan is clarified, in terms of provisions in the CFP, of the inter-institutional agreement, and the precedent set by the Baltic multi-annual plan. The rest of section 5.2.2.2 then presents what policy choices can be made within a multi-annual plan, to tailor the plan to the specific fishery. Furthermore, the report specifies in section 5.2.2.2 what choices the Member States can make under a multi-annual plan to achieve its targets.
3) The assessment of the impacts should be improved, by including risks of incorrect implementation and possible adverse effects. The projected economic impacts at the microeconomic level should be better substantiated in the argumentation, including the distribution of the net benefits. Possible indirect impacts – e.g. on innovation and or on non-EU fisheries - should be considered and elaborated on.	Information has also been included in section 7.3 regarding compliance cost, regarding coherence with the international GFCM measures (in terms of catch limitations adopted in 2016), regarding acceptability of a system of output control (referring to the experience already available in the Adriatic in this respect e.g. with Blue-fin tuna). Section 7.4 contains more details on synergies between the proposed EU multi-annual plan and the current GFCM management measures, which would co-exist if a multi-annual plan is adopted. A section 7.5 on limitations and uncertainty in the impact assessment was also included, describing the sensitivity of the forecast for different elements (e.g. stock status, market effects etc). A section 8.3 has been included to present provisions on implementing conditions in the Member States in terms specifically of compliance and control, including the relationship with measures adopted through regionalisation. In particular, this section also details incentives which Member states and other stake holders have to implement regionalization and what safeguards are in place. Indirect impacts, in particular regarding imports from non-EU countries and possible impacts on their fisheries resources, has been included in the IAR and detailed further in Annex III.
Technical comments have been transmitted directly to the author DG and are	The technical and editorial comments provided in the IAQC have been addressed in the revised Impact

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expected to be incorporated in the final version of the impact assessment report.	Assessment. The report has been thoroughly copy edited.

Consultation

In preparing this Impact Assessment, consultations have taken place at different levels, including stakeholders, scientists, individual citizens, public administations and relevant Commission services (see Annex II for more details).

A **public consultation** via the internet, that took place in 2015 (see Annex II). The main conclusions, which will also be reflected in the relevant parts of the report, were as follows:

- Most contributors agreed on the need for an EU multi-annual plan, basically because the current legal framework does not duly take account of the specificities of the region's region/fisheries and it does not fully implement, the CFP, in particular the regionalisation principle.
- The current framework is considered to be too complex.
- The EU's intervention should be limited to the orientation and determination of the objectives.
- Interactions between fisheries and environmental factors should be taken into account.
- Measures should concern only target species.
- Technical measures and additional measures on the landing obligation should be adopted via regionalisation and not fixed in the plan.
- Technical measures should focus on spatial-temporal closures rather than on increase in selectivity based on mesh size.
- The multi-annual plan should have an adaptive approach and should be proportionate to the share of catches of the different fleets concerned.

In addition, certain **key studies** underpin this Impact Assessment:

An on-going **retrospective evaluation of the MEDREG**[85] found that, despite many of the MEDREG measures being implemented, the MEDREG appears to be failing on the majority of its objectives in the Northern Adriatic region, or results on effectiveness are inconclusive due to limited supporting evidence. For example, all National Authorities that were consulted in the context of this retrospective evaluation perceived little and no impacts of the MEDREG in reducing fishing effort in the Northern Adriatic region and that the MEDREG has had a limited impact on number of vessels and employment in Italy and Croatia.

National management plans adopted by Member States **have been thoroughly analysed** by the STECF[30] based on a dedicated study[77]. STECF concluded that under the existing national management plans, reductions of the catches are **insufficient to reach sustainable fishing levels by 2020** and therefore, STECF considers that, unless changes in the above aspects are made to the national management plans, it is very unlikely that the objectives of the CFP will be achieved.

[77] MAREA: MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE - SPECIFIC CONTRACT n° 9, Task 4 - Ad hoc scientific advice in support of the implementation of the Common Fisheries Policy, "Scientific advice on the conformity of management plans with the requirements of the Common Fisheries Policy in the Mediterranean Sea"- Revised report 08.08.2014.

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Regarding the international measures implemented under the GFCM, **a bioeconomic assessment of management measures** for sardine and anchovy fisheries in the Adriatic was carried out by the GFCM in 2015[50]. Simulations show that current fishing mortalities[78] are too high, including under the emergency measures adopted by the GFCM, and if continued, anchovy and sardine stocks would remain outside biological safe limits or even collapse between 2020 and 2030.

In 2014, the Commission contracted a study entitled "Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea" aiming to identify the main fisheries in the Adriatic, to describe the state of stock assessments and scientific advice for the relevant stocks and to provide socioeconomic information pertaining to the different fisheries undertaken by the coastal countries in the Adriatic. The study was finalized in 2015[79].

A specific contract was launched by DG MARE in 2014, to assess specific management scenarios for multi-annual plans in accordance with the CFP objectives[80]. The study envisaged four case studies, one of which concerned the small pelagic fisheries in the Adriatic. The study then used bio-economic modelling to assess the environmental, social and economic impacts of different scenarios on the different fleet segments.

78 Average of 2012-2014

79 Lembo (2015) "Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea (SEDAF)". Specific contract no. 10 under the MAREA Framework Contract.

80 Service contract number: EASME/EMFF/2014/1.3.2.7/SI2.703 193, "Study on the evaluation of specific management scenarios for the preparation of multi-annual management plans in the Mediterranean and the Black Sea" - CALL MARE/2014/27.

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ANNEX II: STAKEHOLDER CONSULTATION

Experts' advice

Most of the work and consultation necessary to cover all of these aspects of the work has been carried out by scientists working through the auspices of the STECF and of the Scientific Advisory Committee of the GFCM (GFCM-SAC) as well as by a consortium of Mediterranean Research Institutes under a framework contract with the Commission (MAREA). Overall, 5 STECF Expert Working Groups meetings and 4 GFCM-SAC Sessions have taken place, and 5 scientific studies devoted to multi-annual plans and the small pelagic fisheries in the Adriatic have been carried out since 2013[81].

Consultation with stakeholders

Stakeholders were consulted in a targeted manner and in particular through consultation with the **Mediterranean Sea Advisory Council** (MEDAC)[82], the most representative fisheries stakeholders' organisation in the Mediterranean. The MEDAC represents all the parties concerned by this initiative. This comprises the fisheries sector, including small-scale fisheries, the processing sector and trade unions and other interest groups such as environmental organisations, consumer groups and sports/recreational fishery associations which operate in the Mediterranean area in the framework of the CFP.

Since 2014 MEDAC has set up a working group specifically devoted to the development of the multi-annual plan for the small pelagics in the Adriatic. The working group held six meetings, in which representatives of DG MARE, the European Fisheries Control Agency, the scientific research community, as well as industry representatives and Member States fisheries administrations took part[83].

In March 2016, the MEDAC adopted an advice on the multi-annual plan for small pelagics in the Northern Adriatic[84]. In this advice the MEDAC proposed a "traffic light" approach to managing the small pelagics in the Northern Adriatic, whereby stricter measures are taken as a function of where the stock is in relation to both fishing mortality ($F_{MSY)}$ and biological reference points (SSB_{PA} and SSB_{LIM}). The advice proposes that in the worst case, where stocks are fished at fishing levels above MSY and where the size of the spawning stock biomass is below a critical point (SSB_{LIM}), emergency measures be adopted by the Commission under Article 12 of the Basic Regulation. Other recommendations made in this advice include:

- The multi-annual plan should have at least a 3 year duration to allow fishing enterprises to plan their investments on the basis of a reasonable timeframe;
- The measures contained in this plan should be applied as soon as possible, at the latest by 1/1/2018;

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81 STECF (EWG 13-19, EWG 14-09, EWG 14-19, EWG 15-11, EWG 15-16); GFCM (SAC 15th Session, SAC 16th Session, SAC 17th Session, SAC 18th Session); and MAREA Framework Contract (MEDISEH, STOCKMED, BEMTOOL, LANDMED, SEDAF).

82 http://www.med-ac.eu/

83 8th October 2014, Split (Croatia); 20th November 2014, Rome (Italy); 11th March 2015, Rome (Italy); 23rd April 2015, Marseille (France); 11th June 2015, Madrid (Spain); 17th February 2016, Rome (Italy).

84 MEDAC (2016) MEDAC Advice on LTMP for Small Pelagics in GSA 17 (Northern Adriatic) of 11 March 2016 (Prot. 94/2016).

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- All vessels actively fishing in GSA 17 for anchovies and/or sardines should have on board an effective electronic system to control and monitor their position and their fishing activity. In particular, electronic logbook is mandatory for all vessels;
- Fishing authorization mandatory for all vessels actively fishing sardines and anchovies in GSA 17;
- The multi-annual plan should prolong the *de minimis* provisions included in the three-year Discard Plan[17] for anchovy, sardine, mackerel and horse mackerel.
- Before the adoption of the management plan the impacts of the possible management measures should be evaluated;
- In order to reduce the time gap between data collection and the measures to be implemented according to the traffic light approach, in addition to traditional methods, more time-responding systems, such as echo surveys are required;

The Commission also organized a **Scientific and technical seminar on small pelagic fisheries in the Adriatic Sea** on 18 September 2015, bringing together the scientific community (STECF, GFCM, ADRIAMED, national research institutes, independent experts, the Commission's Joint Research Centre), the MEDAC, Member States' fisheries administrations. The aim was to have a discussion with representatives from the different scientific communities that are involved in stock assessments for small pelagics in the Adriatic, to have an opportunity to share information, data and methodologies. During the meeting, the main outcomes of the EU project SEDAF[9] was presented, particularly the biological and socio-economic implications when applying different management scenarios to reach MSY. There was general agreement that sardine and anchovy are over-exploited and that it is time to act.

This was followed by a **Workshop on the implementation of MSY in the different Case Studies, including the small pelagic stocks in the Adriatic** on 21-25 September 2015. This workshop was organized in the context of the Commission-funded project on Management scenarios for the preparation of a multi-annual management plans in the Mediterranean and Black Sea. This meeting enabled different actors (the Commission, MEDAC, independent experts, consultants carrying out the project) to discuss and agree on the different management possibilities, criteria and planned scenarios to reach Fmsy in the context of this project.

A consultation of stakeholders involved in Mediterranean fisheries (including 8 Member States' authorities, research institutes from 8 Member States, 5 NGOs, industry representatives from 8 MS, the MEDAC, STECF) was also carried out in the context of the **Retrospective Evaluation study of the Mediterranean Sea Regulation**[85], which includes a specific case-study on small pelagics in the Adriatic**.** This provided relevant input regarding the problem definition and the effectiveness of the current framework. The response from consulted stakeholders overwhelmingly agreed that fish stocks in the Mediterranean were severely overexploited before 2010 (when all provisions of the MEDREG entered into force) and the majority of respondents across all stakeholder categories stated that no observed improvement in stock status had occurred. Another critical issue identified included concerns about future socio-economic sustainability in Mediterranean fisheries.

[85] Wakeford *et al.*(2016) retrospective evaluation study of the Mediterranean Sea Regulation. Draft final report (April 2016)

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In addition to this, a wide-ranging, **internet-based, public consultation** on Northern Adriatic small-pelagic fisheries was carried out between 22 May 2015 and 11 September 2015[86]. The scope of the public consultation covered only the Northern Adriatic as this is where the vast majority of fishing activity on small pelagics takes place and initially the Commission was considering tabling a proposal for a multi-annual plan for the Northern Adriatic, before deciding to expand the scope slightly to cover the whole Adriatic. This extension in scope was decided in order to cover the whole area where the stock occurs, and to avoid the disproportionate cost of having to develop a separate multi-annual plan just for the Southern Adriatic in future, given how minimal this fishery is (6% of anchovy and sardine caught in the Adriatic (2013) are landed in the Southern Adriatic, and many of these catches actually take place in the Northern Adriatic. The share of landings in the Southern Adriatic has been declining constantly since 2008 (see Annex IV - Tables A8 and A9).

The public consultation was widely broadcasted through bilateral contacts, during the meetings of the MEDAC, the General Fisheries Commission for the Mediterranean (GFCM)[87] and the Scientific, Technical and Economic Committee for Fisheries (STECF)[88] and among all the relevant stakeholders, including national and regional authorities, the catching sector and NGOs and the social partners. A total of 15 detailed contributions were received from Member States, the MEDAC, industry representative organisations, NGOs, and individual citizens. Below is a more detailed overview of the public consultation:

Consultation strategy

The views of stakeholders including civil society were sought through a public consultation on the best management options and on the possible ways to address the challenges posed by the reformed CFP implementation in the area.

Contributions received

A total of 15 written contributions received. Individual contributions are available on the dedicated website to this consultation[86]. Figure 1 and Table 1 provide a summary of the submissions by stakeholder grouping.

The overview of the contributions presented is based on the written contributions received. It is neither intended to draw conclusions regarding the options proposed nor does it represent the position of the Commission. It will support the preparation of the Impact Assessment report, which in turn will be the basis for developing the Commission's proposal for a multi-annual plan for managing small pelagic fisheries in the Adriatic.

86 http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/northern-adriatic-multiannual/index_en.htm

87 www.gfcm.org

88 Commission Decision of 26 August 2005 establishing a Scientific, Technical and Economic Committee for Fisheries (2005/629/EC). See also https://stecf.jrc.ec.europa.eu/

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Figure 1 Breakdown of contributions to the Public Consultation

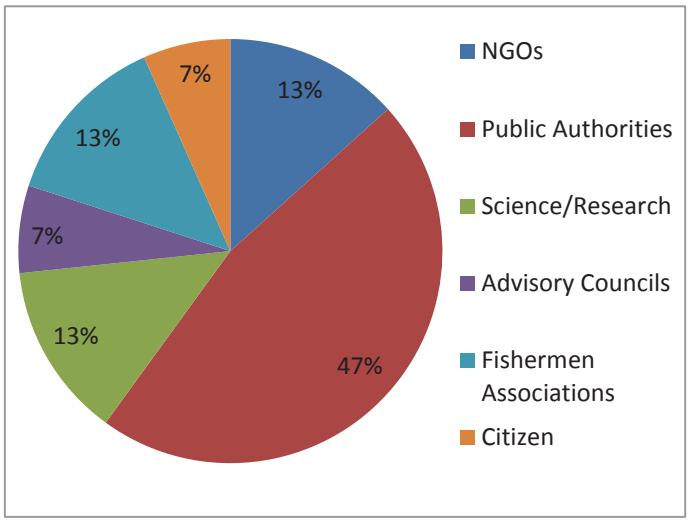

Table 1 Contributors to the Public Consultation

Stakeholder Group	Number of contributions	Examples
Advisory Councils	1 (7%)	MEDAC
Public Authorities	7 (47%)	Ministries, Local government
Civil society organisations	2 (13%)	Environmental NGOs
Industry/stakeholder organisations	2 (13%)	Fishermen's representative organisations
Scientific/Research Institutes	2 (13%)	Fisheries research institutes, fisheries consultants
General Public	1 (7%)	Citizens

General comments

Most contributors (Advisory council, NGOs, Public authorities, the three Member States involved in the fishery) agreed on the need for an EU multi-annual plan, basically because the current legal framework does not allow to duly take into account the specificities of the region and of the relevant fisheries. Moreover, it does not represent a

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coherent framework to fully implement the challenges posed by the CFP, in particular to implement the regionalisation principle.

Several stakeholders (Advisory council, fishermen organizations, local government), identified the fact that the current management framework is highly complex as a problem.

Despite a general agreement on the need for an EU regulation establishing a multi-annual plan, most contributors stressed that the EU intervention should be limited to the orientation and determination of the objectives. The development of more detailed implementation and technical measures should be left to the Member States and the stakeholders represented in the Advisory Council, via the regionalisation process.

Conservation and management approach

All the contributions considered 2020 as a realistic target date for reaching MSY 2020, with the option of 2018 being quickly dismissed. Some contributions even suggested that the objective should be delayed with respect to what is established in the CFP Basic Regulation. In all cases, respondents considered that the transition towards MSY should be gradual.

As far as the identification of the target species is concerned, most of the contributions agreed that sardine and anchovy are the main target species and that the measures of a possible multi-annual plan should be focused on those stocks. For the management of secondary target species such as horse mackerel and sprat, it was considered that the landing obligation provisions are enough.

Since sardine and anchovy are subject to a mixed fishery, most of the contributions agreed that interactions between fisheries and fleets should be taken into account. Environmental factors should also be duly considered, given their strong influence in the recruitment of the two species under discussions.

Some contributions stressed that the plan has to be proportionate to the share of the different fleets and to their impact on the resources.

An adaptive management approach was recommended by several contributions, including from stakeholders' organisations. More concretely, it was suggested that the plan could be implemented in two phases: a transitional period until 2017, during which basically the status quo is maintained, but the scientific monitoring is improved, and then the implementation of new measures as from 2018-2020.

The introduction of catch limits or Total Allowable catches (TACs) was discussed by most of the contributions, and stakeholders are quite divided on this subject. Some contributions, including from public administrations and NGOs, are in favour of introducing for example daily catch limits per vessel or per fisheries, in order to better manage the fishing effort. For some other stakeholders, including some fishermen's organisations, the introduction of TACs would be unacceptable. However, this position is not strongly substantiated, except for a general comment that it would increase discard levels. Other contributions (Public authorities) stressed that technical measures would be more appropriate than catch limits, without properly explaining the rationale behind this assumption.

Regionalised technical measures

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As already mentioned above, technical measures and possible measures to implement the landing obligation should be adopted via regionalisation and not be fixed in a co-decided plan. Stakeholders agree to follow the framework that has been chosen in the Baltic Sea, implementing regionalisation, as an example.

The AC, Member States and the fishing sector suggested a number of technical measures but most contributions agreed that they should focus on spatiotemporal closures, also on rotational basis, rather than on increases in selectivity based on mesh size requirements. More specifically, measures derogating from the MEDREG provisions on the characteristics and the use of purse seines fishing gears were recommended.

Implementation of the landing obligation

There is a general agreement (except from one professional organisation) that the current provisions regulating the implementation of the landing obligation in the Adriatic, which for the time being are included in the Mediterranean discard plan, should be integrated in the future multi-annual plan.

Contributions from scientific bodies stressed that the implementation of the landing obligation should be placed in the context of the management measures that will be decided in the plan. For example, if the management measures that will be adopted have as a consequence to increase the levels of discards, the *de minimis* granted so far should be reconsidered and possibly withdrawn, with all the catches being consequently landed.

A co-management approach in landings control system was also suggested by professional organisation, especially when the catch is entirely transported from the landing site to the site of the first sale. The risk of parallel black market for undersized individuals was in fact evoked.

Scientific issues

A large number of contributions, including from fishermen's organisation, AC and scientific bodies, focused on the scientific aspects.

Overall, most contributions (*Advisory council, professional organisations and scientific bodies*) agreed that the scientific basis for management decisions should be improved and that the time gaps between the collection of the data and their use for scientific purposes (two years) should be reduced. Real time evaluations were recommended by most of the contributions, to properly address the challenges posed by the management of the small pelagic stocks. Some inputs (professional organisations) suggested that fishermen observations should complement scientific data, while others (scientific bodies) argued that catch independent methods should be used to strengthen the scientific basis.

Another reason that was given for developing the scientific research on the two target stocks is that they are in a competitive relation. Therefore, some respondents from Member States) considered that further investigations would be needed to determine whether both can be maintained at MSY level at the same time, and to determine the best ranges of reference points taking into account their mutual interactions.

The discrepancies in stock assessments and scientific advice between the two main scientific bodies dealing with small pelagic in the Adriatic (STECF and GFCM-SAC)

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were recalled and a general revision of input data and of the methodology for stock assessment was recommended.

There was support for carrying out joint stock-assessment for GSA 17 and GSA 18, as opposed to two separate assessments, but only in the future. Some contributions (from a scientific body) argued in fact that for the time being the differences in availability and reliability of data between the two GSAs are too important to combine the data.

Given the importance of environmental factors in the dynamics of the small pelagic populations, one contribution (fishermen association) questioned whether it is realistic to expect that fishing mortality can regulate the spawning stock biomass in the long term. More generally, it was suggested that the positive or negative changes to the stocks biomass originating from climatic variations should be taken into account. The link between the presence of tunas in the Adriatic, in particular of tuna fattening farms, and the decrease of sardine was also raised by one contribution (Advisory council).

Control

A majority of the contributions raised the issue of control measures, which should somehow accompany a new management approach. For example, mandatory fishing authorisations, VMS and logbook obligations should be introduced, to properly monitor and control the enforcement of the management measures. On the other hand, a possible multi-annual plan should envisage some exemptions from Council Regulation (EC) No 1224/2009 (the Control regulation)[60]. This is motivated by the need to take into account the specificities of the small pelagic fisheries in the Adriatic (e.g. exemption from the 4 hours pre-notification requirement before arrival in port).

Financial support

According to most contributions (advisory council, Member States and one NGO), EMFF is the most important lever to speed up the process of implementation of a multi-annual plan. Despite the fact that all contributors recognise the critical role of the fund, local authorities criticized its excessive bureaucracy and complex procedures, in particular regional authorities.

Some contributions, in particular from stakeholders (advisory council) and fishermen organisations, wondered about the possibility to introduce a kind of reward system to access to the EMFF within the multi-annual plan regulation, in particular the possibility of relaxing the rules on the inadmissibility of applications to the EMFF (thus derogating from Regulation 508/2014).

One contribution from a national administration (one Member State) stressed that financial support to temporary cessation would not be enough to cover the estimated economic losses.

Some inputs concerned the need to foresee alternative incentive mechanisms for fishermen to comply with newly introduced management measures. Moreover, according to some stakeholders including fishermen's organisation, financial support for infrastructures should be promoted, in particular landing sites and ports, also to facilitate controls.

Other issues

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Many contributions (Advisory council, professional organisations and public authorities) stressed the important role that co-management schemes could play within a revised management framework, for example to reduce the administrative burden.

Overall, all contributors agreed that fishermen's organisations should be involved at advisory level, to better streamline the procedures. A close cooperation with national and local authorities, fisheries organisations and scientific bodies could also contribute to ensure subsidiarity.

The regulation of the markets was also raised as a critical issue by some contributions, in particular from local authorities and fishermen's organisations. Management models focused on Producers Organisations should be promoted, including the adoption of production and commercialisation plans limiting the catches per vessel and per fishery, in order to reduce the overall fishing effort while increasing the profit of the single company.

Finally, the need to properly promote and disseminate information and to raise the awareness of all stakeholders, including consumers, was stressed by some contributors, such as Advisory Council and Fishermen's organisations.

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ANNEX III: WHO IS AFFECTED BY THE INITIATIVE AND HOW

This Annex contains two parts:

In part A it provides details and figures underpinning the **Section 2.4 The affected stakeholders** and in Part B it presents the immediate consequences of the proposed initiative for those affected stakeholders

Part A – the affected stakeholders

Regarding the importance of the different fisheries sectors in the Member States concerned, Table 1 presents the key figures.

Table 1 Income from the fisheries sector in Croatia, Italy and Slovenia in 2012, including four main sub-sectors (in million Euros and as a percentage of the total fisheries income for each Member State).

	Catching (primary sector)	Aquaculture	Processing	Ancillary activities	Fisheries total
Croatia	355.1 (**63.5%**)	123.0 (22%)	80.2 (14.4%)	8.2 (1.5%)	**558.9**
Italy (Adriatic)	382 (19.8%)	41.3 (2.1%)	1390.6 (**72.1%**)	114.5(5.9%)	**1928.4**
Slovenia	2.4 (2.9%)	4.7 (5.7%)	75.9 (**91.4%**)	0.6 (0.7%)	**83.0**

Source: SEDAF study[9]

The importance of each Member States in terms of catches of anchovy and sardine are presented in Table 2.

Table 2 Landings of anchovy and sardine by Croatia, Italy and Slovenia (2011-2014).

Anchovy landings (t)	**2011**	**2012**	**2013**	**2014**	**Average (2011-2014)**	**% of region**
Croatia	14 260	8 290	9 233	8 594	10 094	29.7
Italy	29 439	27 947	18 653	19 437	23 869	70.1
Slovenia	163	44	21	33	65	0.2
Total	**43 862**	**36 281**	**27 907**	**28 064**	**34 029**	**100**
Sardine landings (t)						
Croatia	45 444	43 770	53 418	55 783	49 604	76.3
Italy	8 202	15 124	18 740	19 106	15 293	23.5
Slovenia	306	18	28	78	108	0.2
Total	**53 952**	**58 912**	**72 186**	**74 967**	**65 004**	**100**

Source: 2011-2013 data from the SEDAF study[9]. 2014 data from DG-MARE-EUMOFA[32]

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In addition to the three Member States referred to above, Albanian and Montenegrin vessels also catch anchovy and sardine in the Adriatic, but their catches are minimal, with 505t of sardine and 378t anchovy for Albania in 2014 and 91t of sardine and 37t of anchovy for Montenegro in 2014[89].

Fishing sector

The majority of **Italian** catches of anchovy and sardine take place in the Adriatic: for 2012 to 2014, Adriatic fisheries accounted for 67% of Italian anchovy catches, and 81% of Italian sardine catches[90]. In **Italy**, there were 197 vessels fishing for pelagics in the Adriatic (in 2007) of which around 140 are pelagic trawlers and the rest are seiners[90].

In **Croatia**, anchovy and sardine constitute the most important species in terms of value, accounting for over 52% of total Croatian landings by value and 83% by weight[39]. Sardine is the more important of the two species in Croatian landings (see Table 2). "Srdelara" purse seiners are the main fishing gear intended for small pelagics, accounting for 99% of catches of sardine and anchovy in Croatia. In **Croatia** small pelagics are targeted using purse seiners of which there were 206 active vessels in 2014 in the Croatian fleet[91].

Sardine purse seine fishing represents the most significant part of the Croatian fisheries sector. The owners of trades, crafts and enterprises owning a vessel with a licence for "Srdelara" purse seine fishing are uniformly distributed along the entire Croatian coast and on the islands, and represent an important economic activity of the rural areas of the coastal region and the islands[91].

Smaller purse seiners (of up to 18 m) which are mostly multi-purpose fishing vessels, participate with only 10% in the total catches employing approximately 700 people. The category of vessels of 18-24 m makes up 31% of the total catches, employing approximately 550 people. In the category of vessels over 24 m, somewhat less than 60% of the total catches is realized and approximately 650 people are employed[91].

In **Slovenia**, sardine and anchovy together accounted for 73.6% of the total catch in 2009. The bulk of the marine catch is sold to known buyers (processing industry, commercial agents), with an increasing proportion of the catch also being sold at the wholesale fish market in Trieste. There are only 4 vessels active in the purse seine segment targeting small pelagics[92].

The ten main fleet segments operating in the Adriatic, by country, geographical sub-areas, fisheries and vessel length stratum are presented in Table 4. In Croatia and Slovenia, small pelagics are targeted using purse seiners, while in Italy both purse seiners and pelagic trawlers are used. The main fleets involved in the small pelagic fisheries, in terms of their impact on the stocks and the number of employees, are Italian pelagic trawlers (24-40m length, 18-24m and 12-18m) and Croatian purse seiners (24-40m and 18-24m).

89 2015 Stock Assessment forms for Anchovy and Sardine, prepared for the GFCM Scientific and Advisory Committee.

90 Annual report on Italy's efforts during 2014 to achieve an enduring balance between fishing capacity and fishing opportunities

91 Croatian Annual report on balance between fishing capacity and fishing opportunities for 2014

92 Slovenian Annual report on efforts to achieve a sustainable balance between fishing capacity and fishing opportunities for the year 2014.

Processing sector

In terms of other sectors that are dependent on fisheries, the processing sector is the most important one, accounting for over 60% of total value generated by all fisheries sectors[93] in the Adriatic (this refers to all fisheries in the Adriatic, not just small pelagics) and above 70% and 90% in Slovenia and Italy respectively9.

Specifically for small pelagics, the processing sector (canning and salting) generates a significant activity in Italy and Croatia, where it represented around EUR 150 million in sales in 2014. However, production of canned anchovy and sardine has strongly decreased in recent years, from 20 500 t in 2009 to 13 000 t in 2014[94]

Figures for the numbers of enterprises and employment within the sector in each of the Adriatic Member States are given in Table 3. Note that the enterprises may be processing catches (of all species) from other areas as well as the Adriatic, this is particularly the case for Italy which fishes in several sea basins. Therefore, the level of employment in the processing sector in the Adriatic is likely to be less than the values per Member State in Table 3. In terms of full time equivalents (FTE), the three Adriatic Member States have a total of over 6700 FTEs, with the vast majority being situated in Italy (77%) followed by Croatia (18%).

In both Italy and Slovenia, 100% of these enterprises meet the definition of SMEs in terms of number of employees[47] (i.e. <250 employees) whilst in Croatia this figure is 95% (Table 3).

Table 3 Numbers of enterprises and employment in the processing sector of Adriatic EU Member States in 2012.

	Number of enterprises by size (= no. employees)					
No. of employees:	**≤ 10**	**11-49**	**50-249**	**≥250**	**Total**	**Total number of FTEs**
Croatia	4	6	9	1	20	1231
Italy	372	144	21	0	537	5223
Slovenia	10	2	3	0	15	306
Total	**386**	**152**	**33**	**1**	**572**	**6760**

Source: STECF 2014 report on Economic Performance of the EU Fish Processing Industry[47].

Markets

Fishery and aquaculture products in the Adriatic are distributed by wholesale fish traders and only a minor part is sold directly by fishermen or farmers. There are at present 28 Adriatic fish markets[9]. Small pelagics in the Adriatic are partly sold to fish processors and fish-farming establishments (e.g. for Blue-fin tuna farming) and placed on the fresh fish market[9].

[93] The fisheries sectors include the following sub-sectors: fishing, fish processing, aquaculture and ancillary activities (e.g. boat building and repairs, service industry, feed supply etc.).

[94] DG-MARE-EUMOFA (2016) Contribution to the impact assessment of EU multi-annual plan for small pelagics in the Adriatic. European Market Observatory for Fisheries and Aquaculture Products.

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Italy is the key market in volume for both species, Croatia exports most of its production and Slovenia accounts only for negligible volume in landings and trade flows (below 1000 tonnes)[32].

For **anchovy**, the Italian trade balance is negative in volume (i.e. they import more than they export overall) because of processed anchovy (salted and/or prepared/preserved) for which Italian imports are relatively important (especially from Morocco, Spain and Tunisia and Croatia but also from Argentina, Albania, Peru…).

For **sardine**, the Italian trade balance is positive in volume (i.e. they export more overall than they import) because of important exports of fresh and frozen sardines, although balance is negative for canned sardine (imports mostly from Morocco). Fresh sardine exports go mainly to France and Tunisia, yet frozen sardine exports go to France and Spain. However, Italian imports of fresh and frozen sardine are mainly from Croatia[32]**Error! Bookmark not defined.**.

For **anchovy**, the Croatian trade balance is positive for all types of products (fresh, frozen, processed) but especially for salted anchovy. Croatian exports of anchovy go for a large variety of countries but main destinations are:

- Italy for fresh anchovy (77% of total);
- Spain (39%) and Morocco (34%) for frozen anchovy;
- Italy for processed anchovy (89%).

For **sardine**, the Croatian trade balance is also significantly positive for all types of preservation states, confirming Croatia as a net exporter of seafood products. Main partner countries for Croatian exports of sardines are:

- Italy for fresh sardine (92% of total);
- Spain for frozen sardine (60%);
- A large variety of destinations in southern and eastern Europe especially[32].

The trends in volumes of anchovy and sardine landed in Italy and of prices of first sale in recent year show an inverse correlation between the two: prices decrease when landings increase and prices increase when landings decrease (see Figure 1 and 2).

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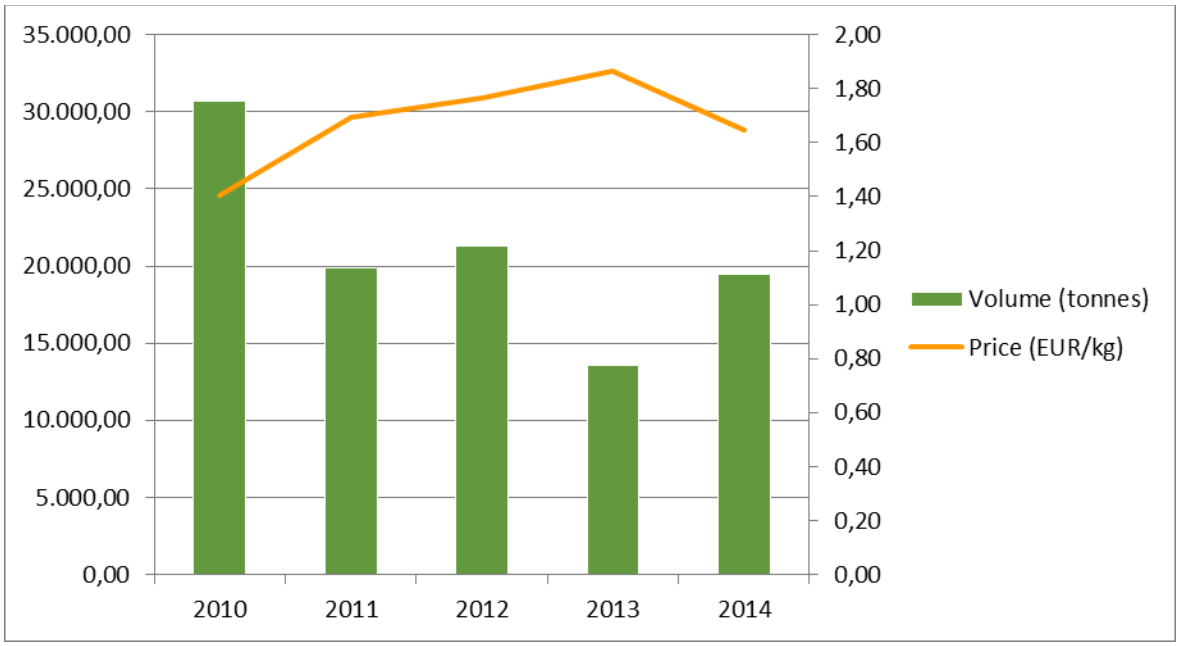
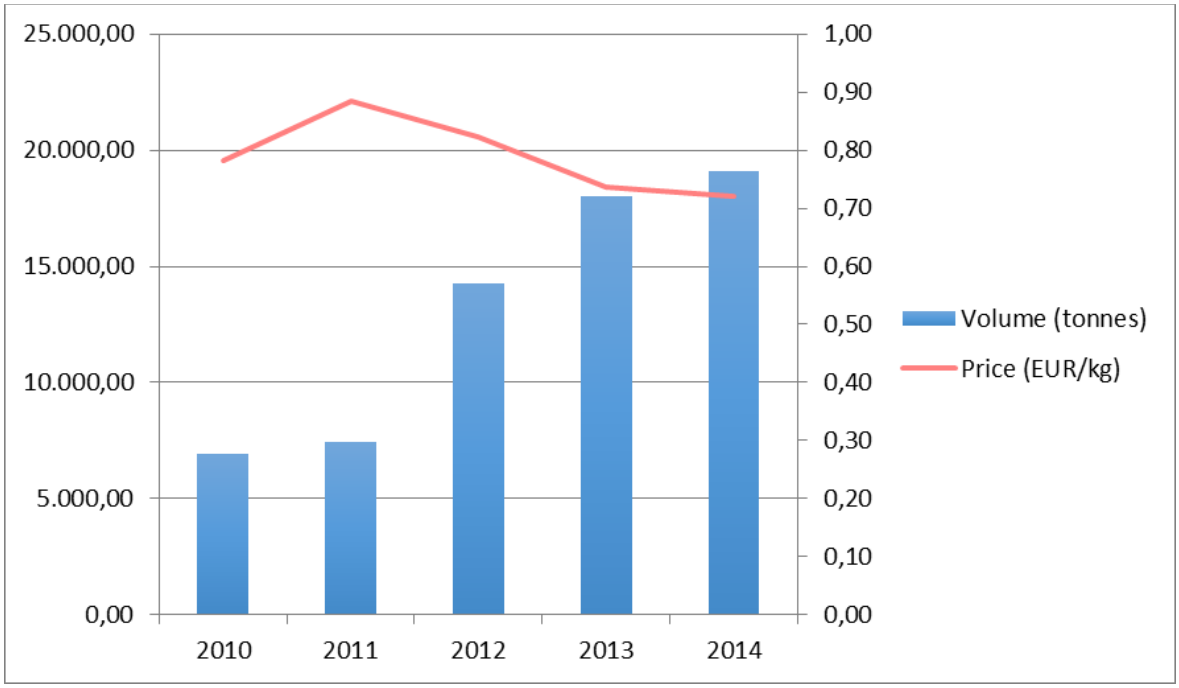
Figure 1 Volume and prices of anchovy landed in Italy (Adriatic)



Source: DG-MARE-EUMOFA[32]

Figure 2 Volume and prices of sardine landed in Italy (Adriatic)



Source: DG MARE-EUMOFA[32]

- If catches of Adriatic anchovy and sardine decline in the medium-term, this may have impacts on markets. In that respect, important factors to consider are the following: There is a lower elasticity of retail price (i.e. how much prices vary inversely to supply) compared to elasticity of first sale prices[32]. This means that only a part of the price increase at first sales is passed on to consumers.

- In a similar situation - the sardine fishery off the Portuguese and Spanish coasts (Atlantic) - management measures in the form of catch limits were introduced by those two Member States, resulting in a decline in landings. The price at first sale increased which compensated in large part the decrease in revenues due to reduced landings for fishermen[32]
- The processing sector and retailers currently import frozen products (but not fresh products) from outside the Adriatic, mainly from Morocco[32]. Small pelagics are managed in Moroccan waters under Moroccan legislation[95].
- There are other stocks of sardine and anchovy in the EU (outside the Adriatic) both in the Mediterranean and the Atlantic (and the Black Sea for anchovy), of which the main stocks are managed (e.g. through catch-limits, or minimum conservation reference sizes).

Likely effect of reduced catches in the medium term:

Prices at first sale are likely to increase as quantities of fish landed decrease. Fishermen may therefore expect similar revenues from this fishery for less time spent fishing.

Consumers - potential impacts in terms of price and availability: Experience with the small pelagic fishery in the Atlantic (Portugal/Spain) has shown that the retail price (for consumers) have been much smaller than for first-sale prices[96]

Retailers simply reduced their profit margins, presumably to keep a more stable price for consumers. Availability of fresh anchovy and sardine may reduce slightly for consumers, as these species do not tend to be imported in fresh form from other areas (imports from outside the Adriatic is only in frozen or canned form) because these species are rather fragile and not valuable enough to warrant the cost of importing them. Availability of canned anchovy and sardine is unlikely to decrease as imports can compensate this.

Processing sector: Adriatic Member States' processing sector use either fresh or frozen fish (the latter they tend to import from non-Adriatic countries such as Morocco). These processing companies already have trade connections with non-Adriatic suppliers of anchovy and sardine as they already import a substantial share of their raw material in frozen form. So availability of raw material should not be a limiting factor – the processing companies are likely to increase their imports from non-Adriatic countries.

Value of sardine and anchovy from the Adriatic may even increase, leading to increased competitiveness, once these stocks are sustainably fished, based on improved marketing and adding value to products e.g. by obtaining a sustainability label.

95 Arrêté du Ministre de l'Agriculture et de la pêche maritime n° 1332-14 du 16 avril 2014 relatif "à la pêcheries des petits pélagiques de l'Atlantique Sud".

96 EUMOFA (2016) EUMOFA Monthly Highlights no. 6/2016. Case study: sardine markets in the EU.

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Table 4 Main fleet segments involved in the small pelagics fishery in the Adriatic in terms of contribution to fishing mortality (F) of small pelagics. Number of vessels and people employed in each fleet segment are also included.

	Fleet name (and code)	*Relative contribution to F (%)*[4]	*No. vessels*	*No. employees*[2]	*Landings (tons) in 2013*[6]	*Landings (M Euro)* [5]
1	Italian GSA17 pelagic trawlers with vessel length 24-40 m (ITA17_TM_2440)	24.7	73 (include GSA18) [3]	264	17 454	17.4
2	Croatia GSA17 purse seine with vessel length 24-40 m (HRV17_PS_2440)	17.7	69[1]	505	40 754	17.9
3	Italian GSA18 pelagic trawlers with vessel length 24-40 m (ITA18_TM_VL_2440)	14.7	See under (1)	181	4 567	8.7
4	Croatian GSA17 purse seine with vessel length 18-24 m (HRV17_PS_1824)	10.7	53[1]	497	19 678	9.2
5	Italian GSA17 pelagic trawlers with vessel length 12-18 m (ITA17_TM_1218)	10.0	35[3]	124	5 262	6.0
6	Italian GSA17 pelagic trawlers with vessel length 18-24 m (ITA17_TM_1824)	8.0	40[3]	153	6 469	5.1
7	Italian GSA17 purse seine with vessel length 24-40 m (ITA17_PS_2440)	6.3	41 (includes GSA18)[3]	142	955	5.2
8	Italian GSA18 purse seine with vessel length 24-40 m (ITA18_PS_VL_2440)	5.0	See under (7)	82	1 498	N.A.
9	Croatian GSA17 purse seine with vessel length 12-18 m (HRV17_PS_1218)	2.7	41[1]	47	6 034	3.3
10	Slovenian GSA17 purse seine with vessel length 12-18 m (SVN17_PS_1218)	0.1	4[1]	16	69	0.2

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Sources: **Data on number of vessels and employment** ([1]) Based on what Croatia and Slovenia reported in their national fleet balance reports from May 2015[39,40]**Error! Bookmark not defined.** and ([3]) based on data submitted by Italy for the 2015 Annual Economic Report on the EU Fleet. **Data on relative contribution to Fishing mortality** (F)([4]) **and on employment (in 2013)** ([2]):Study on the evaluation of specific management scenarios for the preparation of multi-annual management plans in the Mediterranean and the Black Sea[66]. ***(5)*** based on SEDAF study9. Data on landings volumes [(6)] based on DCF data, compiled in the Management scenarios study[66]

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Part B – how will stakeholders be affected?

Once the Regulation setting out the MAP for small pelagic fisheries in the Adriatic is adopted, the immediate consequences would be as follows:

1) For Member States:

– The three Member States concerned would need to gather in regional formations in order to devise discard plans and *ad hoc* technical measures to be adopted by the Commission via delegated acts (regionalisation).

– These Member States would be invited by the Commission to repeal or amend their respective national management plans as these will be superseded by the provisions in the EU multi-annual plan.

– Member States would be required to adopt Total Allowable Catches (TACs) through a Council Decision every year in order to reach FMSY by 2020.

– The three Member States concerned would need to agree on an allocation key for their catches under a TAC system. Each Member States would need to establish a mechanism to allocate its national quota within the national fleet.

– Member States would need to monitor the quota uptake by their vessels to ensure they remain within their national quota.

– Member States would also be required to use their competences on surveillance and control (Regulation (EC) No 1224/2009[60] and associated legislation) in order to enforce the landing obligation and any new measures adopted within the regionalisation process.

– Finally, these Member States would need to comply with the monitoring requirements specified in the above-mentioned Control Regulation (monthly reporting of landings) and in the Data Collection Framework[129] as well as new monitoring requirement required by the multi-annual plans .

– This is not expected to imply additional costs, but should adaptation to new control and monitoring needs imply any additional costs, the EMFF[2] has a number of possibilities to alleviate or compensate for such costs.

2) For fishing operators:

– The fishing industry is the main source of raw data to monitor the performance of multi-annual plans. By providing accurate catch and effort data and admitting scientific observers on board their vessels they play a decisive role in the monitoring process.

– Fishermen would also be required to land all their catches in designated ports, when they catch above a certain threshold of anchovy and sardine.

– Fishermen have the skills and the means to change their behaviour and adapt to new measures and cope with them in the most efficient way and they should make all efforts to facilitate achieving the objectives of the CFP with minimum economic burden. The EMFF can also contribute to this end by giving financial support to a number initiatives concerning market organisation, advisory services, partnerships between scientists and fishermen,

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diversification of activities, permanent and temporary cessation of fishing activities, purchase of selective gear, etc.

– Fishermen can also contribute with their skills and knowledge to participate in the conception of measures under regionalisation, either directly or within their participation in Advisory Councils.

In terms of the exact operators that would be affected by this proposal, the Table below presents the ten main fleet segments that currently target anchovy and sardine in the Adriatic.

3) For the Commission:

- The Commission would need to adopt annually a proposal for fishing opportunities (TAC and quotas) for the following year.

- The Commission would need to monitor the quota uptake by Member States to ensure they remain within their national quotas.

-The Commission, with the help of its scientific advisory committee for fisheries (STECF), would need to monitor the state of the anchovy and sardine stocks and the socio-economic impacts on the fisheries sector.

-The Commission would also prepare a proposal for the GFCM Annual Session to introduce a catch-limit mechanism to further align the management approaches under international plan with the EU plan (i.e. using output rather than input controls).

-The Commission would need to report to the Parliament and Council on the implementation and impacts of the EU plan 5 years after its entry into force and then every 5 years.

ANNEX IV:ANALYTICAL MODELS USED IN PREPARING THE IMPACT ASSESSMENT

1 SUMMARY

The "Study on the evaluation of specific management scenarios for the preparation of multiannual management plans in the Mediterranean and the Black Sea"[80] was commissioned by the Commission in order to assess specific management scenarios for multi-annual plans in accordance with the CFP objectives. The study was carried out by a consortium led by COISPA, including also the following organizations: CIBM, CNR – ISMAR, IBER-BAS, IEO, IOF, NISEA.

The study models the possible socio-economic and environmental consequences, until 2021, of different possible management scenarios. This includes the status quo option, in which anchovy and sardine are managed under the current framework (Option 1), as well as two options under which the stocks are managed via an EU multi-annual plan, in order to reach sustainable fishing levels by 2018 or by 2020 (Option 2).

Each of the sub-options under Option 2 has been further split into two to show the range of possible impacts that would arise depending on how the fishing reductions are spread throughout the fleet segments involved: either proportionally to a fleet's impact[97] on the fish stocks, or equally for all fleet segments. Table 1 presents these four scenarios in more detail.

[97] "Fleet segments having a greater impact" means those segments that contribute the most to the total amount of landings.

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Table 1: Scenarios considered to reach the F_{MSY} targets.

Scenarios	Timing to reach F_{MSY}?	Distribution of reduction within fleet	Full description of sub-option
2a	2018	Proportional to impact of fleet	Target is the upper end of the F_{MSY} range of anchovy (and we apply this range for sardine) in 2018. To achieve this, a reduction would be applied to both activity and capacity, from 2015 to 2017, and then to activity only in 2018*. The application of the reduction will be higher for the fleets with greater impacts on the stocks.
2b	2018	Applied equally	Same strategy as for sub-option 2a, except for the fact that the reduction is applied equally across all fleet segments.
2c	2020	Proportional to impact of fleet	Target is the upper end of the F_{MSY} range of anchovy (and we apply this range for sardine) in 2020. To achieve this, a reduction would be applied to activity from 2015 to 2020 and to capacity from 2015 until 2017*. The activity reduction would be higher for the fleets with greater impacts on the stocks.
2d	2020	Applied equally	Same strategy as for sub-option 2c, except for the fact that the reduction is applied equally across all fleet segments.

*on the basis that reducing capacity, through scrapping of vessels (removing them from the fleet), will no longer be eligible for EU subsidies under the EMFF[2] from 2018 onwards and hence is very unlikely to be pursued as a management option thereafter given the cost scrapping.

The modelling was carried out using BEMTOOL (see below) a bio-economic modelling tool which was specifically developed for modelling in the context of fisheries management. BEMTOOL has also been used by the General Fisheries Commission for the Mediterranean (GFCM) for their Management Strategy Evaluation for sardine and anchovy in the Adriatic[98].

1.1 BIOECONOMIC MODELLING

BEMTOOL

The tool used to carry out the projections of the different management scenarios is BEMTOOL bioeconomic model.

BEMTOOL (Accadia et al., 2013; Facchini et al., 2014; Bitetto et al., 2015; Rossetto et al., 2015) is a bioeconomic platform incorporating 6 operational modules (Biological, Pressure, Economic, Behavioural, Policy/Harvest Rules and Multi-Criteria Decision Analysis – MCDA) characterized by components communicating by means of relationships and equations.

[98] http://www.fao.org/gfcm/reports/technical-meetings/detail/en/c/396403/

BEMTOOL v.1 (June, 2013) was developed and released for the first time as an output of the BEMTOOL project, Specific Project N.4 (SI2.613770) of MAREA (Mediterranean hAlieutic Resources Evaluation and Advice) Framework contract (MARE/2009/05_Lot1).
BEMTOOL v.2 (December, 2014) the model was upgraded in the LANDMED project, Specific Project N.11 (SI2.678902) of MAREA Framework Contract with new functions regarding the uncertainty modelling and the relationship between fishing mortality by fleet, stock and effort. Discard and selectivity modelling were further improved. Some technical aspects to improve the user accessibility were also implemented.
BEMTOOL v.2.0.6 (current release) The relevant upgrades implemented in BEMTOOL v.2.0.6 in the context of SEDAF project, Specific Project N.10 (SI2.666117) of MAREA Framework Contract regarded the economic module with a more refined association of a price to the discard (options: constant price or price depending on the discard volume through an elasticity coefficient), so that the revenues take into account both the income related to the sale of landing of the target species and the income from the sale of the discard of the target species, if any.

In ALADYM (Lembo et al., 2009) core a new facility was introduced in order to parameterize the biological simulation with entry by F (fishing mortality) in case the F by fleet segment is not available.
Also a revision of all the tables and graphs produced by BEMTOOL and ALADYM has been done in order to avoid redundancy in the variables and graphs saved in BEMTOOL and ALADYM folders.

BEMTOOL platform is an application in R language with a GUI to ease the model inputs. BEMTOOL app is tested with 2.14.2, R 3.0.1, R 3.0.2, R 3.0.3 versions. The model is open source.

The **requirements to run BEMTOOL application** are listed below:
1. The BEMTOOL application works under Windows XP SP3, Windows Vista, Windows 7, both Bit and 64Bit versions. The correct functioning is not guarantee on Linux-like Operative systems.
2. R-CRAN software version > 2.14.2 must be installed on your computer. R installer for Windows and other OS can be found at http://cran.r-project.org.
3. In the R-CRAN installation the following R packages must be installed: FLXSA library and linked FLAdvice, Flash, FLAssess, FLBRP, FLCore packages; also akima, ggplot2, ggplotFL, plyr, proto and reshape are required to be installed; also RGtk2 package is needed to run R graphical interface.
4. RGtk2 package requires the installation of the GTK+ Toolkit. It can be found at http://ftp.gnome.org/pub/GNOME/binaries/win32/gtk+/2.22/gtk+-bundle_2.22.1-20101227_win32.zip.

Characteristics of the **BEMTOOL operational modules** are summarised below:

- Biological, which simulates the evolution of the biomass and the demographic structure for each stock affected by the fishing activity of single or multiple fleet segments or metier.
- Impact, which simulates the evolution of fishing mortality and the related outputs in terms of total production (landings and discards) and production by fleet segment or metier.
- Economic, which simulates the evolution of the economic variables of the fishery.

- Behavioural, which simulates the dynamic transformation of the profit obtained from fishing into the fishing effort through assumptions on fishermen behaviour (investments, disinvestments). This includes fleet dynamics like entity-exit decisions of fishing vessels and changes due to technological progress.
- Policy, which core factors are the Harvest rules that simulate the implementation of one management measure or a set of management measures, as well as the application of taxes and subsidies, all of which directly or indirectly affecting the economic and biological processes.
- Multi Criteria Decision Analysis (MCDA) for evaluating the performances of different fishery management scenarios from the biological and socioeconomic points of view, using a selection of indicators to score management measures against objectives.

The **process of the bio-economic modelling** can be summarized in the following steps:

1. **Case study configuration**, including the name of the case study, species, fleet segments, simulation and forecast period;
2. Parameterization of the **biological simulation** entering biological parameters by species in ALADYM (Lembo et al., 2009) or, optionally, selecting the assessment tool (VIT, XSA, SURBA or Report) and importing the results;
3. Input of **effort and landing data** time series;
4. **Diagnosis** to visualize the state of the stocks, the impact, the state of the fleet and the economic indicators in the past/present time;
5. Parameterization of the **economic simulation;**
6. Selection of the **management** (**harvest) rules** for the planning of the forecast scenario or, alternatively, the selection of the option for the **MEY calculation**;
7. Implementation of the **forecast** to predict the state of the stocks, the impact/pressure and the state of the fleet and the economic indicators in future after the implementation of management trajectories;
8. Parameterization of the **Multi Criteria Decision Analysis (MCDA)** entering the utility parameters and weights for the indicators and estimation of the results.

The word *simulation* indicates the past and current years, while the word *forecast* the future years.

BEMTOOL follows a multi-fleet approach simulating the effects of a number of management trajectories on stocks and fisheries on a fine time scale (month). The model accounts for length/age-specific selection effects, discards, economic and social performances, effects of compliance with landing obligation and reference points. The implementation of decision modelling (MCDA and Multi-attribute utility theory) allows that stakeholder perception is encompassed to weight model-based indicators and rank different management strategies. A wide set of biological, pressure and economic indicators are the default output.

The uncertainty (process error) implemented in the model following Monte Carlo paradigm allows a risk evaluation in terms of biological sustainability of the different management strategies. Uncertainty is propagated to all the indicators estimated by the model, thus accounting of the economic outputs.

BEMTOOL is used to assess the consequences of different scenarios from the biological, impact and economic point of view.

METHOD FOR CALCULATING THE REDUCTION OF AN OVERALL (ALL THE ASSESSED SPECIES COMBINED) FISHING MORTALITY TOWARDS A COMBINED REFERENCE POINT FOR A GIVEN FLEET SEGMENT

The reduction of an overall combined fishing mortality (all the assessed species combined) towards a combined reference point, is estimated weighing the fleet segments and the species caught by each of them as follows:

$$F_{2013,f,combined} = \frac{\sum_{s=1}^{4}(ValueLand_{2013,s} * F_{2013,f,s})}{\sum_{s=1}^{4} ValueLand_{2013,s}}$$

$$F_{2013,combined} = \sum_{f=1}^{10} F_{2013,f,combined}$$

$$F_{MSY,combined} = \frac{\sum_{s=1}^{4}(ValueLand_{2013,s} * F_{MSY,s})}{\sum_{s=1}^{4} ValueLand_{2013,s}}$$

where:

$F_{2013,f,combined}$ is the fishing mortality combined (taking into account all the target species together) for the fleet segment *f* in 2013;

$F_{2013,combined}$ is the overall fishing mortality combined (taking into account all the target species together and the fleet segments) in 2013;

$F_{MSY,combined}$ is a combination of the reference points F_{MSY} of all the species;

$ValueLand_{2013, s}$ is the overall landing value of species s.

APPROACH BASED ON F_{MSY} RANGES

The model is based on an approach using a range of target fishing mortalities (F_{MSY} range). The upper and lower ends of a range are derived to deliver no more than 5% reduction in long term yield compared with the MSY point value.

At first glance the upper and lower boundaries of the FMSY ranges will be used empirically, i.e based on a linear relationship derived for stocks with different life history traits in the ICES area (ICES[99], 2015).

[99] ICES is the International Council for Exploration of the Seas, is one of the leading authorities in terms of fisheries management advice and is in charge of providing scientific advice to the European Commission for fisheries management in EU waters with the exception of the Mediterranean and Black Sea.

The objective is to get provisional estimates of FMSY ranges for the stocks harvested, thus accounting for mixed fishery considerations. Fupper could be used associated with a Management Strategy Evaluation (MSE) to test if the upper levels of the ranges are precautionary (i.e. the risk of the SSB falling below Blim is less than 5%).

F_{MSY} ranges were computed based on a meta-analysis carried out using the estimates provided by ICES for the Baltic and North Sea (STECF 2015a).

Upper and Lower limit of the F_{MSY} ranges were computed using two linear models:

$$\text{Flow (the lower end of the Fmsy range)} = 0.00296635 + 0.66021447 * F_{0.1}$$

$$\text{Fupp (the upper end of the Fmsy range)} = 0.007801555 + 1.349401721 * F_{0.1}$$

where $F_{0.1}$ is used as a proxy of F_{MSY}.

Afterwards, to test if exploiting a stock at the upper limit of the provisional F_{MSY} ranges obtained through the predictive linear models a Management Strategy Evaluation (MSE) was developed.

The test included testing the robustness of the upper limit to mis-specifications of natural mortality and low recruitment levels, with regards to keep the stock below 5% of biological risk.

Here we intended biorisk as the risk of SSB being below the minimum historical Spawning Stock Biomass (Blim=Bloss).

The FLR code distributed at the meeting of the Commission's Scientific Technical and Economic Committee for Fisheries (STECF meeting 15-11 (in which small pelagics stocks in the Adriatic were assessed)[114] was used.

ASSUMPTIONS

The following assumptions and information about the stocks should be taken into consideration when interpreting the outcomes of this study:

The methods assume that present bioeconomic conditions (recruitment, stock abundance, cost structure, fish and fuel prices) will not change strongly in the period 2015-2020, except as a consequence of the management measures considered under the various policy options.

The model, including in particular the F_{MSY} ranges, is calculated based on current fishery selectivity. Therefore, if selectivity were improved e.g. through changes in gear design, fishing area, or season, then possible yields in terms of small pelagics caught would be higher than in the simulations. In other words, sustainable levels of catches of small pelagics could be higher than in forecasts if selectivity is improved in future.

Full compliance with the applied management measures is also assumed.

In general, as the stock assessment were not updated to 2014 (the most recent stock assessments at the time of this study was the stock assessment carried out by the STECF in 2015, based on 2013 data), the study assumed that the state of the stocks in 2014 was equivalent to that in 2013.

In the modelling, management measures were applied as of 2015, and under all scenarios, possible measures planned at national level (e.g. under national management plans) for the small pelagics in the Adriatic were taken into account.

In the absence of specific information on how reductions in fishing effort translate into reductions in fishing mortality for these stocks, the models assumes that the reduction of fishing mortality is linearly translated into reduction of fishing effort, under the assumption of nearly constant or randomly varying catchability i.e. reducing fishing effort by 10% would equate to fishing mortality declining by 10%.

To translate reduction of fishing mortality required to reach Fmsy (65% reduction) into effort reduction, the following assumptions were made:

On the basis of the latest STECF scientific assessment, the level of fishing mortality for anchovy, which drives this fishery, should be reduced by 65% to reach sustainable fishing levels[114]. Under the scenarios with an EU multi-annual plan, the tools used to reduce fishing mortality and hence catch levels are reductions in effort and more specifically, reductions in fishing capacity (typically achieved by scrapping of vessels) and fishing activity (i.e. time spent fishing). This choice is based on the fact that the Member States involved in this fishery currently used these methods to manage their fisheries and that they have also carried out reductions in their fishing for small pelagics by using these instruments (see section 1.3 of the report).

Any combination of activity and capacity reductions, which would amount to a 65% reduction in overall fishing effort (which is assumed to translate linearly into a 65% reduction in fishing mortality), could be considered. When carrying out the modelling to produced forecasts of the various impacts under the EU multi-annual plan scenarios, it has been assumed that the required 65% reduction in fishing mortality would be achieved through a reduction of activity (i.e. fishing days) by 58.5% and of capacity (i.e. number of vessels) by 6.5% (i.e. 90% of the required reduction is achieved through activity reductions and 10% through capacity reductions). This 90%-10% split is in line with what Member States plans to reduce fishing mortality on these stocks (see section 1.3 and Annex IX) as well as feedback from the sector obtained by the consultants during the study. This split was then agreed during the project Workshop held in Bari on September 21-25, 2015 (see next Section).

The models assumed that after 2017, no reductions in fishing capacity would take place as this typically takes places through "scrapping" of vessels, (i.e. removing them from the fishing fleet). This is based on the fact that scrapping will no longer be eligible for EU subsidies under the EMFF[2] from 2018 onwards and hence is very unlikely to be pursued thereafter as a management option given the high cost scrapping.

In addition to the assumptions presented above, there are further specific assumptions presented in the following sections, in the context of each topic and data set.

CONSULTATION ON THE MODEL AND ITS ASSUMPTIONS

A Workshop was organized by the consultants in charge of the modelling above, with scientific experts from fisheries institutes in several EU Member States[100], as well as the Commission and the Mediterranean Advisory Council (MEDAC) in Bari, Italy on 21-25 September 2015 to agree on the above approach including the scientific reference points to be used (i.e. the Fmsy targets) and the assumptions and management scenarios to be evaluated. In this meeting, for example, it was agreed that the reference points of anchovy should be used for sardine (F_{MSY} = 0.36).

[100] Italy, Spain, France, Bulgaria

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INPUT DATA FOR THE MODELLING

A.1 INPUT OF THE BIOLOGICAL MODULE OF SMALL PELAGIC FISHERIES IN GSA17 AND GSA18

The data used for the parameterization of the biological and the pressure modules come from the stock assessment revised during the STECF EWG 15-11 held in September 2015 provided by European Commission's Joint research Centre (JRC) for the purposes of this project.

The methodology used is the State-Space Model (SAM, Nielsen A. and Sibert J. R., 2007) for both stocks, tuned with fishery independent information from acoustic surveys. The assessment covers the GSAs 17 and 18, combining data from Italy, Croatia and Slovenia.

For anchovy, split year assumption has been used, therefore assuming the birth date at the first of June (Cingolani *et al.,* 1996 and, respect to the assessment presented suring the GFCM small pelagic stock assessment working group (held in November 2014), the SSB has been re-estimated, after correcting the settings related to maturity (M and F before spawning and the maturity at age 0).

For sardine the calendar year has been used, assuming the birth day at the first of January and, respect to the assessment presented during the GFCM small pelagic stock assessment working group (held in November 2014), the SSB has been calculated at the beginning of the year (spawning season), correcting the settings related to maturity (M and F before spawning set equal to 0).

In the tables below, the fleet segment codes are used. Their definition can be found in Table 4 in Annex III.

GROWTH PARAMETERS OF SMALL PELAGICS IN GSA17 AND GSA18

The growth parameters (Sinovcic, 2000) and the length-weight relationship coefficients for the two species are listed in the Table A1 below The growth functions are for sex combined.

The life span has been set equal to 5 years (from age 0 to age 4) for anchovy, and to 7 years (from age 0 to 6) for sardine.

Table A.1 - Growth parameters for anchovy and sardine in GSA 17 and GSA18.

Parameter	Sex combined anchovy	Sex combined sardine
Linf (cm)	19.4	20.5
K	0.57	0.46
t_0	-0.5	-0.5
a (mm/g)	4.00E-06	0.000005
b (mm/g)	3	3.03

RECRUITMENT OF SMALL PELAGICS IN GSA17 AND GSA18

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Recruitment vectors (Table A2) have been used for simulations, whilst a constant value for projections. The recruitment used in BEMTOOL is the one estimated during the STECF EWG 15-11.

For sardine the recruitment figures from the STECF EWG 15-11 stock assessment[114] were related to age 1, being age 0 poorly represented in commercial catches. In order to have an estimate of the recruitment at age 0.5, the recruitment related to age 1 from SAM has been projected backward for a half year, assuming a total mortality of 3 (consistent with the value of natural mortality at age 0.5) and assuming that a small part of the fishing mortality impact also individuals at age 0, being present in the catches though in small part. Input recruitment is reported in the following table.

Table A.2 - Recruitment by year used in simulation phase for anchovy and sardine in the Adriatic (GSA 17 and GSA18).

Year	R (thousands)	R (thousands)
2008	86 012 225	27 646 231
2009	83 136 966	31 295 975
2010	76 286 001	43 925 254
2011	75 000 100	35 819 393
2012	60 976 555	45 127 391
2013	57 771 146	56 911 047
2014*	57 771 146	56 911 047

*The value of 2013 has been used for projections.

The number of recruits entering in the population has been split by month in order to take into account the seasonal recruitment, according to the characteristics of anchovy, which recruits more from May to September, and sardine that recruits more from December to April (Table A.3). The age of recruitment has been set at 1 month for anchovy and at 6 months for sardine, coherently with the age class used in the assessment.

The proportion of recruits entering each year by month in the population for both species in GSA 17 and GSA18 is reported in the table A.3

Table A.3 Proportion of recruits entering each year in the population for sardine in GSA 17 and 18.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anchovy	0	0.025	0.05	0.1	0.15	0.15	0.15	0.15	0.15	0.05	0.025	0
Sardine	0.2	0.2	0.2	0.1	0.05	0.025	0	0	0.025	0.05	0.05	0.1

MATURITY AND SEX RATIO OF SMALL PELAGICS IN GSA17 AND GSA18

The size at first maturity used for anchovy is 8.14 cm total length (TL) with a maturity range of 6 mm TL (Rampa *et al.*, 2005); the size at first maturity used for sardine is 7.9 cm TL with a maturity range of 6 mm TL (Sinovcic *et al.*, 2008).

NATURAL MORTALITY OF SMALL PELAGICS IN GSA 17 AND GSA18

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According to the assessment, the natural mortality at age was estimated using the Gislason's methodology (Gislason *et al.,* 2010) with no distinctions between sexes. The vectors by age of the two species are reported in the Table A4.

Table A.4 Natural mortality for anchovy and sardine in GSA 17 and GSA18.

Age	M anchovy	M sardine
0	2.36	2.51
1	1.10	1.1
2	0.81	0.76
3	0.69	0.62
4+	0.64	0.56
5	-	0.52
6+		0.5

A.2 INPUT OF THE PRESSURE MODULE OF SMALL PELAGIC FISHERIES IN GSA 17 AND GSA18

FISHING MORTALITY OF SMALL PELAGICS IN GSA 17 AND GSA18

E. encrasicolus

The F-mode of ALADYM (Lembo et al., 2009) model has been used in BEMTOOL for both stocks. The overall fishing mortality by year and age from SAM model (STECF EWG 15-11[114]) for anchovy and sardine have been split among the fleet segments according to the respective proportions in weight in the landings, thus assuming that all the fleets have the same exploitation pattern. For 2014 the same fishing mortality of 2013 has been assumed. The age range used for anchovy in the output calculation of average F was 1-2, while for sardine was 1-3, with no distinction between sexes, in agreement with the assessments. Fishing mortality by age and year is reported in the Table A.5 for anchovy and in Table A.6 for sardine

Table A.5 Overall fishing mortality for anchovy (SAM model).

age	2008	2009	2010	2011	2012	2013
0	0.02	0.01	0.02	0.03	0.03	0.02
1	0.28	0.41	0.55	0.49	0.50	0.37
2	1.29	1.77	1.89	2.34	1.59	1.71
3	2.12	2.11	2.45	2.98	1.82	2.13
4	2.12	2.11	2.45	2.98	1.82	2.13

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Table A.6 Overall fishing mortality for sardine (SAM model).

Age	2008	2009	2010	2011	2012	2013
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.04	0.04	0.05	0.09	0.11	0.13
3	0.27	0.30	0.37	0.63	0.82	0.77
4	0.63	1.27	1.22	1.45	1.68	0.70
5	0.90	0.93	0.95	0.96	0.99	0.97
6+	4.27	4.27	4.30	4.32	4.29	4.28

EFFORT OF SMALL PELAGIC FISHERIES IN GSA 17 AND GSA18

The monthly effort variables used to simulate the past and current years by fleet segment are listed in Table A.7. For 2014 the same effort as 2013 has been assumed.

Table A.7 Effort for the selected fleet segment in GSA 17 and 18.

Effort Variable	ITA17_TM_VL_1218						ITA17_TM_VL_1824					
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
average monthly GT	23	24	22	29	23	28	67	81	73	71	72	81
average monthly KW	147	152	152	171	171	187	318	321	331	343	358	411
number of vessels	32	33	38	25	47	35	25	25	25	22	21	25
annual fishing days	69	184	154	123	111	123	116	156	167	138	170	139
Effort Variable	**ITA17_TM_VL_2440**						**ITA17_PS_VL_2440**					
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
average monthly GT	117	117	117	115	109	109	105	114	120	114	102	101
average monthly KW	478	475	480	467	438	439	373	379	395	377	371	380
number of vessels	45	44	41	41	54	46	21	16	10	15	15	14
annual fishing days	158	169	167	142	150	167	105	111	150	93	108	77
Effort Variable	**HRV_PS_VL1218**						**HRV_PS_VL1824**					
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
average monthly GT	6	6	6	6	6	7	75	75	73	75	77	79
average monthly KW	51	51	51	51	83	89	319	319	317	283	332	340
number of vessels	43	43	43	42	45	45	59	59	61	61	57	54
annual fishing days	76	76	76	88	76	76	110	110	120	98	98	98
Effort Variable	**HRV_PS_VL2440**						**SVN_PS_VL1218**					
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
average monthly GT	155	155	151	133	136	149	10	10	12	12	12	10
average monthly KW	557	557	542	383	489	536	105	96	118	118	118	105
number of vessels	67	67	72	69	68	67	4	5	4	4	4	4
annual fishing days	110	110	132	110	110	110	96	108	120	108	72	84
Effort Variable	**ITA18_TM_VL_2440**						**ITA18_PS_VL_2440**					
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**

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average monthly GT	84	84	84	82	82	83	102	102	102	109	117	117
average monthly KW	432	432	432	416	430	432	455	455	455	476	494	494
number of vessels	34	34	34	31	27	27	5	5	5	4	5	5
annual fishing days	142	137	145	152	133	112	129	123	109	138	115	132

LANDINGS AND DISCARDS OF SMALL PELAGIC FISHERIES IN GSA 17 AND 18

Landing data 2008-2013 for Italy and Slovenia were obtained from the National Programs of the EU Data Collection Framework and are in line with data collected in the WP2 - Collation and review on the main socio-economic information on the main fisheries of the SEDAF project9. Croatian socio- economic data were obtained from the data collected and reviewed by the SEDAF project (SEDAF-D6 Report economic and structural overview).

E. encrasicolus

The landing data for anchovy by fleet segment used to parameterize the model are listed in the table A.8. For 2014 the same landing as 2013 has been assumed.

Table A.8 Landing for anchovy by fleet segment in the Northern Adriatic (GSA 17) and Southern Adriatic (GSA 18) (tons).

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	1753	8336	9508	4240	4498	2196
ITA17_TM_VL_1824	5794	6317	7498	4334	2880	1813
ITA17_TM_VL_2440	13373	11323	10168	7976	10368	7737
ITA17_PS_VL_2440	4655	3515	2705	2564	3214	789
HRV17_PS_VL_1218	1083	1145	1139	1061	564	883
HRV17_PS_VL_1824	3711	3711	3285	4722	2866	3105
HRV17_PS_VL_2440	6224	6224	6170	7921	4652	5134
SVN17_PS_VL_1218	100	99	51	76	43	21
ITA18_TM_VL_2440	6870	6958	6736	7600	5180	3714
ITA18_PS_VL_2440	2623	1768	1845	1881	1438	1388
Total	46188	49396	49104	42375	35703	26781

According to DCF data and the recent results of MAREA LANDMED project[101], the discard has been considered as negligible both for pelagic trawlers and for purse seine.

S. pilchardus

The landing data for sardine by fleet segment used to parameterize the model are listed in the Table A.9. For 2014 the same landing as 2013 has been assumed.

[101] http://mareaproject.net/

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Table A9 Landing for sardine by fleet segment in GSA 17 and 18 (tons).

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	189	137	312	393	1515	2151
ITA17_TM_VL_1824	557	1027	2248	2518	5138	4909
ITA17_TM_VL_2440	3393	2549	3786	3733	7170	8261
ITA17_PS_VL_2440	137	109	119	69	156	32
HRV_PS_VL_1218	2240	3042	2821	4839	3931	4780
HRV_PS_VL_1824	10676	10676	9449	13584	13069	15233
HRV_PS_VL_2440	18685	18685	18522	23779	24226	32531
SVN_PS_VL_1218	67	87	92	60	16	26
ITA18_TM_VL_2440	1395	638	1428	701	782	722
ITA18_PS_VL_2440	70	69	59	58	32	47
Total	37409	37021	38835	49734	56035	68693

According to DCF data and the recent results of MAREA LANDMED project, the discard has been considered as negligible both for pelagic trawlers and for purse seine.

Total landing

The total landing data by fleet segment used to parameterize the model are listed in the table A.10. For 2014 the same landing as 2013 has been assumed.

Table A.10 Total landing by fleet segment in GSA 17 and 18 (tons).

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	2519	8817	10746	5675	7625	5262
ITA17_TM_VL_1824	6794	7719	10470	7262	9341	6469
ITA17_TM_VL_2440	17516	14371	14713	12392	18939	17454
ITA17_PS_VL_2440	4973	3710	2840	2695	3583	955
HRV_PS_VL_1218	6240	6240	6240	6240	5030	6034
HRV_PS_VL_1824	15421	15421	13649	19621	17261	19678
HRV_PS_VL_2440	26086	26086	25857	33196	30418	40754
SVN_PS_VL_1218	198	235	161	185	107	69
ITA18_TM_VL_2440	8405	7721	8464	8888	6230	4567
ITA18_PS_VL_2440	2937	1971	2006	2015	1615	1498
Total	91089	92292	95146	98170	100149	102739

A.3 INPUT OF THE ECONOMIC MODULE SMALL PELAGIC FISHERIES IN GSA 17 AND 18

Data 2008-2013 for the estimation of the socio-economic parameters for Italy and Slovenia were obtained from the National Programs of the EU Data Collection Framework and are in line with data collected in the WP2 - Collation and review on the main socio-economic information on the main fisheries. Taking into account that official Croatian socio- economic data are under revision for the purpose of this study scientist presumed data needed for this exercise. Croatian socio-economic data were obtained from the data collected and reviewed by the SEDAF project9. For all fleet segments, 2014 data were assumed equal to 2013.

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The economic data of the selected fleet segments used to parameterize the economic function in the projections have been reported in the following paragraphs.

REVENUES OF SMALL PELAGIC FISHERY IN GSA17 AND GSA18

The revenues by fleet segment for anchovy, sardine and the total revenues are reported in the tables A.11, A.12, A.13, According to the revenues and the landings by fleet segment the prices in the projections have been modelled.

E. encrasicolus

Table A.11 Revenues (€) of anchovy by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	1673609	7573644	7444215	3733108	4405337	3454688
ITA17_TM_VL_1824	5351637	5632733	7118840	3896844	2557411	2125463
ITA17_TM_VL_2440	16341141	14090618	12507196	10086650	14897657	11158593
ITA17_PS_VL_2440	10456217	7506328	4428387	4490999	5495818	3823897
HRV_PS_VL1218	566716	566716	566716	566716	373517	968445
HRV_PS_VL1824	2234425	2234425	2172358	3103368	2101167	2745990
HRV_PS_VL2440	4094434	4094434	4042606	5182828	3386541	4122380
SVN_PS_VL1218	362604	177272	138314	176687	114224	70688
ITA18_TM_VL_2440	13073484	14555042	10697086	12904588	9432117	8138954
ITA18_PS_VL_2440	4193597	3027368	2917341	3623140	2816154	2349163
Total	**58347864**	**59458580**	**52033059**	**47764928**	**45579943**	**38958261**

S. pilchardus

Table A.12 Revenues (€) of sardine by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	184366	87462	225221	302917	1232099	1042262
ITA17_TM_VL_1824	403006	762618	1253694	1405249	3021998	2563310
ITA17_TM_VL_2440	2820477	2450474	3236267	3123202	4961159	4826675
ITA17_PS_VL_2440	125709	109718	91577	45585	126849	138378
HRV_PS_VL1218	1862814	1862814	1862814	1862814	1360430	1956088
HRV_PS_VL1824	4859220	4859220	4724241	6748916	4931034	6074783
HRV_PS_VL2440	6662500	6662500	6578165	8433545	8481631	12713813
SVN_PS_VL1218	245066	140206	219338	114100	29747	53008
ITA18_TM_VL_2440	2436454	423960	1198311	472964	434560	375893
ITA18_PS_VL_2440	29636	35591	33591	36417	16623	24080
Total	**19629248**	**17394563**	**19423219**	**22545709**	**24596130**	**29768290**

Total revenues

Table A.13 Total Revenues (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	2742110	8113294	8572863	5104098	7183903	6041431
ITA17_TM_VL_1824	6385558	6988394	9086260	5750189	6493183	5117546

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ITA17_TM_VL_2440	20084253	17153415	16631584	14039900	21366175	17416791
ITA17_PS_VL_2440	11623294	7934372	4539655	4770133	6963075	5159950
HRV_PS_VL1218	2994272	2994272	2994272	2994272	2185184	3279056
HRV_PS_VL1824	7437141	7437141	7230554	10329363	7498727	9248474
HRV_PS_VL2440	11467596	11467596	11322436	14515944	13420002	17905450
SVN_PS_VL1218	792829	523187	450725	456613	301652	197824
ITA18_TM_VL_2440	15619100	15079577	12233412	15160005	10149189	8673406
ITA18_PS_VL_2440	4409513	3194496	3075806	3766814	2998762	2449074
Total	**83555666**	**80885744**	**76137567**	**76887331**	**78559852**	**75489002**

COSTS OF SMALL PELAGIC FISHERIES IN GSA17 AND GSA18

In the following tables from A.14 to A.26 all the data are reported on the costs by fleet segment taken into account in the simulation phase (past and present years) of the case study.

Table A.14 Total variable costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	1063604	2111573	2449889	2008785	2635909	1491532
ITA17_TM_VL_1824	2145098	2240255	2906459	2555494	2733456	2774383
ITA17_TM_VL_2440	8422323	6601622	7023174	6963217	9382573	8531484
ITA17_PS_VL_2440	2261307	1517508	1302597	1420774	1771110	896806
HRV_PS_VL1218	171866	171866	216468	171866	197281	214475
HRV_PS_VL1824	3603544	3603544	4194582	3164251	3120238	2993959
HRV_PS_VL2440	5418305	5418305	7377074	5305080	5385106	5671828
SVN_PS_VL1218	17218	45701	32926	46456	32118	38320
ITA18_TM_VL_2440	6928229	4982209	5856128	7000562	5725746	3807874
ITA18_PS_VL_2440	1078932	841813	806305	923737	822991	742982
Total	**31110426**	**27534396**	**32165602**	**29560222**	**31806528**	**27163643**

Table A.15 Other variable costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	309852	638229	799094	270177	565617	443425
ITA17_TM_VL_1824	718619	903738	1086583	708015	807765	482202
ITA17_TM_VL_2440	2855522	2683153	2581270	2176986	2849415	3402264
ITA17_PS_VL_2440	1185758	942549	716470	663265	854491	442505
HRV_PS_VL1218	55214	55214	55214	55214	53460	54337
HRV_PS_VL1824	2360444	2360444	2747582	2085451	2043838	1961159
HRV_PS_VL2440	2056438	2056438	2799860	2085451	2043838	2152659
SVN_PS_VL1218	5870	4990	5604	8763	5966	7118
ITA18_TM_VL_2440	1804098	1717080	1579482	1781099	1419655	1101303
ITA18_PS_VL_2440	413679	393840	347309	351999	313856	349869
Total	**11765494**	**11755675**	**12718468**	**10186420**	**10957901**	**10396841**

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Table A.16 Fuel costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	753752	1473344	1650795	1738608	2070292	1048107
ITA17_TM_VL_1824	1426479	1336517	1819877	1847480	1925691	2292180
ITA17_TM_VL_2440	5566801	3918469	4441903	4786231	6533159	5129221
ITA17_PS_VL_2440	1075549	574959	586127	757509	916619	454301
HRV_PS_VL1218	116652	116652	161254	116652	143821	160138
HRV_PS_VL1824	1243100	1243100	1447000	1078800	1076400	1032800
HRV_PS_VL2440	3361867	3361867	4577214	3219629	3341268	3519169
SVN_PS_VL1218	11348	40711	27322	37693	26152	31202
ITA18_TM_VL_2440	5124131	3265129	4276646	5219462	4306091	2706571
ITA18_PS_VL_2440	345329	218440	237991	301083	293667	301082
Total	**19025008**	**15549188**	**19226129**	**19103147**	**20633160**	**16674771**

Table A.17 Maintenance costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	341451	350543	374666	256902	376229	301166
ITA17_TM_VL_1824	301681	313421	307028	276454	272020	392587
ITA17_TM_VL_2440	1005118	977129	905034	913492	1120897	1178246
ITA17_PS_VL_2440	842392	631301	576226	619665	662848	18791
HRV_PS_VL1218	161549	161549	161549	161549	190831	176190
HRV_PS_VL1824	1409160	1409160	1415831	1250855	1397823	1358858
HRV_PS_VL2440	1564184	1564184	1645533	1250855	1397823	1502183
SVN_PS_VL1218	9456	19470	18470	9500	17096	13894
ITA18_TM_VL_2440	536656	536078	536078	529192	424401	426298
ITA18_PS_VL_2440	227536	227543	227543	181384	195037	8065
Total	**6399183**	**6190378**	**6167958**	**5449848**	**6055005**	**5376278**

Table A.18 Total fixed costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	664910	684024	752339	515218	730185	587386
ITA17_TM_VL_1824	882399	923918	889490	823866	962336	551071
ITA17_TM_VL_2440	1937927	1900959	1703320	1718504	2061870	1801036
ITA17_PS_VL_2440	1378301	1033583	940049	1022531	1137206	222169
HRV_PS_VL1218	197481	197481	197481	197481	208366	230772
HRV_PS_VL1824	1504923	1504923	1512047	1321008	1492815	1451202
HRV_PS_VL2440	1670481	1670481	1757358	1321008	1492815	1604267
SVN_PS_VL1218	1982	23945	3373	2590	1221	993
ITA18_TM_VL_2440	895280	895382	895382	838650	676640	722607
ITA18_PS_VL_2440	402465	402521	402521	320867	345018	63453
Total	**9536149**	**9237217**	**9053360**	**8081723**	**9108472**	**7234956**

Table A.19 Other fixed costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013

ITA17_TM_VL_1218	323459	333481	377674	258316	353956	286220
ITA17_TM_VL_1824	580718	610497	582462	547411	690317	158484
ITA17_TM_VL_2440	932809	923830	798286	805012	940974	622790
ITA17_PS_VL_2440	535909	402282	363822	402866	474357	203378
HRV_PS_VL1218	197481	197481	197481	197481	208366	202924
HRV_PS_VL1824	1504923	1504923	1512047	1321008	1492815	1451202
HRV_PS_VL2440	1670481	1670481	1757358	1321008	1492815	1604267
SVN_PS_VL1218	1982	23945	3373	2590	1221	993
ITA18_TM_VL_2440	358624	359304	359304	309458	252240	296308
ITA18_PS_VL_2440	174929	174978	174978	139482	149981	55388
Total	**6281315**	**6201202**	**6126785**	**5304632**	**6057042**	**4881954**

Table A.20 Labour costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	741403	3183846	3172628	1564243	2423041	2144702
ITA17_TM_VL_1824	1878850	2080624	2750057	1356678	1591379	1023509
ITA17_TM_VL_2440	4641090	4868782	4430297	3230790	5091402	4482947
ITA17_PS_VL_2440	4174629	2615418	1336184	1338090	2185793	1914730
HRV_PS_VL1218	271514	271514	271514	271514	236871	254192
HRV_PS_VL1824	4927100	4927100	5132300	5262075	5364994	5173800
HRV_PS_VL2440	4978100	4978100	5398200	5262075	5364994	5250800
SVN_PS_VL1218	71623	180147	217697	197631	109739	63614
ITA18_TM_VL_2440	4004666	4770660	3013048	3990086	3287631	2423283
ITA18_PS_VL_2440	1542049	1103086	1064085	1333013	1020138	851067
Total	**27231024**	**28979277**	**26786010**	**23806195**	**26675982**	**23582644**

Table A.21 Depreciation costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	295005	323476	370691	413922	421209	408646
ITA17_TM_VL_1824	1025203	1193317	1157258	1198260	1246142	1341602
ITA17_TM_VL_2440	3262516	3717053	3522971	3058327	3709252	3356606
ITA17_PS_VL_2440	1679967	2041577	1683911	2278404	1151595	1481809
HRV_PS_VL1218	81864	81864	81864	81864	77858	79861
HRV_PS_VL1824	3212450	3212450	3227658	5242580	3186604	3097777
HRV_PS_VL2440	3565857	3565857	3751306	5242580	3186604	3424513
SVN_PS_VL1218	33925	48430	46281	35931	27868	22649
ITA18_TM_VL_2440	2162529	2209904	2368473	2051983	1406596	1806045
ITA18_PS_VL_2440	344382	298520	563050	748527	650737	592890
Total	**15663698**	**16692448**	**16773463**	**20352378**	**15064465**	**15612398**

Table A.22 Opportunity costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	16996	38668	41679	46258	39697	53455
ITA17_TM_VL_1824	51562	118685	116778	124928	118427	175114

ITA17_TM_VL_2440	170002	441934	399659	376710	394084	483730
ITA17_PS_VL_2440	98554	243567	176802	257899	117521	196353
HRV_PS_VL1218	103620	103620	103620	103620	51418	48545
HRV_PS_VL1824	394201	394201	394201	394201	203825	170151
HRV_PS_VL2440	1555156	1555156	1555156	1555156	986319	856332
SVN_PS_VL1218	6419	11885	4744	8855	11712	15348
ITA18_TM_VL_2440	114176	251173	249537	233048	142164	230258
ITA18_PS_VL_2440	20565	40991	58012	72042	56935	73978
Total	**2531250**	**3199879**	**3100188**	**3172716**	**2122102**	**2303265**

Table A.23 Total capital costs (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	312001	362145	412370	460180	460906	462101
ITA17_TM_VL_1824	1076765	1312003	1274036	1323188	1364569	1516716
ITA17_TM_VL_2440	3432518	4158986	3922630	3435038	4103336	3840336
ITA17_PS_VL_2440	1778520	2285143	1860713	2536304	1269116	1678161
HRV_PS_VL1218	185484	185484	185484	185484	129276	131964
HRV_PS_VL1824	3606651	3606651	3621859	5636781	3390429	3267928
HRV_PS_VL2440	5121013	5121013	5306462	6797736	4172923	4280845
SVN_PS_VL1218	40343	60315	51025	44786	39580	37997
ITA18_TM_VL_2440	2276705	2461077	2618010	2285031	1548760	2036303
ITA18_PS_VL_2440	364947	339510	621062	820568	707672	666868
Total	**18194947**	**19892326**	**19873651**	**23525095**	**17186567**	**17919220**

Table A.24 Other income (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	0	0	0	0	0	0
ITA17_TM_VL_1824	0	0	0	0	0	0
ITA17_TM_VL_2440	0	0	0	0	0	0
ITA17_PS_VL_2440	0	0	0	0	0	0
HRV_PS_VL1218	96902	96902	96902	96902	64673	82041
HRV_PS_VL1824	948600	948600	961600	963695	1083010	170300
HRV_PS_VL2440	0	0	2025047	4360245	3644281	0
SVN_PS_VL1218	0	8570	0	10466	0	0
ITA18_TM_VL_2440	0	0	0	0	0	0
ITA18_PS_VL_2440	0	0	0	0	0	0
Total	**1045502**	**1054072**	**3083549**	**5431308**	**4791964**	**252341**

Table A.25 Number of employees by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	83	97	102	92	171	124
ITA17_TM_VL_1824	110	113	109	135	148	153
ITA17_TM_VL_2440	262	243	241	246	344	264
ITA17_PS_VL_2440	224	170	145	152	137	142
HRV_PS_VL1218	45	45	45	45	44	47

HRV_PS_VL1824	473	473	493	493	529	497
HRV_PS_VL2440	478	478	493	529	505	505
SVN_PS_VL1218	7	16	12	18	19	16
ITA18_TM_VL_2440	238	238	238	205	175	181
ITA18_PS_VL_2440	97	97	96	80	89	82
Total	**2017**	**1970**	**1974**	**1995**	**2161**	**2011**

Table A.26 Capital value (€) by fleet segment in GSA 17 and 18.

Fleet segment	2008	2009	2010	2011	2012	2013
ITA17_TM_VL_1218	1490775	1568297	1738433	1886805	1870168	1795191
ITA17_TM_VL_1824	4522628	4813618	4870786	5095653	5579240	5880899
ITA17_TM_VL_2440	14911190	17923840	16669745	15365561	18565833	16245221
ITA17_PS_VL_2440	8644322	9878514	7374399	10519396	5536595	6594160
HRV_PS_VL1218	2440073	2440073	2440073	2440073	1947497	2086604
HRV_PS_VL1824	7990836	7990836	8261711	9282795	7719960	7313646
HRV_PS_VL2440	36807905	36807905	39554763	36621415	37357276	36807905
SVN_PS_VL1218	186100	344583	280000	315000	400000	400000
ITA18_TM_VL_2440	10014546	10187012	10408190	9505749	6697527	7732811
ITA18_PS_VL_2440	1803804	1662498	2419674	2938487	2682285	2484410
Total	**88812179**	**93617176**	**94017774**	**93970934**	**88356381**	**87340847**

A.4 FITTING OF OBSERVED LANDING DATA AND COMPARISON WITH ASSESSMENT RESULTS

The fitting of the model is quite satisfactory for both the species, with an average difference of 5.7% by year for anchovy and of 1% for sardine. The differences between simulated and observed data by fleet segment and year are reported in the figures A.5 – A.6.

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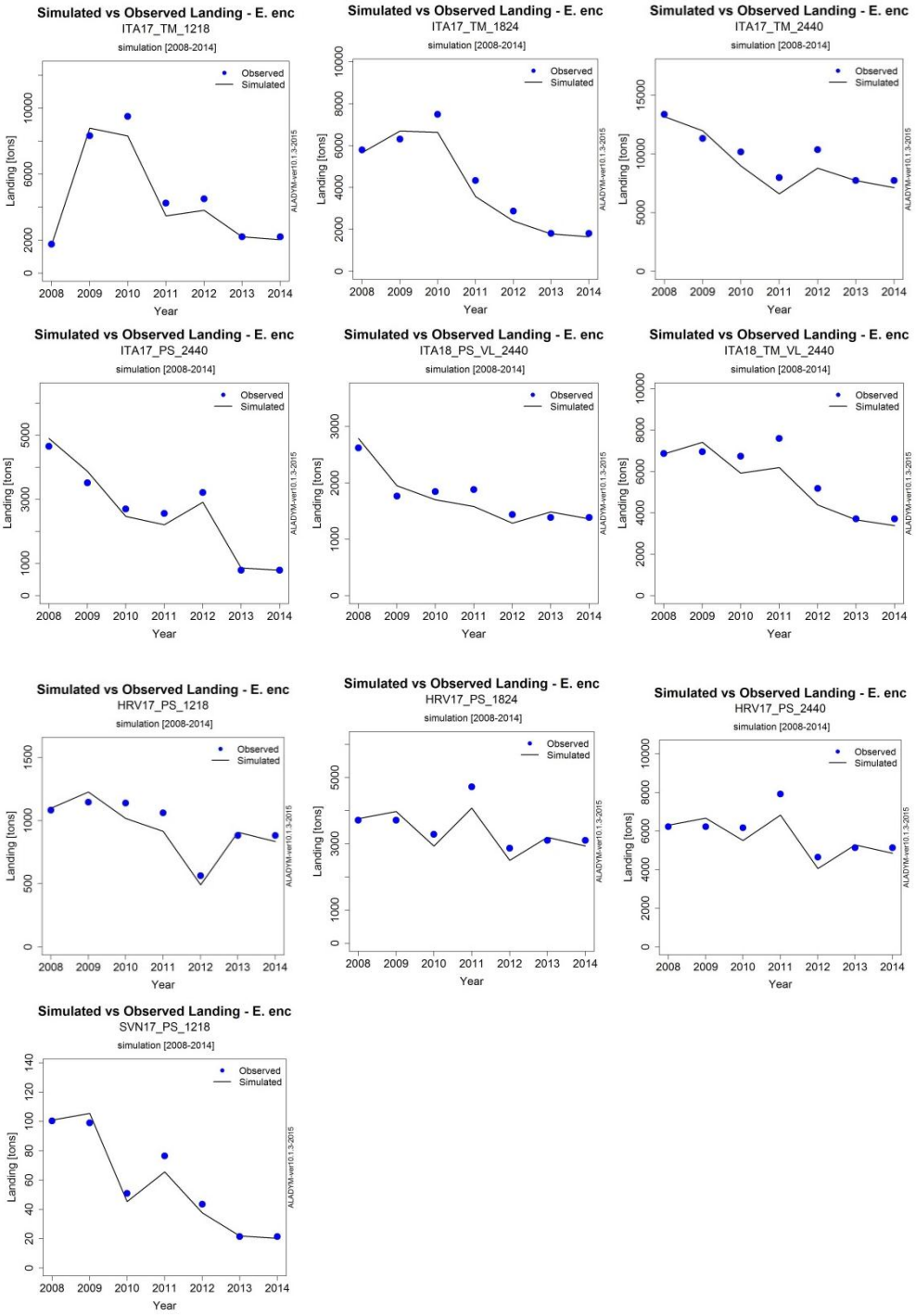

Figure A.1. Comparison between simulated and observed landings by fleet segment for anchovy in GSA 17 and 18.

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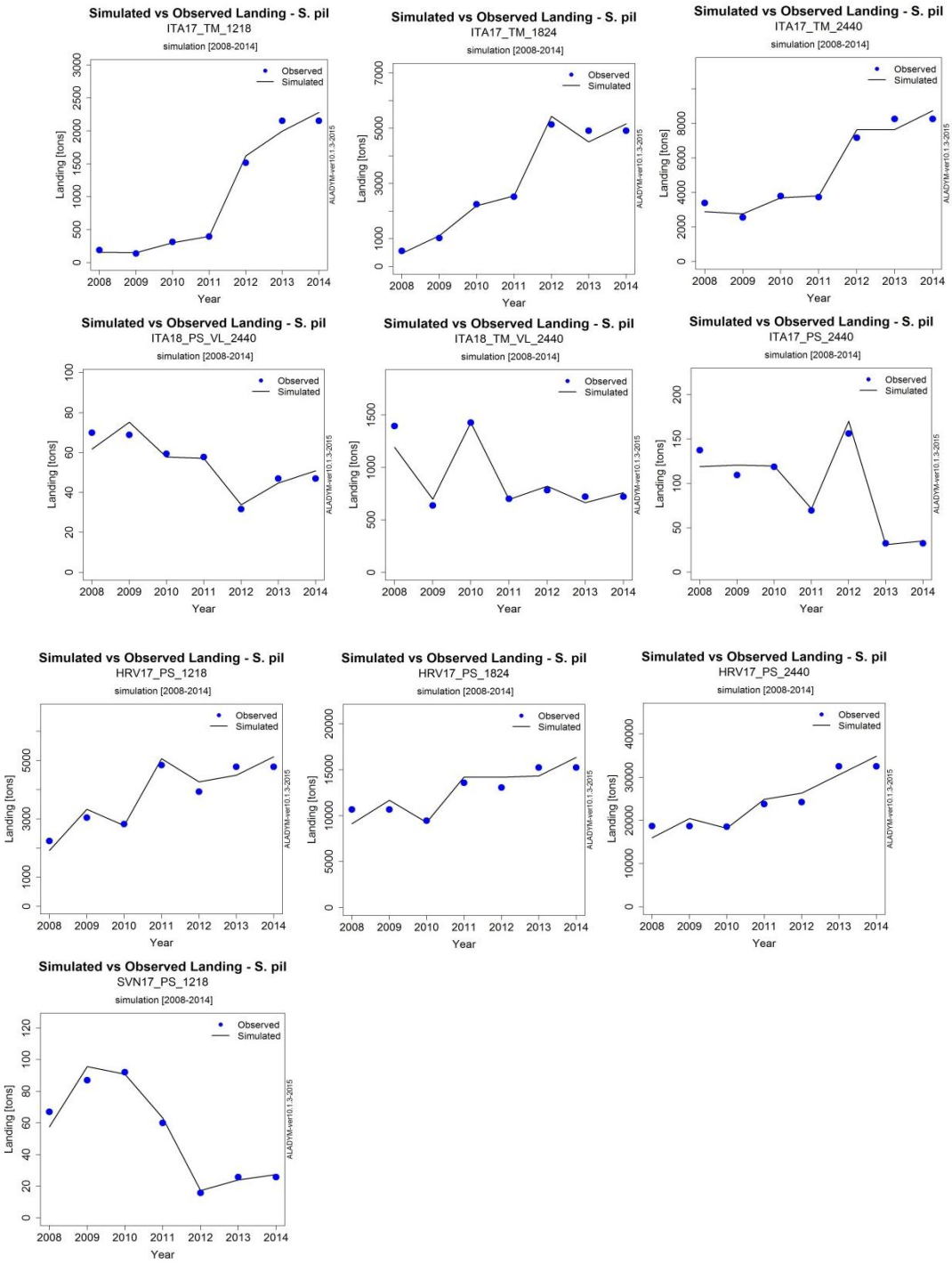

Figure A.7. Comparison between simulated and observed landings by fleet segment for sardine in GSA 17 and 18.

The comparison between the Spawning Stock Biomass (SSB) from the assessment models and the BEMTOOL simulation is shown in figure 3. BEMTOOL model estimates for anchovy an SSB smaller than the one of the assessment (the difference is about 20%), probably due to the hypothesis of split year in the assessment, while in BEMTOOL the calendar year has been used. However, the SSB estimated by BEMTOOL and by the assessment are much more similar respect to the comparison obtained within SEDAF project9, thanks to the revision of the assumptions on maturity in SAM model carried out at STECF EWG 15-11[114].

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For sardine, the fitting of the SSB is much satisfactory as it shows a good level of agreement between BEMTOOL and the new SAM estimated SSB at the beginning of the year. The average difference between BEMTOOL and SAM model is around 5-6%. Some initial shift can be due to the fact that BEMTOOL is considering the last 7 years, while the assessment worked on a longer time series.

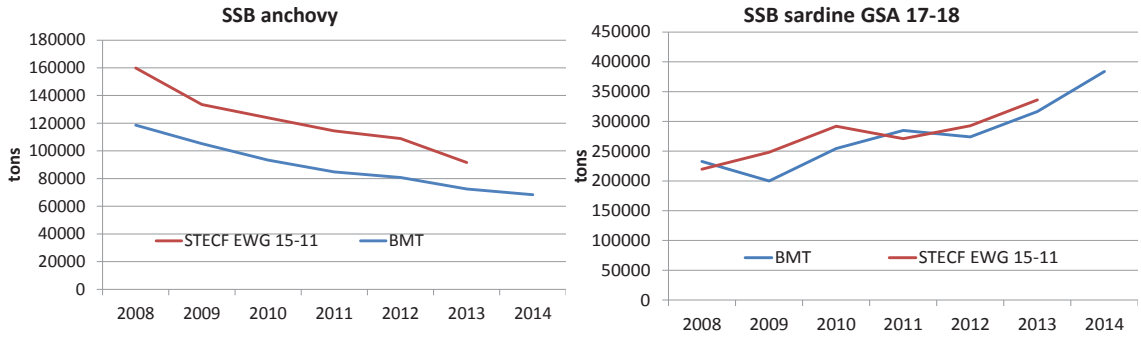

Figure A.8 Comparison between BEMTOOL and stock assessment SSB by fleet segment for anchovy and sardine in GSA 17 and 18.

A.5 PROJECTIONS OF STATUS QUO WITH UNCERTAINTY ON RECRUITMENT

A.5.1 INPUT OF THE BIOLOGICAL AND PRESSURE MODULES

In order to perform the projections of the stock in the future, the recruitment of anchovy and sardine (I.e. the addition of juveniles to the population) at the beginning of the forecast phase has been assumed equal to the recruitment in 2013 (respectively 57 771 146 and 56 911 047 thousand).

A multiplicative log-normal error with mean 0 and standard deviation 0.3 has been applied to the geometric mean of recruitment in order to take into account the uncertainty due to the process error that is propagated to all the indicators produced by BEMTOOL.

Figure A.4 shows the recruitment of anchovy and sardine with confidence interval used in all the performed scenarios.

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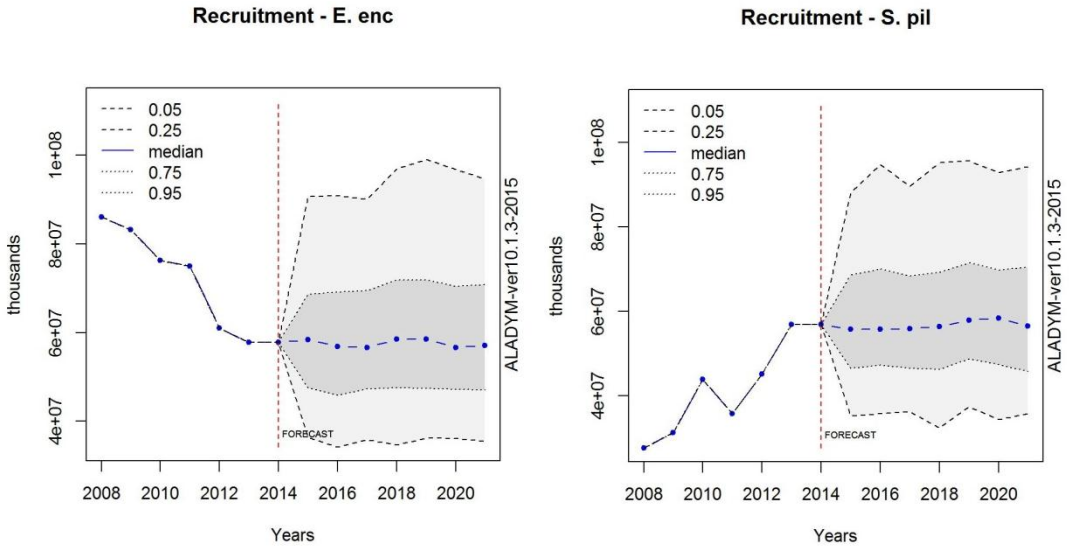

Figure A.4 Recruitment used for anchovy and sardine in the forecast scenarios with confidence intervals.

All the other biological inputs have been maintained unchanged in the projections.

For the status quo the effort has been maintained constant and equal to 2013 for all the years (until 2021).

A.5.2 INPUT OF THE ECONOMIC MODULE

Due to the presence of relevant fluctuations in the time series of most fleet segments, the socio economic parameters to be used in the forecast have been estimated on the basis of the most recent economic data available, i.e. in 2012 and 2013, as described in the next paragraphs.

PRICES DYNAMICS

The price of European anchovy and European sardine were dependent on total landings (L). In order to model this type of relationship, option one of BEMTOOL software has been selected. This option corresponds to the following equation:

$$p_{s,f,t} = p_{s,f,t-1}\left(1 + \varepsilon_{s,f,landing}\frac{L_{s,f,t} - L_{s,f,t-1}}{L_{s,f,t-1}}\right)$$

where:

$p_{s,f,t}$ is the price of the target species s, for the fleet segment f at time t; (€)

$L_{s,f,t}$ is the landings of the target species s, for the fleet segment f at time t (Kg);

$\varepsilon_{s,f,landing}$ is the elasticity coefficient price-landings for species s and fleet segment f (€/kg).

According to this option the ex-vessel mean price of stock *s* landed by fleet segment *f* at time *t* is a function of the same price at time *t-1* and the relative increase of landings (at the same level of

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aggregation than price) from time *t-1* to time *t,* given a flexibility coefficient ε estimated for that stock and fleet segment, which represents the parameter to be estimated.

Due to the lack of reliable estimations, the flexibility coefficient was computed exogenously on the basis the existing literature on seafood demand related to small pelagic species in Northern Adriatic (Camanzi *et al.,* 2010). This study estimated price-quantity relationship equal to -0.2 for both species considered in the ex-vessel markets of the Emilia Romagna and Veneto Regions in Italy. This resulted in the parameterization reported in the table A.27.

Table A.27 Price parameterization by fleet segment and stock in GSA 17 and 18.

Fleet segment	coeff. price-landings European anchovy	coeff. price-landings European sardine
ITA17_TM_VL_1218	-0.2	-0.2
ITA17_TM_VL_1824	-0.2	-0.2
ITA17_TM_VL_2440	-0.2	-0.2
ITA17_PS_VL_2440	-0.2	-0.2
HRV_PS_VL1218	-0.2	-0.2
HRV_PS_VL1824	-0.2	-0.2
HRV_PS_VL2440	-0.2	-0.2
SVN_PS_VL1218	-0.2	-0.2
ITA18_TM_VL_2440	-0.2	-0.2
ITA18_PS_VL_2440	-0.2	-0.2

COSTS DYNAMICS

Variable costs

Variable costs were considered as a single item (as sum of fuel and other variable costs) and estimated in a single equation as a linear function of fishing effort EFF and the coefficient β :

$$TVC_{f,t} = \beta_f EFF_{f,t}$$

where:

$TVC_{f,t}$ are total variable costs for fleet segment *f* at time *t* (€);

$EFF_{f,t}$ is the effort (in terms of total annual days at sea) of fleet segment *f* at time *t*;

β_f is the total variable costs per unit of effort at time *t*.

Maintenance costs and fixed costs

According to option 1 of BEMTOOL model, both fixed costs OFC and maintenance costs MC are directly linked to the total annual gross tonnage GT. These functions can be represented as follows:

$MC_{f,t} = \alpha''_f GT_{f,t}$ where:

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$MC_{f,t}$ are the maintenance costs for the fleet segment *f* at time *t* (€);

$GT_{f,t}$ is the annual gross tonnage;

αf' is other fixed costs per unit of *GT*.

$$OFC_{f,t} = \alpha'_f GT_{f,t}$$

where:

$OFC_{f,t}$ are the other fixed costs for the fleet segment *f* at time *t* (€);

$GT_{f,t}$ is the annual gross tonnage for fleet segment *f* at time *t*;

αf'' is the maintenance costs per unit of *GT*.

Capital costs

Depreciation costs (DC)) have been estimated as an average of the gross tonnage of the fleet segment, corresponding to option one of the BEMTOOL software.

$$DC_{f,t} = \beta'_f GT_{f,t}$$

As suggested in the 2014 Annual Economic Report on the EU Fishing Fleet "(STECF-14-16)[102], opportunity costs of capital (*OC)* are calculated by taking into account the fixed tangible asset value (*K*) and multiplying it by the real interest (*r*).

$$OC_{f,t} = r_{f,t} K_{f,t}$$

Variable cost are directly related to the number of estimated days at sea. Similarly, fixed and capital costs are function of the estimated fleet capacity, expressed in terms of number of vessels and gross tonnage.

Labour costs

According to the prevalent income sharing system between the ship-owner and the crew, the labour cost is estimated as a percentage of the difference between total revenues and total variable costs:

$$LC_{f,t} = cs_f \left(R_{f,t} - TVC_{f,t} \right)$$

[102] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/2014-annual-economic-report-eu-fishing-fleet-stecf-14-16-scientific-technical-and-economic

where:

$LC_{f,t}$ is the labour cost of the fleet segment *f* at *t* (€);

$R_{f,t}$ are the total revenues (target species+ other species) of the fleet segment *f* at time *t* (€);

$TVC_{f,t}$ are the total variable costs for the fleet segment *f* at time *t* (€);

cs_f is crew share for the fleet segment *f*.

Thus, labour cost are directly related to total revenues and variable cost.

As highlighted in Table , the crew share ranges from 0.08 of Croatian Purse seiners 12-18 m to 0.83 of Croatian Purse seine fleet 18-24 m.

Table A.28 Costs parameterization by fleet segment in GSA 17 and 18 pelagic case study

Fleet segment	Total variable costs per unit of effort (sea days)	crew share	maintenance costs per unit of GT	other fixed costs per unit of GT	depreciation costs per unit of GT	opportunity costs per unit of GT
ITA17_TM_VL_1218	347	0.47	313	298	425	56
ITA17_TM_VL_1824	804	0.44	196	79	670	87
ITA17_TM_VL_2440	1112	0.50	234	124	668	96
ITA17_PS_VL_2440	832	0.45	437	144	1049	139
HRV_PS_VL1218	70	0.08	559	644	254	154
HRV_PS_VL1824	598	0.83	318	339	724	40
HRV_PS_VL2440	755	0.43	151	161	344	86
SVN_PS_VL1218	111	0.4	361	26	588	398
ITA18_TM_VL_2440	1254	0.5	190	132	806	103
ITA18_PS_VL_2440	1255	0.5	15	106	1129	141

Revenues and total landings

Revenues by fleet segment and species are calculated by multiplying landings produced in the biological sub-model by the prices estimated on the basis of the price module.

As assessed species account for 60-90% of total revenues and production for all fleet segments, the remaining part of landings value and weight was assumed to be as a fixed percentage of the estimated revenues and production of anchovy and sardine according to BEMTOOL option 1 of revenues modelling:

$$R_{f,t} = rr_f \sum_{s=1:n} R_{f,s,t}$$

$$L_{f,t} = ll_f \sum_{i=1:n} L_{f,i,t}$$

where:

$R_{f,t}$ is the total revenues (target species+ other species) of the fleet segment *f* at time *t* (€);

$R_{f,s,t}$ is the revenues of target species s of the fleet segment *f* at time *t* (€);

rr_f is correction factor to pass from the revenues of assessed species to the total revenues of the fleet segment *f*.

$L_{f,t}$ is the total landings weight (target species+ other species) of the fleet segment *f* at time *t* (€);

$L_{f,s,t}$ is the landings weight of target species s of the fleet segment *f* at time *t* (€);

ll_f is correction factor to pass from the landings of assessed species to the total landings of the fleet segment *f*.

Total revenues and production are thus function of the estimated landings value and weight of the two target assessed species.

Average employees per vessel

Employment in the future has been estimated by average number of employees per vessel in the fleet segment *f* (em_f) multiplied by the number of vessels for each fleet segment ($N_{f,t}$):

$$EM_{f,t} = em_f N_{f,t}$$

Capital Value

Capital value was estimated by the average value of a vessel for the fleet segment *f* at time *t*. Discount rates used are the harmonized long-term interest rates for convergence assessment calculated by the European Central Bank, available at http://www.ecb.int/stats/money/long/html/index.en.html.

Parameterization of socio-economic indicators by fleet segment is reported in the table A.29.

Table A.29 Socio-economic indicators parameterization by fleet segment in GSA 17 and 18 pelagic case study.

	correction factor for landings	correction factor for revenue	average employees per vessel	value of a single vessel	discount rate
ITA17_TM_VL_1218	1.24	1.33	3.5	51291	4.3%
ITA17_TM_VL_1824	1.01	1.01	6.2	237612	4.3%
ITA17_TM_VL_2440	1.01	1.02	5.7	353157	4.3%
ITA17_PS_VL_2440	1.05	1.32	10.2	473018	4.3%
HRV_PS_VL1218	1.07	1.12	1.0	46369	4.7%
HRV_PS_VL1824	1.07	1.05	9.0	135438	4.7%
HRV_PS_VL2440	1.08	1.06	8.0	549372	4.7%
SVN_PS_VL1218	1.46	1.6	4.0	100000	5.8%
ITA18_TM_VL_2440	1.1	1.2	6.7	286400	4.3%
ITA18_PS_VL_2440	1.1	1.1	18.2	552091	4.3%

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Socio-economic indicators

The current revenue to break even revenue ratio and net profit have been estimated according to the Economic performance indicator calculations provided in: "The 2014 Annual Economic Report on the EU Fishing Fleet" (STECF-14-16).

BER is calculated as Current Revenue (CR) divided by the Break Even Revenue (BER), where:

Current Revenue (CR) = income from landings + other income

Break Even Revenue (BER) = fixed costs / (1-[variable costs / current revenue]).

Fixed costs include non-variable costs, annual depreciation, opportunity cost of capital.

Variable costs include crew wage, unpaid labour, energy costs, repair costs and other variable costs.

Net profit is the difference between revenue and explicit costs and opportunity costs. It includes all operational costs, such as wages, energy, repair, other variable, fixed costs and depreciation and opportunity costs of capital. It measures the efficiency of a producer in society's view by evaluating the total costs of inputs (excluding natural resource costs) in comparison to outputs or revenue. Therefore, economic profit is the primary indicator of economic performance and is often used as a proxy of resource rent in fisheries. The excess of revenue over the opportunity cost of producing the good is also referred to as supernormal or abnormal profits. Abnormal profits in a sector is an incentive for other firms to enter the industry. Zero or a negative profit may indicate high competition in the sector and can be used as one of the indicators of overcapacity.

A.5.3 INPUTS AND DYNAMICS OF EFFORT REDUCTION

The Table A.30 reports the dynamics of effort reduction to reach the reference point by fleet, year and scenario, In the status quo scenario the absolute number of average number of annual fishing days per vessel and the number of active vessels are reported.

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Table A. 30 – Dynamics of effort reduction in comparison to the status quo (Option 1). For the status quo absolute number are reported, while for the other scenarios percentage to the status quo are reported.

	Average number of annual fishing days per vessel							Number of active vessels						
Scenario 1 – StatusQuo (Baseline)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
ITA17_TM_1218	123	123	123	123	123	123	123	35	35	35	35	35	35	35
ITA17_TM_1824	139	139	139	139	139	139	139	25	25	25	25	25	25	25
ITA17_TM_2440	167	167	167	167	167	167	167	46	46	46	46	46	46	46
ITA17_PS_2440	77	77	77	77	77	77	77	14	14	14	14	14	14	14
HRV17_PS_1218	76	76	76	76	76	76	76	45	45	45	45	45	45	45
HRV17_PS_1824	98	98	98	98	98	98	98	54	54	54	54	54	54	54
HRV17_PS_2440	110	110	110	110	110	110	110	67	67	67	67	67	67	67
ITA18_TM_VL_2440	112	112	112	112	112	112	112	27	27	27	27	27	27	27
ITA18_PS_VL_2440	132	132	132	132	132	132	132	5	5	5	5	5	5	5
SVN17_PS_1218	84	84	84	84	84	84	84	4	4	4	4	4	4	4

	Reduction on fishing days							Reduction on vessels						
Scenario 2 (2018): scenario 2a	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
ITA17_TM_1218	-7%	-15%	-22%	-30%	-30%	-30%	-30%	-1%	-2%	-3%	-3%	-3%	-3%	-3%
ITA17_TM_1824	-6%	-12%	-17%	-23%	-23%	-23%	-23%	-1%	-2%	-3%	-3%	-3%	-3%	-3%
ITA17_TM_2440	-20%	-40%	-60%	-80%	-80%	-80%	-80%	-13%	-27%	-40%	-40%	-40%	-40%	-40%
ITA17_PS_2440	-3%	-6%	-9%	-12%	-12%	-12%	-12%	0%	-1%	-1%	-1%	-1%	-1%	-1%
HRV17_PS_1218	-3%	-6%	-9%	-12%	-12%	-12%	-12%	0%	-1%	-1%	-1%	-1%	-1%	-1%
HRV17_PS_1824	-11%	-22%	-32%	-43%	-43%	-43%	-43%	-2%	-3%	-5%	-5%	-5%	-5%	-5%
HRV17_PS_2440	-19%	-38%	-56%	-75%	-75%	-75%	-75%	-7%	-13%	-20%	-20%	-20%	-20%	-20%
ITA18_TM_VL_2440	-19%	-37%	-56%	-75%	-75%	-75%	-75%	-2%	-3%	-5%	-5%	-5%	-5%	-5%
ITA18_PS_VL_2440	-5%	-11%	-16%	-21%	-21%	-21%	-21%	-1%	-1%	-2%	-2%	-2%	-2%	-2%
SVN17_PS_1218	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

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	Reduction on fishing days							Reduction on vessels						
Scenario 2 (2018): scenario 2b	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
ITA17_TM_1218	-14.6%	-29.3%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA17_TM_1824	-14.6%	-29.3%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA17_TM_2440	-14.6%	-29.2%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA17_PS_2440	-14.6%	-29.3%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
HRV17_PS_1218	-14.6%	-29.3%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
HRV17_PS_1824	-14.6%	-29.3%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
HRV17_PS_2440	-14.6%	-29.3%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA18_TM_VL_2440	-14.6%	-29.3%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA18_PS_VL_2440	-14.6%	-29.3%	-43.9%	-58.5%	-58.5%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
SVN17_PS_1218	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

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	Reduction on fishing days							Reduction on vessels						
Scenario 2 (2020): scenario 2c	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
ITA17_TM_1218	-7.5%	-7.5%	-12.0%	-19.2%	-26.8%	-30.0%	-30.0%	-1%	-2%	-3%	-3%	-3%	-3%	-3%
ITA17_TM_1824	-5.7%	-5.7%	-9.2%	-14.7%	-20.5%	-23.0%	-23.0%	-1%	-2%	-3%	-3%	-3%	-3%	-3%
ITA17_TM_2440	-20.0%	-20.0%	-32.0%	-51.2%	-71.4%	-80.0%	-80.0%	-13%	-27%	-40%	-40%	-40%	-40%	-40%
ITA17_PS_2440	-3.0%	-3.0%	-4.8%	-7.7%	-10.7%	-12.0%	-12.0%	0%	-1%	-1%	-1%	-1%	-1%	-1%
HRV17_PS_1218	-3.0%	-3.0%	-4.8%	-7.7%	-10.7%	-12.0%	-12.0%	0%	-1%	-1%	-1%	-1%	-1%	-1%
HRV17_PS_1824	-10.8%	-10.8%	-17.2%	-27.5%	-38.4%	-43.0%	-43.0%	-2%	-3%	-5%	-5%	-5%	-5%	-5%
HRV17_PS_2440	-18.8%	-18.8%	-30.0%	-48.0%	-66.9%	-75.0%	-75.0%	-7%	-13%	-20%	-20%	-20%	-20%	-20%
ITA18_TM_VL_2440	-18.7%	-18.7%	-30.0%	-48.0%	-66.9%	-75.0%	-75.0%	-2%	-3%	-5%	-5%	-5%	-5%	-5%
ITA18_PS_VL_2440	-5.3%	-5.3%	-8.4%	-13.4%	-18.7%	-21.0%	-21.0%	-1%	-1%	-2%	-2%	-2%	-2%	-2%
SVN17_PS_1218	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0%	0%	0%	0%	0%	0%	0%

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	Reduction on fishing days							Reduction on vessels						
Scenario 2 (2020): scenario 2d	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
ITA17_TM_1218	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA17_TM_1824	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA17_TM_2440	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA17_PS_2440	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
HRV17_PS_1218	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
HRV17_PS_1824	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
HRV17_PS_2440	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA18_TM_VL_2440	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
ITA18_PS_VL_2440	-14.6%	-14.6%	-23.4%	-32.2%	-45.3%	-58.5%	-58.5%	-2.2%	-4.3%	-6.5%	-6.5%	-6.5%	-6.5%	-6.5%
SVN17_PS_1218	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

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Development of stocks over time and current status

The assessment of anchovy and sardine was presented during the EWG-15-11 (STECF 15-14)[114]. This assessment used DCF data together with the historical time series available for GSA17 and GSA18 from 1975 to 2013 (sardine) and from 1976 to 2013 (anchovy). The year 2014 was not included in the assessment since problems were encountered with some data, which were inconsistent in respect to the rest of the dataset (e.g. Croatian data for 2013 only). EWG-15-11 thus used the data of the previous years integrated by expert knowledge.

Fishing mortality (F_{bar1-2}) and SSB of anchovy are varying along the time, catch and recruitment are decreasing, fishing mortality (F_{bar1-2}) is decreasing in the last two years.

Fishing mortality (F_{bar1-3}) and SSB of sardine are varying along the time, catch and recruitment are recently increasing.

Table 1.0.3 reports the metrics from the last assessment available (STECF 15-14). Discard in these fisheries is considered negligible.

Tab. 1.0.3 – Fishing mortality, Spawning Stock Biomass, landings and Recruitment from the last stock assessments.

Stock	***Fishing mortality**** *(Fcurrent)*	***Spawning Stock Biomass**** *(tons)*	***Landings**** *(tons)*	***Recruitment**** *(in thousands)*
Anchovy	$F_{bar\ (1-2)}$=	91,679	32,150	57,771,146
Sardine	$F_{bar\ (1-3)}$=	336,082	63,612	12,698,571

*estimates refer to assessment EWG 15-11 (STECF 15-14)

A **Management Strategy Evaluation** (MSE) was performed in line with EWG-15-11 for both anchovy and sardine using a segmented stock recruitment relationships together with the reference points derived.

Regarding anchovy the findings of the MSE are (according to EWG-15-11):

1. moving to MSY will result in considerable decrease in catches in the short-term though they increase and stabilise over the longer-term;
2. the catches are variable (high CVs) throughout reflecting the variable, autocorrelated nature of recruitment in the stock.
3. the probability of being below B_{lim} is initially very high but decreases over the time of management.

For sardine, the forward simulation proved very difficult, and the segmented stock recruitment relationship resulting in a very low F_{MSY} (<0.1). This is considered erratic, given that the catches are very variable (high CVs) throughout reflecting the variable, autocorrelated nature of recruitment in the stock.

An attempt to run an MSE on sardine using the geometric mean of the last 3 years and setting F_{MSY} equal to the F_{MSY} estimated for anchovy (F_{upper}=0.36) did not give any plausible results, being the catches oscillating cyclically between really high and really low values.

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For sardine the lower level of SSB in the time series after which a good recruitment was observed was thus used as a proxy of B_{lim} and B_{pa} was set as $2*B_{lim}$[103].

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[103] In order to estimate this reference point, a log-normal distribution of Blim is assumed, with a coefficient of variation of 40%. This results in approximately $B_{pa} = 2*B_{lim}$ (GFCM approach, Report of the Working Group on Stock Assessment of Small Pelagic Species (WGSASP) Rome, Italy, 24–27 November 2014.

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ANNEX V: MAIN ELEMENTS OF THE COMMON FISHERIES POLICY

The new CFP, Regulation (EU) 138/2013 entered into force on 1 January 2014. The main elements of the new CFP are:

(1) **Maximum Sustainable Yield** is the best possible objective for renewable and profitable fisheries, harvesting the maximum amount of fish on a long term basis. The objective of the CFP is to ensure that MSY is achieved by 2015 where possible, and by 2020 at the latest. Not all stocks in the north-east Atlantic are MSY-assessed yet. Of the assessed stocks 60% of them are fished at MSY (up from 6 % only in 2005). In the Mediterranean only around 11% of assessed stocks are within MSY and there is little sign of improvement. For many stocks, particularly in the Mediterranean, we have no assessment of MSY.

(2) **Annual legislation on fixing fishing opportunities** (TACs and quotas, some are set on a two-yearly basis): to fix, based on scientific advice that is consistent with MSY and in accordance with multi-annual plans (where they exist), the amount of fishing for the stocks concerned, and to allocate quotas to the Member States following the so-called relative stability key. In turn, Member States deal with how to distribute their national quotas to their fishermen. Annually fishing opportunities are set for the Baltic, North Sea, Atlantic and deep-sea stock, by Council only, to determine the level of catches (before the landing obligation: landings), for each stock. The COM outlines its approach for the TAC each spring in a Policy Statement.

The COM proposals are based on existing multi-annual plans (with certain provisions on TAC setting), or on annual biological advice. TACs are shared out to Member States following fixed allocation keys (so-called relative stability, which differs among stocks). TACs (in tonnes) are a translation of fishing mortality (F, mortality caused by fishing as a ratio of the stock). In the context of multi-annual plans the COM will be seeking advice on MSY expressed in ranges of fishing mortality that correspond to sustainable fishing and MSY, for the target species.

Under certain multi-annual plans TACs are accompanied by effort reduction schemes for certain fleets. These effort regimes are currently considered ineffective, causing red tape, and sometimes creating conflicts with the TACs. They are likely to disappear from future multi-annual plans, but are currently still part of the TAC proposals.

(3) **The landing obligation**: The new CFP includes a landing obligation for all catches of species subject to catch limits (TACs) and, in the Mediterranean, also catches of species which are subject to minimum sizes (only blue-fin tuna is under TAC in this sea basin).

It applies to all Union vessels fishing in Union and non-Union waters. The landing obligation is applied in a gradual way and is fishery based. As of 1 January 2015 pelagic fisheries and industrial fisheries everywhere in Union waters are under the landing obligation, as are all other fisheries (salmon and cod) in the Baltic.

The landing obligation comes with a set of potential measures and flexibility instruments to make the transition and timely implementation possible. These include quota flexibilities, exemptions for species that have a high survival rate (i.e. it makes sense to return these fish to the sea if they are likely to survive) and a *de minimis* exemption to cater for unwanted catches that are unavoidable. The plans may also fix conservation reference sizes for fish. These measures should be developed through multi-annual plans, but in the absence of such plans, *discard plans* can be adopted (with duration of maximum three years).

(4) **EU multi-annual plans**: they contain the framework for management of a stock or a combination of stocks (by fishery). Multi-annual plans are designed to ensure effective management of the fisheries and to bring conservation and management provisions for groups of stocks under plans. Plans contribute to stability and a long-term security for the industry. The elements that shall and that may be included in a multi-annual plan are specified in Article 10. The main elements of plans are:

MSY-related targets (per target stock), deadlines for achieving MSY, and fishing mortality/exploitation ranges that are consistent with MSY (F_{MSY} as a range of values), safeguard provisions if science indicates that stocks are in trouble; specific conservation measures for non-target species, so as to keep them within sustainable boundaries, mechanisms to allow for regionalisation of implementing measures under the plan.

The precise shape and content of multi-annual plans were subject to work by an inter-institutional task force involving the Commission, the European Parliament and the Council in order to provide guidelines on the structure and content of these multi-annual plans and to solve delicate issues on the sharing of competences among those EU Institutions[104].

A recent Court ruling[105] complemented the conclusions of the Task Force, confirming that that the adoption of measures necessary for the pursuit of the objectives of the CFP must be reserved to the EU legislature under Article 43(2) of the Treaty on the Functioning of the EU (TFEU)[106] as they entail a policy decision. Measures on the fixing and allocation of fishing opportunities can be adopted by the Council in accordance with Article 43(3) of the TFEU, as they do not require such a policy assessment since they are of a primarily technical nature and are intended to be taken in order to implement provisions adopted on the basis of Article 43(2) of the TFEU.

(5) **Fleet capacity rules**: these are provisions to support that the fleet capacity of a Member State matches with the fishing opportunities that are allocated to it; fleet overcapacity potentially leads to overfishing. Member States cannot increase the engine power or storage capacity of their fleets. Each Member State is subject to a maximum capacity threshold (in engine power (kW) and in vessel volume (gt)).

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104 Council Document No 8529-14 PECHE 117 CODEC 1004, also published by the European Parliament: http://www.europarl.europa.eu/meetdocs/2009_2014/documents/pech/dv/taskfor/taskforce.pdf

105 Court ruling of 1 December 2015 in joined cases C-124/13 – Parliament/Council and C-125/13 Commission/Council.

106 Consolidated version of the Treaty on the Functioning of the European Union. OJ C 326, 26.10.2012, p. 47–390

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Nominally, all Member States fleets are under these ceilings; however, in many Member States the effective engine capacity may well outscore the numbers in the CFP. Despite intensified enforcement, this is a persistent and hard-to-tackle issue.

Annually Member States must report on the balance between capacity and fishing opportunities. Historically this has not been linked to targeted actions. For the first time, under the new CFP Member States have to give follow-up to the identification of overcapacity with an action plan to eliminate it, in order to have access to funding for decommissioning of excess vessels. The assessment exercise by Member States on the balance between capacity and fishing opportunities is facilitated by common guidelines developed by the Commission. It includes technical and economic parameters. Member States will have to include in their reports an action plan for the fleet segments with identified imbalance. In the action plan, Member States have to set out the adjustment targets and tools to achieve the balance. The plan has to include a clear time frame for the implementation of the action plan as well.

(6) **The External Dimension**: The CFP reform enshrines for the first time the external dimension of the CFP (Part VI of the Basic Regulation: Articles 28-31). It calls for strong external action that follows externally the same principles and standards as internally while promoting a level-playing field for EU operators. Under the CFP new international agreements should contribute to long term sustainability worldwide via stronger bilateral relations and tackling global issues such as IUU fishing and fishing overcapacity, uphold and strengthen the global architecture for fisheries governance (UN, FAO, OECD, etc.), contribute towards a more effective functioning of RFMOs, more sustainable Fisheries Agreements and better coherence with other EU policies.

(7) **Data Collection Framework**: a set of requirements on collection by fishermen and Member States and management of biological and other data as input for biological, economic and other knowledge and advice in support of the policy. To align to the new CFP, the Commission made a proposal in 2015 to Recast the Data Collection Framework Regulation[107]. It will introduce simplifications and more flexibility and adaptability, based on an evaluation of the previous framework.

(8) **Advisory Councils**: The Advisory Councils (ACs) were established since 2004 to advise the Commission on matters related to fisheries management in their respective areas of competence. Seven ACs were established for the Mediterranean Sea, the South Western Waters, the North Western Waters, the North Sea, the Baltic Sea, small pelagic species, and the Long Distance Fleet.

ACs are stakeholders' organisations that bring together the industry (fishing, processing and marketing sectors) and other interest groups, such as environmental and consumers' organisations. They receive an annual grant of up to 250.000 euros from the Commission to cover part of their operational costs.

[107] Proposal for a Regulation of the European Parliament and of the Council concerning the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy (recast) COM/2015/0294 final - 2015/0133 (COD).

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The new CFP foresees the creation of four new ACs for Aquaculture, Markets, the Black Sea and Outermost Regions.

ACs are expected to expand their play in the regionalised CFP and are to be consulted by Member States when preparing joint recommendations on conservation measures.

(9) **Regionalisation:** Another important innovation introduced by the Basic Regulation (Article 18) is "**Regionalisation**". The Basic Regulation enables Regionalisation for a number of instruments and measures: multiannual plans, discard plans, establishment of fish stock recovery areas and conservation measures for compliance with obligations under EU Environmental legislation. Where regionalisation applies, EU member States with a direct management interest may agree to submit joint recommendations for achieving the objectives of the above-mentioned plan or measure. The recommendations have to be compatible with the objectives of the CFP, with the scope and objectives of the measure or plan, and be at least as stringent as measures under EU law. The EU countries have to consult the relevant Advisory Council(s) on the joint recommendations before submitting them to the Commission. If all these conditions are met, the Commission can then adopt a Delegated Act to transform these joint recommendations into EU law applicable to all operators.

Concretely, in most cases, regionalisation may only be used in the context of multi-annual plans.

The aim of Regionalisation is to increase the involvement of the Member States affected by regulation and thus their ownership of the measures. The Commission's role is to ensure that the adopted measures fulfil the objectives of the Basic Act. Regionalisation thus constitutes an important shift from instrument-based to results-based management.

(10) **Establishment of fish stock recovery areas:** Under Article 8 of the Basic Regulation, the Union shall endeavour to establish protected areas due to their biological sensitivity, including areas where there is clear evidence of heavy concentrations of fish below minimum conservation reference size and of spawning grounds. In such areas fishing activities may be restricted or prohibited in order to contribute to the conservation of living aquatic resources and marine ecosystems. Member States shall identify, where possible, suitable areas which may form part of a coherent network and shall prepare, where appropriate, joint recommendations (in line with regionalisation) with a view to the Commission submitting a proposal. The Commission may be empowered in a multiannual plan to establish such biologically sensitive protected areas.

ANNEX VI: BACKGROUND INFORMATION ON THE FISHERY AND THE STATUS OF ANCHOVY AND SARDINE IN THE ADRIATIC

Anchovy and sardine – a mixed fishery

The most valuable and sought-after small pelagic species in the Adriatic are sardine and anchovy, with anchovy being the more valuable of the two and considered to be driving the fishery. The Adriatic small pelagic stocks represent a high economic income for the fisheries sector in that sea basin (estimated to 74 million EUR and corresponding to 18% of the total production in the Adriatic in 2013[108]).

Anchovy and sardine account for over 97% of catches of small pelagics in the Adriatic (see Table 1).

Table 1 Average catches of small pelagics per year, by species, in the Adriatic in 2013-2014 for all countries involved in the fishery.

Species	**Annual catches (in tonnes)**	**% of total catches**
Sardine	73057	72
Anchovy	25266	25
Sub-total for sardine and anchovy	*98323*	*97*
Jack and horse mackerels nei	767	1
Chub mackerel	710	1
Silversides	361	<1
Atlantic mackerel	318	<1
European sprat	240	<1
Greater amberjack	85	<1
Round sardinella	60	<1
Atlantic mackerel	31	<1
Leerfish	20	<1
Atlantic horse mackerel	15	<1
Big-scale sand smelt	11	<1
European barracuda	10	<1
Mediterranean sand smelt	7	<1
Garfish	5	<1
Common dolphinfish	1	<1
Sub-total for other small pelagics	*1874*	*3*
Total for all catches	**100197**	**100**

[108] Sabatella E., Kolitari J., Markovic O., Sabatella R., Zorica B. (2015) Report with a detailed economic and structural overview of the fishing fleets and a qualitative economic performance assessments (for each country and for the whole Adriatic Region). Specific contract N°10 : Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea (SEDAF). Framework Contract MARE/2009/05-Lot 1 "Scientific advice and other services for the implementation of the Common Fisheries Policy in the Mediterranean Sea".

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Source: FAO catch production statistics: http://www.fao.org/gfcm/data/capture-production-statistics/en/. Data downloaded on 10 May 2016.

Two kind of fishing gears are currently used to catch small pelagic species in the Adriatic: the mid-water pelagic trawl net towed by two vessels, mostly operating in the northern and central areas. The second gear is purse seine that is the main gear operating in Croatia[30]**Error! Bookmark not defined.**

Anchovy and sardine in the Adriatic are part of a mixed fishery with a higher catch of sardine in the eastern side (Croatian and Slovenian coasts) and of anchovy in the western (Italian coast) side. Mixed fisheries are fisheries in which several species are likely to be caught in the same fishing operation (i.e. using the same vessel and gear): fishermen unavoidably catch a mixture of species at the same time. They cannot control (or only to a limited extent) the composition of their catches. This means that fishing effort applying to the anchovy cannot be separated from that applying to the sardine and accordingly, the two species should be managed together.

Anchovy and sardine – status of the stocks

These two species have been assessed as overfished since at least 2011 (see Table 2). The most recent scientific advice by the STECF (2015) indicates that both stocks are still being overexploited beyond their reproduction capacities (See Table 3). The current levels of fishing mortality for anchovy is 3.5 times higher than sustainable levels (F_{MSY})[11] and on average, around 35% of the stock is fished every year (See Table 3). The current level of fishing mortality for sardine is 6.75 times higher than which is considered to be sustainable (F_{MSY}) and on average, around 19% of the stock is fished every year (See Table 3).

For both stocks, the ratio of current fishing mortality to sustainable fishing mortality has been increasing since 2011 i.e. we are moving further away from F_{MSY} rather than moving towards a sustainable level of fishing mortality: in 2011 levels of fishing mortality for anchovy were 1.18 times too high (compared to sustainable levels) and in 2013 this was 3.43 times too high. For sardine we moved from 1.43 times above sustainable fishing levels in 2011 to 6.63 times too high (see Table 3)

Recent increases in sardine stock (since 2000), although mow in terms of historical levels, shows that there is still some potential for recovery for this stock. However, to ensure such recovery takes place, exploitation levels needs to be reduced and brought in line with maximum sustainable yield. In contrast, the size of the anchovy stock (SSB) appears to have declined sharply since 2005 (Figure 1).

The GFCM's Scientific Advisory Committee advised in 2015 that fishing mortality for anchovy should be reduced immediately, and that fishing mortality for sardine should be reduced[109]. STECF in 2015 advised that to reach F_{MSY}, catches will need to be decreased considerably for both species and that to achieve this, the relevant fleets' effort should be reduced until fishing mortality is below or at the proposed F_{MSY} level (i.e. by 65% for anchovy), in order to avoid future loss in stock productivity and landings. STECF further advised that this should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations[114].

[109] Report of the 17th Scientific Advisory Committee to the GFCM.

Table 2 Ratio between current fishing mortality (Fcurr) and fishing mortality at MSY (F_{MSY}) for sardine and anchovy in the Adriatic, from 2011 to 2013. Values greater than 1 indicate overfishing and values lower than 1 indicate sustainable fishing.

	Fcurr/Fmsy		
	2011	**2012**	**2013**
Anchovy	1,18	2,09	3,43
Sardine	1,43	2,01	6,63

Source: STECF 2015 stock assessment for small pelagics in the Adriatic[114]**Error! Bookmark not defined.**. The stock assessment carried out in 2015 is based on 2013 data hence 2013 is the most recent year for which such a ratio is available.

Based on the most recent data from scientific surveys in Italy using acoustic techniques (2015), the last 3 years show a declining trend in abundance and biomass for both anchovy and sardine in the Adriatic, with some of the recent biomass levels being the lowest in the available time series. There also appear to be declines in the most recent years for juveniles of both anchovy and sardine, with for example the abundance of young anchovy and sardine being at very low or even the lowest point in the historical time series.

Giacomo Chato Osio & Finlay Scott (2016). Trend exploration of MEDIAS acoustic surveys for early warning and prioritization of small pelagics assessments in the Mediterranean. JRC Technical Reports EUR 28018, DOI 10.2788/331072

Table 3 Scientific advice and reference points for anchovy and sardine in the Adriatic based on STECF (2015) advice

Scientific advice	Reference points				Harvest rate **
	Blim*	Bpa*	F_{MSY} (vs $F_{current}$)	Fmsy ranges	
ANCHOVY - The current levels of fishing mortality (Fcurrent) for anchovy is 3.5 times higher than which is considered to be sustainable (Fmsy) - The stock is considered to be overexploited. - Moving to MSY will require considerable decrease in catches in the short-term though they increase and stabilise over the longer-term.	99,285	139,000	0.30 (vs 1.04)	F_{lower} = 0.23 F_{upper} = 0.364	Around **35%** (i.e. total catches of 32.150 t/SSB of 91.679 tonnes) .
SARDINE - The current levels of fishing mortality for sardine is 6.75 times higher than which is considered to be sustainable (Fmsy) - The stock is considered to be overexploited. - The catches are highly variable throughout reflecting the variable, auto correlated nature of recruitment in the stock. - Moving to MSY will require considerable decreases in catches.	223,000	446,000	0.08 (vs 0.54)	F_{lower} = 0.065 F_{upper} = 0.11	Around **19%** (i.e. total catches of 63.612t /336.082 t SSB)

** Biomass at the beginning of the year (tonnes); ** Calculated as catches divided by the SSB.*
Source: STECF 2015 assessment of small pelagic stocks in the Adriatic[114]

As a result of overfishing, sardine and anchovy stocks may become even less resilient to environmental changes (such as temperature variations) and face a higher risk of population collapse. This happened in the late 1980s when a severe drop of anchovy catches was registered (catches decreased from over 50,000 tonnes to 7,000 tonnes in 1988). Since then, the recovery of the anchovy stock has been only partial as the stock size is still at very low levels and catches are mostly dominated by juveniles and small-sized individuals as fishing activity has already over-exploited large-size individuals11.

Overall, excessive levels of fishing, as well as damage to fish habitats, have caused major losses of biodiversity, changes in the structure of fish populations (e.g. fewer large individuals), appearance of invasive species, food web modifications (e.g. decline of top predators with cascading effects). In addition, overfishing can jeopardise food security

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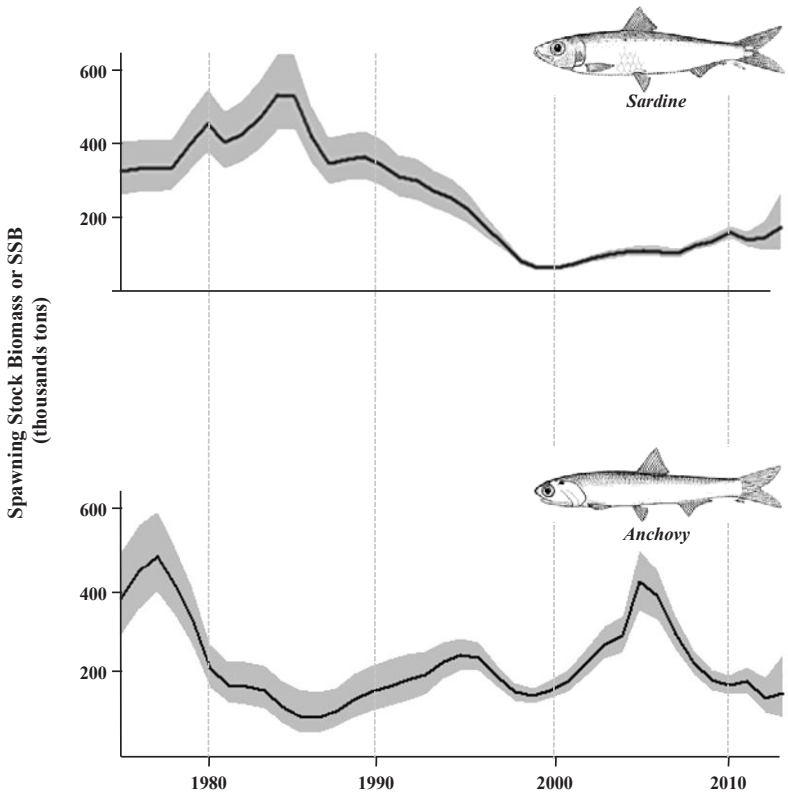
and the livelihood of local people, which is particularly important in the context of the Mediterranean Sea, where there are a large number of small-scale artisanal fisheries. Ensuring that fish stocks remain within biological limits is therefore crucial not only for the ecological balance of the ecosystems, but also for the social and economic well-being of coastal communities.

Figure 1 Historical evolution of the Spawning Stock Biomass (SSB, tonnes) for sardine (upper panel) and anchovy (lower panel), from the mid-1970s to 2013.



Source: Figure based on STECF 2014 stock assessment11

Discarding

Wasteful discarding of unwanted catches was identified as one of the main problems which the reform of the CFP aimed to address. The extent to which fishermen catch unwanted species (eg species they are not targeting or individuals that are below the legal minimum size) and then discard them varies by fishery – mainly due to the nature of the fish stocks and the gear used. For demersal fish[110], levels of unwanted catches tend to be much higher than for pelagic fish such as anchovy and sardine (which swim at the surface, and occur in schools of fish ie groups of only that species). For pelagic species which school, such as anchovy and sardine, setting a net will catch almost exclusively the fish in that school and hence few other species (although undersized individuals of the target species may be caught). Gear selectivity also has an impact on levels of unwanted

[110] which swim not at the surface of the water but lower down in the water column and which tend not to swim in big groups (schools) of fish and to occur in conjunctions with other species.

catches – trawlers, for example, tend to catch far more unwanted fish than gears such as purse seiners which consist of a net that is laid around a school of fish and then tighten to trap them.

Discard data on small pelagic fisheries in the Adriatic are available only sporadically for a limited proportion of the Italian, Slovenian and Croatian fleets but overall the level of discarding is considered to be low, being on average equal to 8.5% for the Italian fleet of GSA 17 (average 2011-2013), and to 2.7% for the Slovenian fleet of GSA 17 (average 2005-2013)[11].

Discards of anchovy and sardine in the fisheries targeting these species in the Adriatic were < 1 % for Croatia, Italy, Slovenia, Albania and Montenegro[111]. By-catches have been estimated in more detail for certain fleet segments, such as the purse seiners in Croatia. For this fleet segment in 2011, 7.9% of catches were non-target species, which comprised mostly other small pelagic fish species. Chub mackerel (*Scomber japonicus*) prevailed with 56.8% followed by boque (*Boops boops*, 14.8%) and horse mackerels (*Trachurus mediterereneus* and *Trachurus trachurus*, 10.1% and 9.9%, respectively)[16]. In Slovenian purse-seiners targeting anchovy and sardine, the following non-target species are caught: mackerel (*Scomber scombrus*), horse mackerel (*Trachurus* sp.), European sprat (*Sprattus sprattus*), round sardinella (*Sardinella aurita*). The level of discard of target species caught using purse seines in Slovenia was under 1%[15].

Box 1: Scientific advice mechanism in the Mediterranean

Scientific advice for demersal and small pelagic fisheries management in the Mediterranean area is delivered by the Scientific Advisory Committee (SAC) of the General Fisheries Commission for the Mediterranean (GFCM). The SAC was created in 1999 and its advice comprises technical and scientific bases for decisions concerning fisheries conservation and management, including biological, social and economic aspects.

Every year a number of thematic workshops and working groups are held under the umbrella of the SAC. The conclusions and recommendations of these meetings are later on adopted by the GFCM. Moreover, two Working Groups for stock assessment (one for demersal stocks and one for small pelagic stocks) are held every year. The outcomes of these Working Groups constitute the basis for the provision of scientific advice for fisheries management in the GFCM region.

The EU's advisory body on fisheries, the Scientific, Technical and Economic Committee for Fisheries (STECF)[112] also provides scientific advice on Mediterranean fisheries. Every year, a number of STECF Expert Working Groups (EWGs) take place, which carry out stock assessment for priority Mediterranean stocks. These EWGs are based on data collected and provided by the Member States under the EU fisheries Data Collection Framework[129].

In addition, the ADRIAMED regional project[113] under the FAO, established in 1999, has provided valuable scientific input on small pelagics in the Adriatic. The Project aims to

111 2015 Stock Assessment forms for Anchovy and Sardine, prepared for the GFCM Scientific and Advisory Committee.
112 https://stecf.jrc.ec.europa.eu/about-stecf
113 http://www.faoadriamed.org/

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promote scientific cooperation among the Adriatic nations and Albania, Croatia, Italy, Slovenia and Montenegro all participate in ADRIAMED. The outcomes of ADRIAMED feed into the work of the STECF and the GFCM.

Scientific advice about anchovy and sardine and conservation reference points

In 2015, the STECF was tasked by Commission services to provide F_{MSY} ranges for anchovy and sardine in the Adriatic. In September 2015, STECF provided F_{MSY} ranges[114] (F_{lower}, F_{upper}) that are derived to deliver no more than a 5% difference in long-term yield compared with F_{MSY}. This is in line with the way in which the international Council for Exploration of the Seas (ICES)[115] provides F_{MSY} advice for stocks in other sea basins. Additionally, in order to be consistent with the ICES precautionary approach, the value for F_{upper} is capped, so that the probability of the spawning stock biomass (SSB) being below the limit biomass reference point (B_{lim}) is no more than 5% ([116] and Figure below).

Theoretically, wider (or narrower) Fmsy ranges could be envisaged. However, for consistency and coherence with the Baltic plan, which has used the ICES definitions for the F_{MSY} ranges, the Adriatic plan would also use ICES' definitions.

STECF provided in 2015 the following F_{MSY} ranges for anchovy and for sardine[114]:

- Anchovy: $F_{lower} = 0.23$, $F_{upper} = 0.36$ (and the F_{MSY} point value = 0.30);
- Sardine: $F_{lower} = 0.065$, $F_{upper} = 0.11$ (and the F_{MSY} point value = 0.08).

However, the stock assessment for sardine is considered as being very uncertain and unstable by the STECF, meaning that the reference values vary quite substantially depending on the model used or over time[117] (when new data are added). In line with the precautionary approach, STECF therefore set very conservative values for F_{MSY}[114].

On this basis, and given that the two species are part of a mixed fishery and should be managed jointly, in the sub-options presented below, the anchovy **range for F_{MSY}** was used for both anchovy and sardine. For anchovy, to get from current levels of fishing mortality (F) to F_{MSY}, a **reduction of 65% in fishing mortality** is required. For sardine, a reduction of 40% would be sufficient to reach F_{MSY} but as these two species are part of a mixed fishery and are targeted by the same fisheries and that anchovy is driving this

114 Scientific, Technical and Economic Committee for Fisheries (STECF) – Small pelagic stocks in the Adriatic Sea. Mediterranean assessments part 1 (STECF-15-14). 2015. Publications Office of the European Union, Luxembourg, EUR 27492 EN, JRC 97707, 52 pp.

115 www.ices.dk

116 SSB is the spawning stock biomass – the size of the adult part of a stock (in tonnes) that is able to contribute to reproduction in any given year; B_{lim} and B_{pa} are conservation (or precautionary) reference points for any stock. The smaller the stock size, the greater the likelihood that reproduction will be impaired and the stock will fall below safe biological limits. If the stock size is below B_{lim} there is a risk that the stock will suffer from severely reduced productivity. B_{pa} is the biomass reference point designed to have a low probability of being below B_{lim}. When the spawning stock size is estimated to be above B_{pa}, the probability of impaired recruitment is expected to be low.

117 For example, whereas in 2015 STECF estimated the F_{MSY} point value for sardine at 0.08, in 2014 they estimated F_{MSY} at 0.23. In 2013, it was 0.46. For anchovy, on the other hand, the F_{MSY} point value was 0.38 in 2013, 0.5 in 2014 and 0.3 in 2015.

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fishery, the target reduction in F for anchovy was used to ensure that F_{MSY} would be reached for both species[118].

For the purpose of modelling the impacts of the different sub-options under Option 2, the upper bound of the F_{MSY} range for anchovy was used. The rationale for this is the following: by applying the target reduction in fishing mortality for anchovy (65%) to sardine, we will effectively be exploiting sardine at less than the maximum that could be harvested in line with F_{MSY} Therefore, to minimize this under-exploitation of sardine, the upper end of the F_{MSY} range of sardine is used.

In addition to F_{MSY} ranges, a multi-annual plan should contain **safeguard values in terms of biomass**: Blim and Bpa[119] (Figure 2). STECF provided in 2015 the following Blim and Bpa reference points for anchovy and for sardine:

1) Anchovy: Bpa = 139 000 t, Blim = 99 285 t

2) Sardine: Bpa = 446 000 t, Blim = 223 000 t[114]

As for F_{MSY} ranges, the biomass safeguard values for sardine are considered to be unstable and more uncertain than those for anchovy.

[118] Applying the sardine target reduction in F (40%) would not be sufficient to achieve F_{MSY} for anchovy by 2020 and is therefore not an option.

[119] SSB is the spawning stock biomass – the size of the adult part of a stock (in tonnes) that is able to contribute to reproduction in any given year; B_{lim} and B_{pa} are conservation (or precautionary) reference points for any stock. The smaller the stock size, the greater the likelihood that reproduction will be impaired and the stock will fall below safe biological limits. If the stock size is below B_{lim} there is a risk that the stock will suffer from severely reduced productivity. B_{pa} is the biomass reference point designed to have a low probability of being below B_{lim}. When the spawning stock size is estimated to be above B_{pa}, the probability of impaired recruitment is expected to be low.

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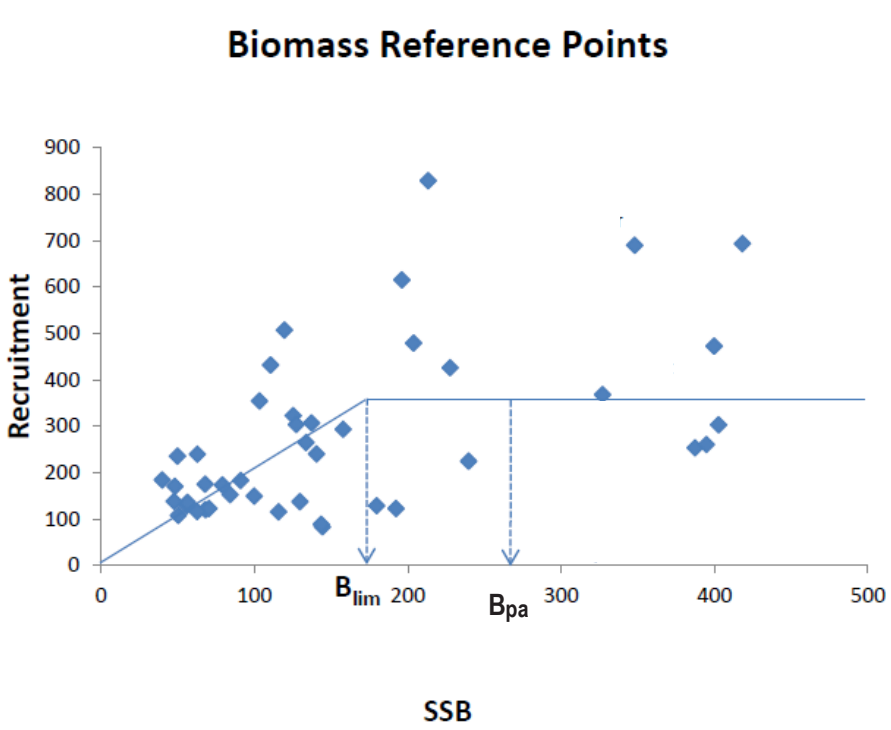
Figure 2 Illustration of biomass-based reference points. B_{lim} and B_{pa} are precautionary reference points related to the risk of impaired reproductive capacity. Diamonds show the variable recruitment for different spawning stock sizes (SSB) that has been observed over the years. Recruitment can be seen to be generally lower when the SSB is below B_{lim}.



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ANNEX VII: IMPACTS OF THE DIFFERENT OPTIONS FORECAST UNTIL 2021

The environments, economic and social impacts of the different Options were forecast under the Management Scenarios Study[66]. The outcomes are presented in graphical form below, including historical trends, to support the discussion under Section 6 of the report.

The figures below present historical trends in environmental and socio-economic parameters for the anchovy and sardine stocks and fisheries in the Adriatic. The graphs also present information about Option 1 (Baseline scenario), and Option 2 including Sub-options 2 (2018) and Sub-option 2 (2020) with the range of possible impacts depending on how Member States will allocate fishing reductions within the fleet (numbered 2a-2d for presentational purposes, with 2a and 2b representing the possible outcomes under Sub-option 2 (2018) and 2c and 2d representing the possible outcomes under Sub-option 2 (2020). The impacts of Option 3 (worst case) are equivalent to those under the Baseline (Option 1) whilst the impacts of Option 3 (best case) will be in line with the possible range of impacts under Option 2.

Figure 1 Past trends and forecasted anchovy stock sizes in the Adriatic until 2021 under the different Options

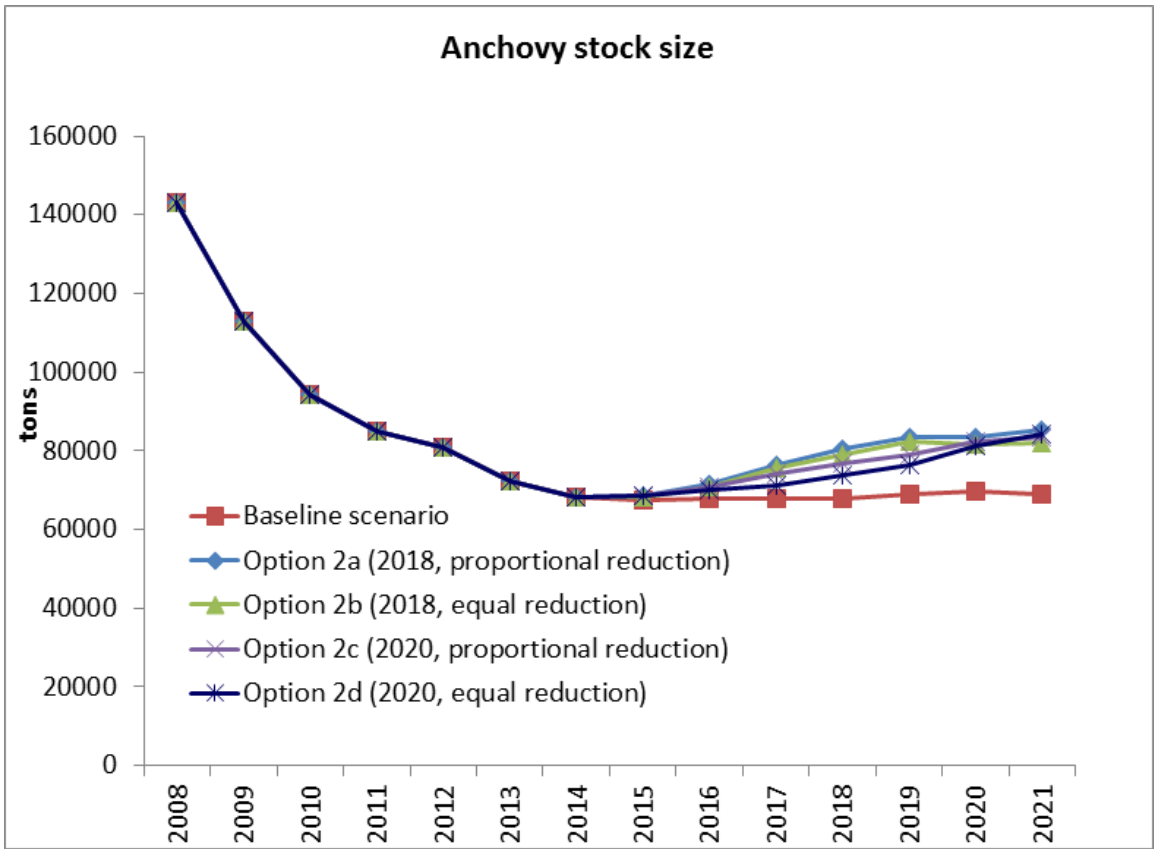

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Figure 2 Past trends and forecasted sardine stock sizes in the Adriatic until 2021 under the different Options

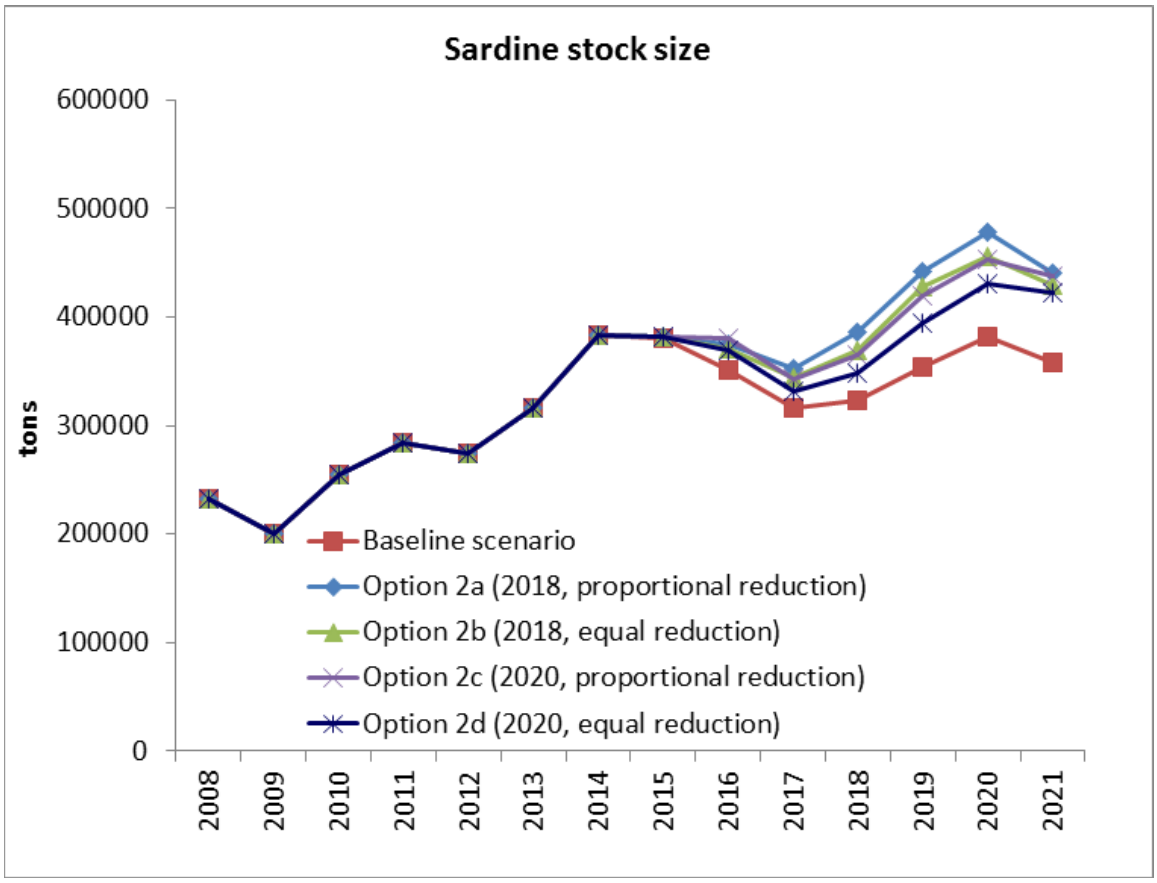

Figure 3 Past trends and forecasted catches of anchovy in the Adriatic until 2021 under the different Options

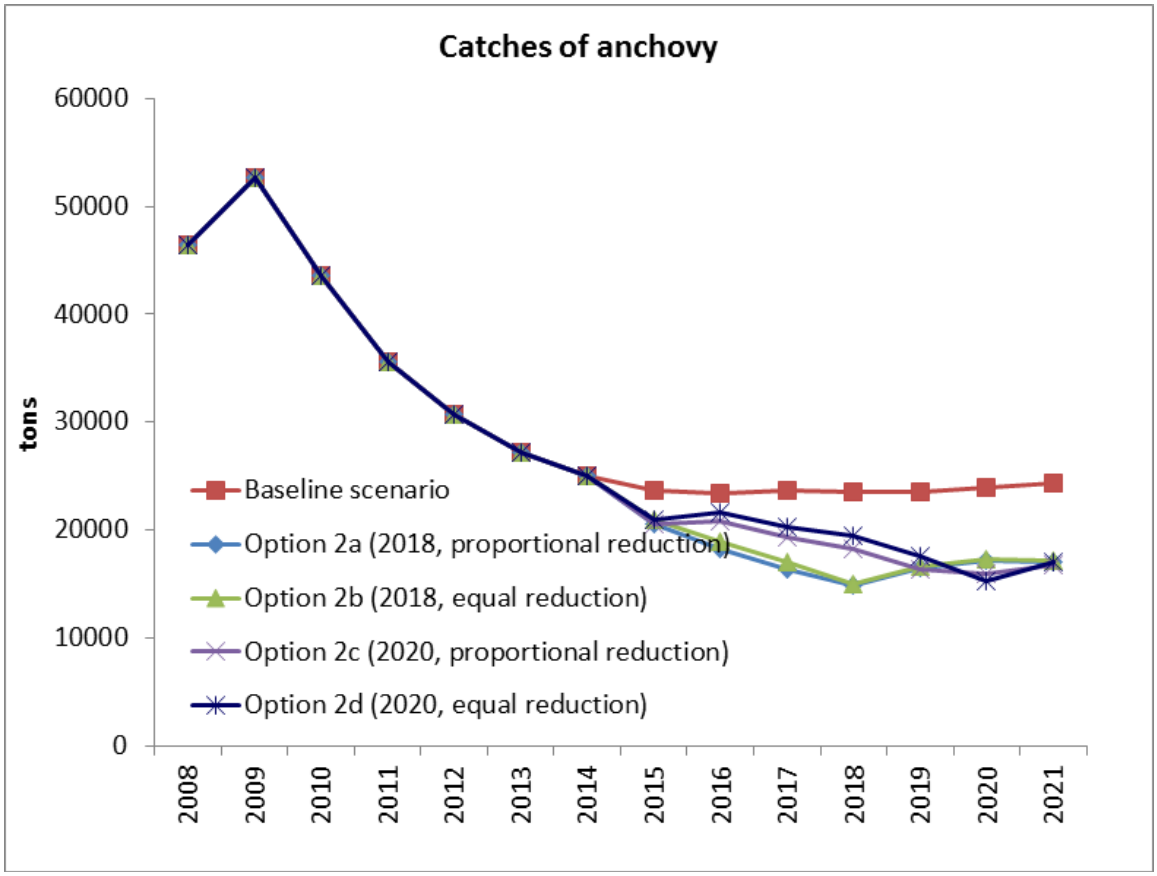

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Figure 4 Past trends and forecasted catches of sardine in the Adriatic until 2021 under the different Options

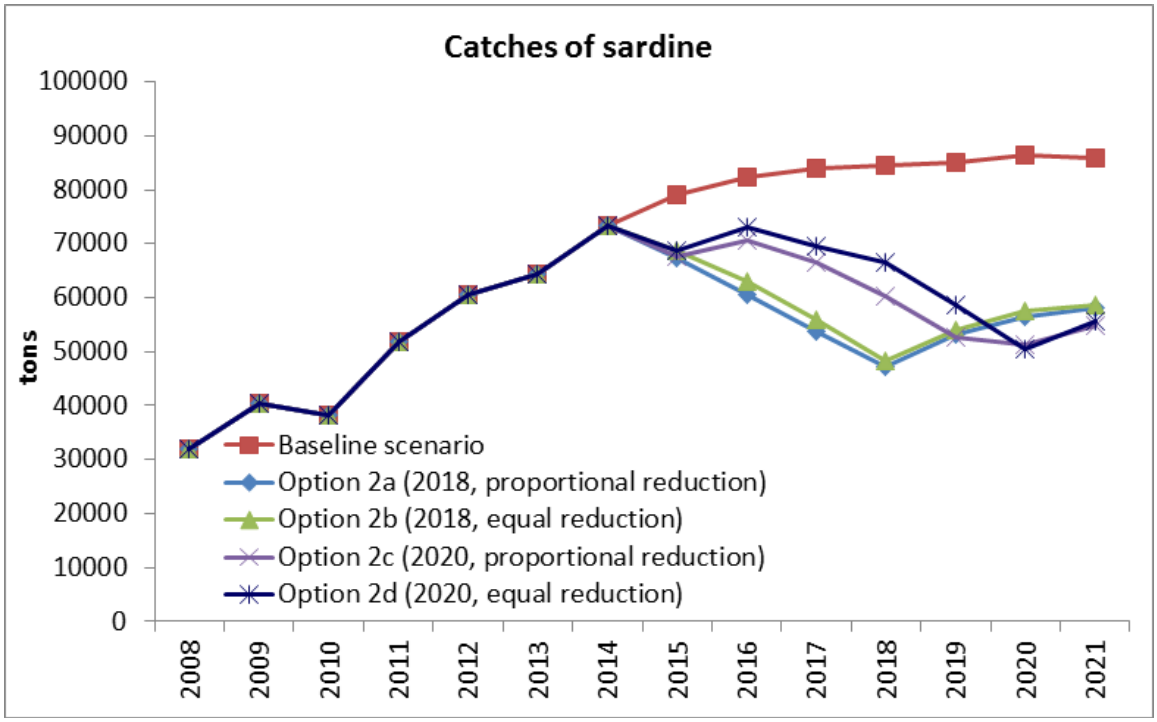

Figure 5 Past trends and forecasted total revenues for the anchovy and sardine fisheries in the Adriatic until 2021 under the different Options

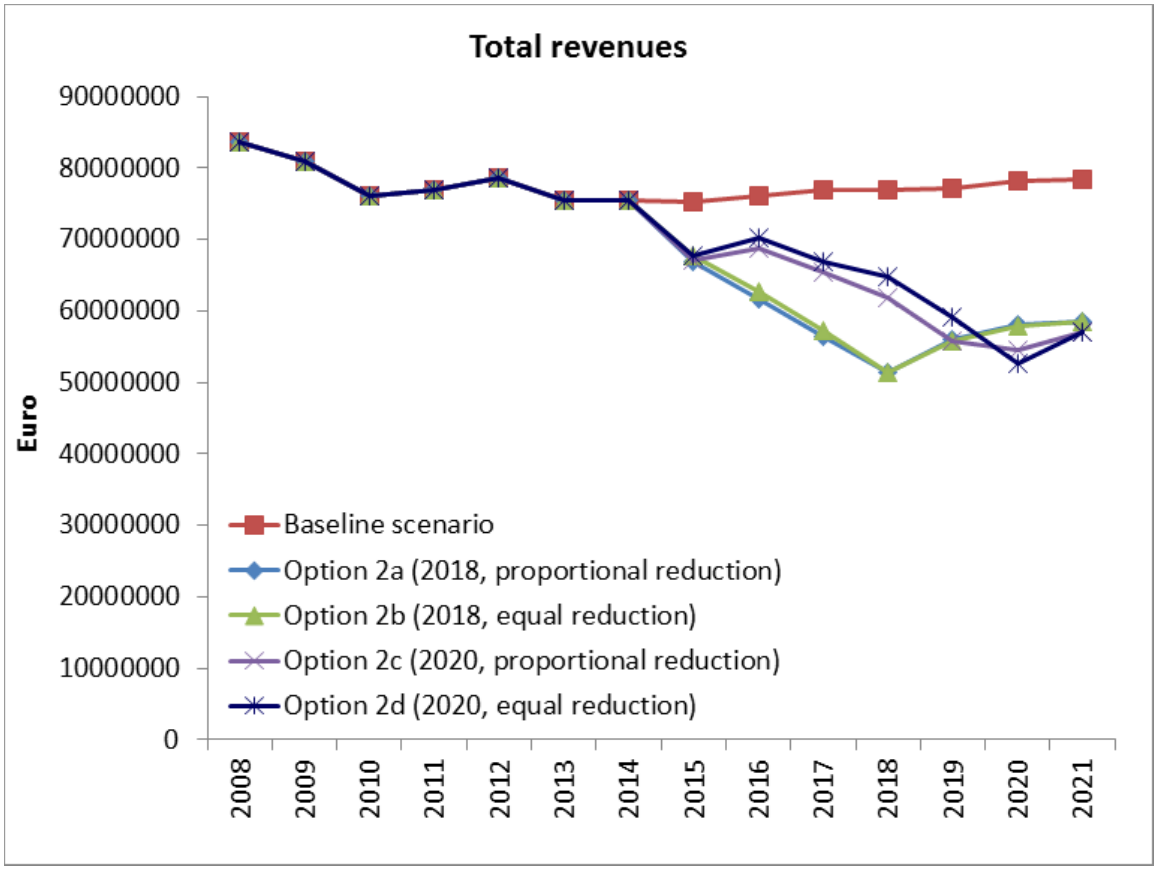

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Figure 6 Past trends and forecasted average salary for fishermen in the anchovy and sardine fisheries in the Adriatic until 2021 under the different Options

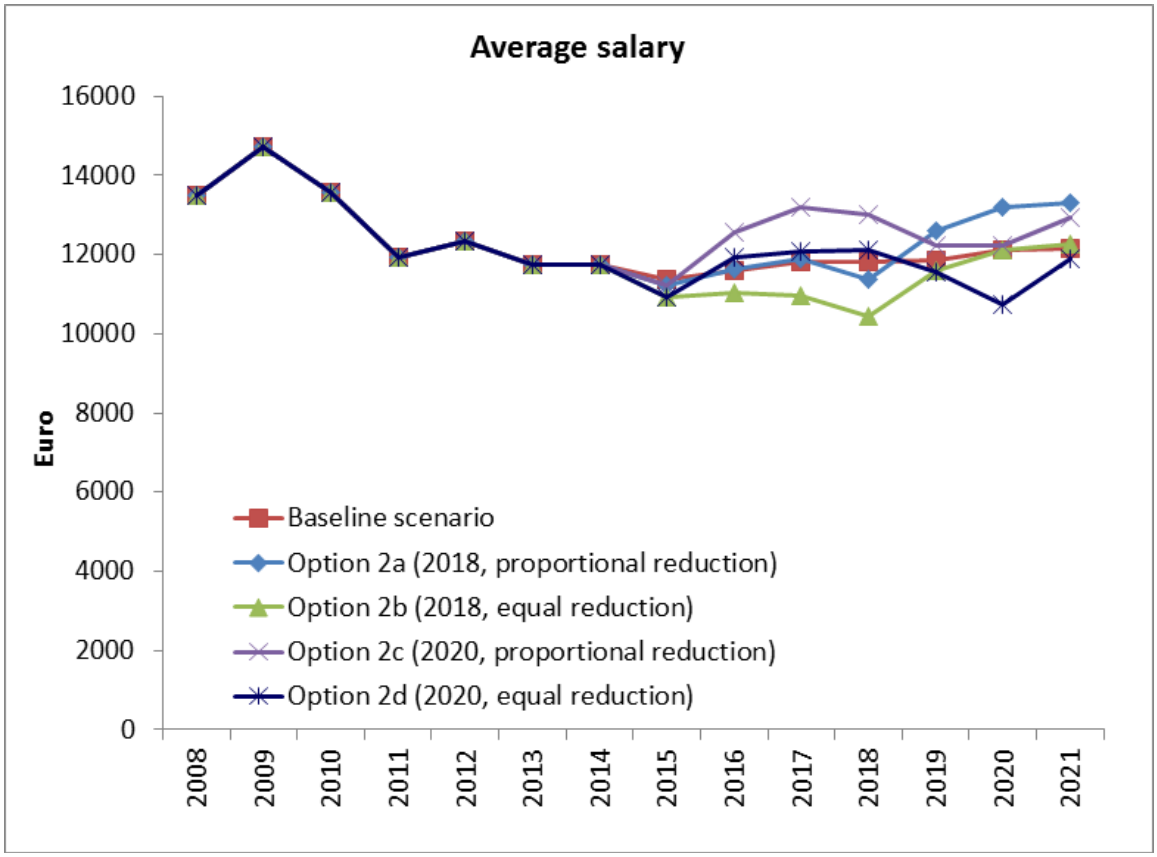

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Figure 7 Past trends and forecasted employment in the anchovy and sardine fisheries in the Adriatic until 2021 under the different Options

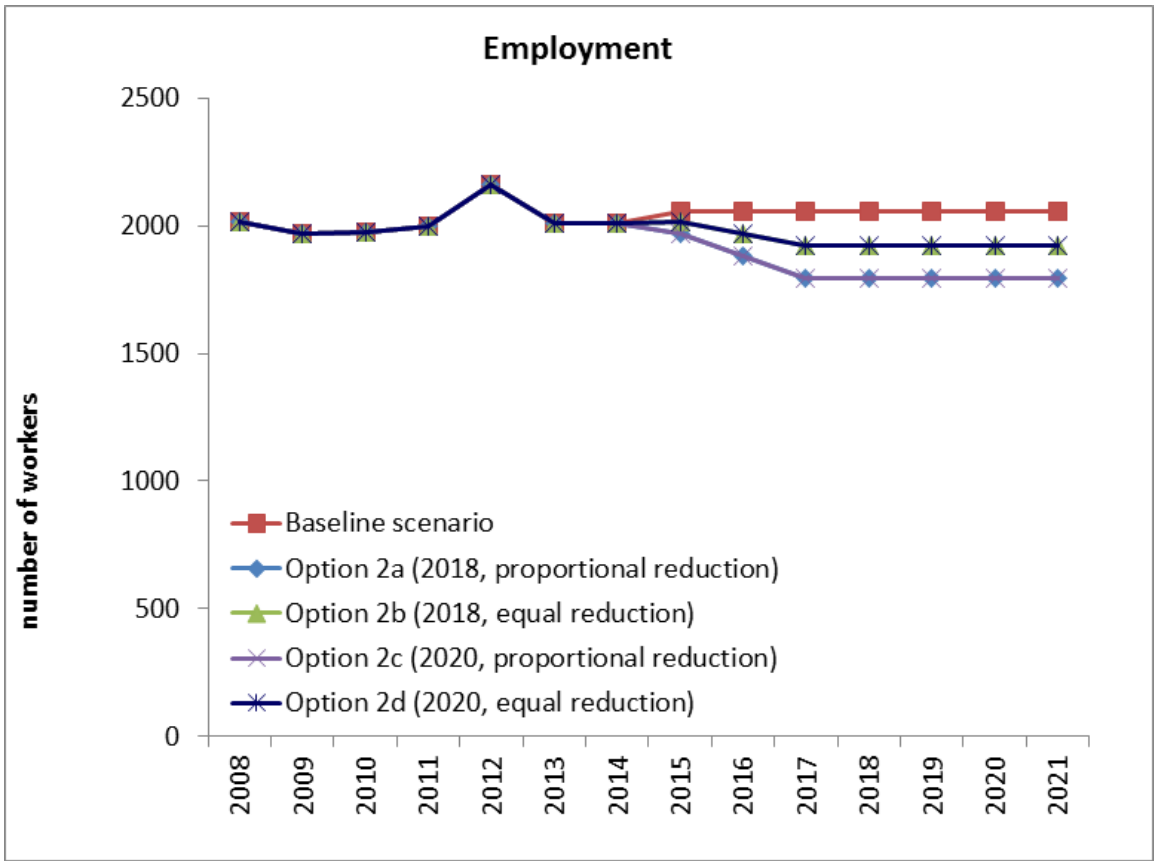

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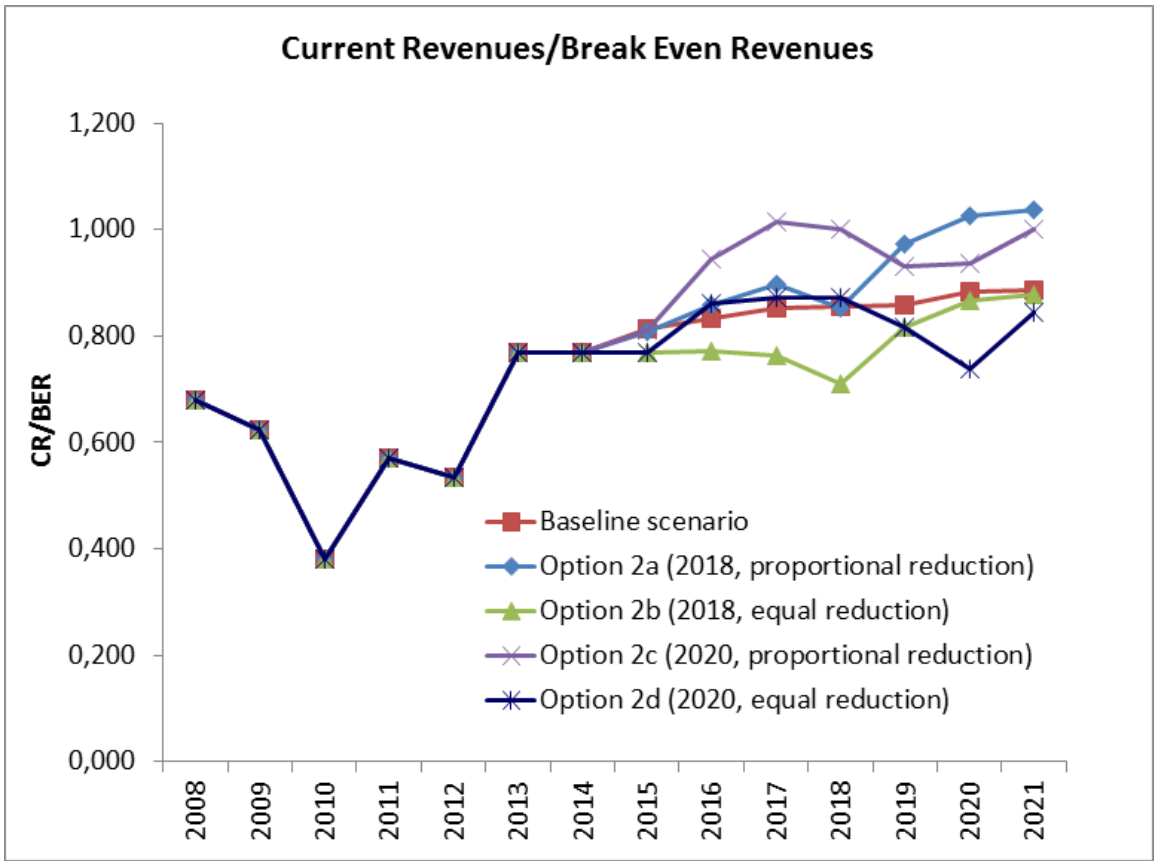
Figure 8 Past trends and forecasted levels of short-term profitability (Current revenue/Break Even revenue) in the anchovy and sardine fisheries in the Adriatic until 2021 under the different Options



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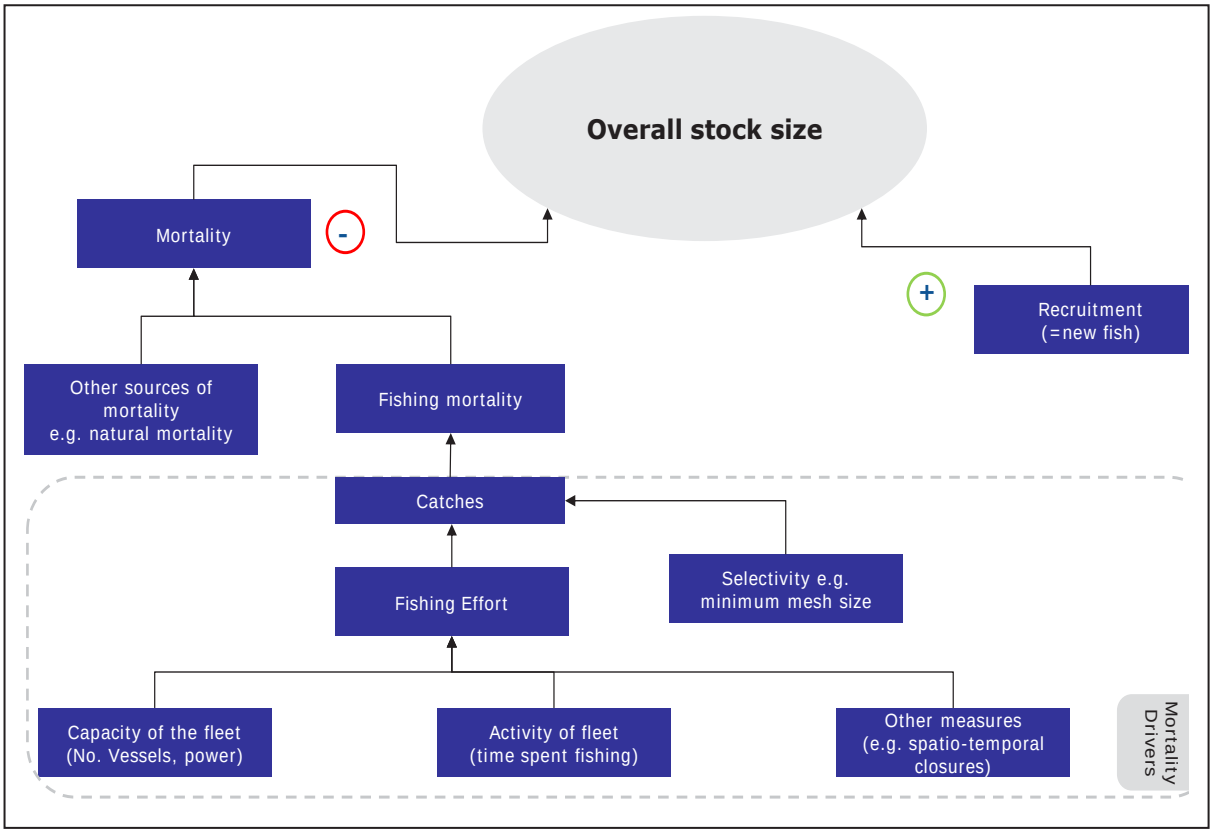
ANNEX VIII: OVERVIEW OF FISHERIES MANAGEMENT

In a fishery, fishing mortality is directly related to the level of catches that take place, which in turn depend on several factors, such as how many boats are fishing the stocks, for how long, using what gear etc. (see Figure 1). Fisheries can be managed in different ways, essentially by managing either the effort that goes into the system (how much fishing takes place), which is referred to an input control, or what comes out of the system (quantity of fish, or catches), which is referred to as output control.

Figure 1 Factors affecting stock size in fish and different drivers of fishing mortality



Essentially, levels of catches depend on both how much fishing takes place (fishing effort) and how many fish are caught by boats while they fish (selectivity). Fishing effort in turn is determined by the number of boats fishing (and their size/power) and how much time these boats spend fishing.

Effort limitation (input controls)

To date, as presented in Section 1.3, anchovy and sardine in the Adriatic have been managed through effort limitation (also referred to input limitations as management focuses on the input to the system), in the form of limitations on the number of vessels authorized to fish, of the number of days that vessels can spend at sea, on closed periods, or areas, etc. as well as through measures focusing on the selectivity of the gear (e.g. minimum mesh sizes).

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Managing effort and selectivity have an impact on levels of catches, but this is indirect i.e. reducing the number of days that vessels can fish by 50% does not necessarily result in a 50% decrease in catch levels. In fact, this would generally result in a smaller reduction in catches than 50%. In the case of pelagic trawlers, for example, which are one of the fleet segments involved in this fishery, they generally spend only a few hours per day at sea fishing for small pelagics, and hence if the number of days authorized is reduced, they could simply increase the number of hours they fish in a day to maintain catches at the same level. Additionally, small pelagics occur in shoals (aggregations of fish which move together) and hence an important part of a vessel's fishing time is spent looking for shoals, and only a smaller part translates into actual fishing time and hence mortality on the fish. This is another reason why it is difficult to estimate how changes in effort will translate into changes in catches.

Catch limits (output controls)

There are several other fishing areas where small pelagics are managed through catch limitations, e.g. in the Atlantic and North Sea through the system of Total Allowable Catches (TAC) and (national) quotas as well as in other areas of the world (e.g. off West Africa, in Australia[120]).

Total allowable catches (TACs), also referred to as fishing opportunities, are catch limits (expressed in tonnes or numbers) that are set for most commercial fish stocks in the Baltic, North Sea and Atlantic Ocean as well as under many RFMOs (including for Blue-fin tuna under ICCAT). The Commission prepares the proposals, based on scientific advice on the stock status from advisory bodies such as **ICES** and **STECF**. Some multi-annual plans contain rules for the setting of the TACs. TACs are set annually for most stocks (every two years for deep-sea stocks) by the Council of fisheries ministers.

TACs are shared between EU countries in the form of national quotas. For each stock a different allocation percentage per EU country is applied for the sharing out of the quotas. This fixed percentage is known as the **relative stability** key. EU countries can exchange quotas with other EU countries.

EU countries have to use transparent and objective criteria when they distribute the national quota among their fishermen. They are responsible for ensuring that the quotas are not overfished. When all the available quota of a species is fished, the EU country has to close the fishery.

In several other parts of the European fishing sector, which were faced with problems of overexploitation and stock declines, there have been recoveries in the fish stocks and the fishing sectors following implementation of multi-annual management plans[121] and a system of catch-limits. In the Northeast Atlantic, North Sea and Baltic, between, 2006 and 2014 the number of stocks fished sustainably increased from 2 to 26. In line with this improvement of the state of fish stocks, there has been a general improvement in the economic performance of the EU fleet. The economic performance of the fleets dependent on plaice, for example, have improved significantly under the management plan which brought the fishery to a sustainable level[21].

120 http://www.afma.gov.au/fisheries/small-pelagic-fishery/

121 These multi-annual management plans were adopted under the previous CFP.

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In the case of the Blue-fin Tuna, one of the most valuables species worldwide, after a serious decline in stocks, and the near collapse of Blue-fin Tuna as well as the fisheries sector dependent on it, a 15-year recovery plan was adopted in 2006 by the RFMO in charge of management of this stock (the International Commission for the Conservation of Atlantic Tunas - ICCAT). This recovery plan was based on a system of catch-limits to manage the Blue-fin Tuna. Thanks to the successful implementation of this recovery plan, which involved restricting catch limits for several years, the stock has reached record levels and in 2014 the ICCAT endorsed a 20% annual increase of the Bluefin tuna (BFT) TAC over the next three years (including a 20% in catches for the EU fishing sector)[122].

[122] https://www.iccat.int/en/

ANNEX IX: MEASURES UNDERTAKEN OR PLANNED BY CROATIA, ITALY AND SLOVENIA TO ADDRESS THE IMBALANCE BETWEEN THEIR FISHING CAPACITY AND THE AVAILABLE RESOURCES

Member States are required under the Basic Regulation (Article 22) to put in place measures to adjust the fishing capacity of their fleets to their fishing opportunities over time. The analysis and evaluation of the balance between the fleets and the resources that they exploit is carried out by each Member State, in accordance with the common guidelines developed by the Commission. If the assessment clearly demonstrates that the fishing capacity is not effectively balanced with fishing opportunities, Member States must prepare an action plan for the fleet segments with identified structural overcapacity. The action plan set out the adjustment targets and tools to achieve a balance and a clear time-frame for its implementation[123].

Croatia, Italy and Slovenia have already taken measures to reduce the impacts of their fleet segments involved in the small pelagic fishery in the Adriatic (under the European Fisheries Fund (EFF)[124], and that all three Member States plan to carry out more measures in this regard in the coming years using the European Maritime and Fisheries Fund (EMFF)[2] funding.

Specifically, the three Member States have proposed the following measures in their Action Plans[125] to achieve an enduring balance between fishing capacity and fishing opportunities, established under Article 22(4) of the Basic Regulation:

- **Croatia** considers that, in light of the available data on the status of stocks in the Adriatic and the indicators available, the capacity reduction measures should target purse seiners (and demersal trawls). Therefore, Croatia plans to reduce capacity and effort for its purse seiners in the Adriatic, and to use technical measures. Scrapping measures are part of the Croatian Operational programme for the European Fisheries Fund (EFF) as well as for the EMFF, with the target date for achieving results by the end of 2017 for the EFF and the end of 2020 for EMFF respectively, with the following capacity reduction targets (compared to 2013):

	Under EFF	**Under EMFF**
Purse seiners of 12-18m	20%	20%
Purse seiners of 18-24m	10%	10%
Purse seiners of 24-40m	7%	5%

123 COM (2014) 545: COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL 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.

124 COUNCIL REGULATION (EC) No 1198/2006 of 27 July 2006 on the European Fisheries Fund; OJ L23 of 15.8.2006, p. 1.

125 http://ec.europa.eu/fisheries/fleet/index.cfm?method=FM_Reporting.AnnualReport

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By limiting the number of authorizations for purse seiners, Croatia also intends to achieve further reductions in fishing effort. Croatia also expects to implement additional temporal closures (as of May 2015) in the whole territorial waters of Croatia, affecting all vessels targeting small pelagic species. In addition, Croatia intends to reduce fishing effort through diversification of activities and possibly to reduce the capacity through withdrawal from fishing by way of reassignment of the vessels (conversion to other complementary activities)[126].

- **Slovenia** includes its purse seiners 12-18m (4 vessels), in their action plans to reduce capacity for this segment on the basis that these vessels are already the subject of a GFCM multiannual management plan in the Adriatic. This is to be done through reductions in fishing effort, use of temporary cessation of fishing activities, and freezing of the number of licences for purse seiners in the Adriatic[40].

- **Italy** plans to rebalance the capacity and productivity of the main fish stocks by reducing current fishing mortality by an average of at least 20%, with a target date of 2017. This is to be done, amongst other, through a 10% reduction in capacity (GT/kW) of the purse-seine /pair-trawling fleet in GSA 17 & 18 (12-18m, 18-24m and 24-40m segments) by the end of 2017. These capacity reductions are proposed in addition to reductions achieved under schemes financed through the EFF that were due to be completed in 2015. Italy also envisages further reductions in fishing mortality (of at least 10%) to be achieved through future multi-annual management plans under the CFP and/or through changes in the management plans in force under the MEDREG. Italian authorities consider that this will be achieved through a combination of temporary cessation, effort control, and a ban on towed gear in biological protection areas.

[126] Annual report on balance between fishing capacity and fishing opportunities for 2014 – Croatia.

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ANNEX X: DETAILED INFORMATION ON DATA COLLECTION AND MONITORING PROVISIONS RELATING TO IMPLEMENTATION OF THE COMMON FISHERIES POLICY

Monitoring of some of the effects of management measures is done as part of the routine work associated with the implementation of the CFP:

(1) The EU fisheries Control Regulation (Council Regulation (EC) No 1224/2009)[60] contains provisions that oblige Member States to **control whether fishermen respect the CFP rules**. Among other rules, Member States are obliged to carry out landing inspections and cross check whether fishermen correctly record their catches in order to, amongst other, ensure that no fish caught illegally enter markets (see Annex XI for further details).

(2) Specifically for sardine and anchovy in the Northern Adriatic (where the vast majority of fishing for these species takes place in the Adriatic), the Commission has adopted in 2014 a Specific Control and Inspection programme (SCIP)[127], which is implemented through Joint Deployment Plans (JDPs). Joint control and inspection activities conducted under the JDP are exhaustive and based on a risk assessment approach. They cover fishing and fishing-related activities including farming, weighing, processing, marketing, transport and storage of fisheries products and sport and recreational fisheries[128].

(3) Under the EU Data Collection Framework (DCF)[129], Member States are required to collect detailed **data on catch** (e.g. size and age of the fish caught) and to provide it to scientific bodies for stock assessment purposes.

(4) Under the DCF, Member States must also collect annually **data on their fleets**, allowing estimates of number of vessels by fleet segment, their fishing capacity and fishing effort, as well as **social and economic data** allowing an assessment of their economic performance. This inculdes, for example, measures of employment and of profitability of the sectors.

(5) Under the DCF, Member States must also collect socio-economic data on the **aquaculture and processing sectors**. This inculdes, for example, measures of employment and of profitability of the sectors.

(6) These DCF data are analysed annually or bi-ennially by the STECF to identify trends in the fisheries, aquaculture and processing sectors.

(7) Every year, at the request of the Commission, STECF assesses the **status of certain fish stocks** in the Mediterranean against $_{MSY}$ and other benchmarks related to sustainability. Historical values for F (fishing mortality) and spawning stock biomass (SSB) are estimated and catch projections are conducted showing how different catch levels in the coming year would affect F and SSB relative to chosen benchmarks (F_{MSY}, B_{MSY}, B_{pa}, etc). Sardine and anchovy in the Adriatic have been assessed regularly in recent years.

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127 Commission Implementing Decision 2014/156/EU of 19 March 2014 which establishes a SCIP for fisheries exploiting stocks of bluefin tuna in the eastern Atlantic and the Mediterranean, swordfish in the Mediterranean and stocks of sardine and anchovy in the northern Adriatic Sea

128 http://www.efca.europa.eu/en/content/mediterranean

129 Council Regulation (EC) No 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy framework for fisheries. OJ L60, 5.3.2008, p.1-12.

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(8) In addition, under the GFCM Management Plan, GFCM Parties are required to ensure scientific monitoring of the status of the small pelagic stocks in the Adriatic as well as monitoring of the fisheries concerned. The GFCM SAC will provide on an annual basis advice on the status of these stocks.

(9) The **markets** are also a valuable source of information. The EU Market Observatory for Fisheries and Aquaculture products (EUMOFA[73]) enables direct monitoring of the volume, value and price of fishery and aquaculture products, from the first sale to retail stage, including imports and exports.

(10) Progress toward **MSFD Good Environmental Status** is already an obligation for Member States under that Directive.

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ANNEX XI: OVERVIEW OF CURRENT MANAGAEMENT MEASURES AT NATIONAL, EU AND INTERNATIONAL LEVEL INCLUDING RETROSPECTIVE EVALUATION OF THESE MEASURES

I. Management at national level

Council Regulation (EC) No 1967/2006 (the Mediterranean Regulation or MEDREG)[13] is the framework for fisheries management in the Mediterranean. Adopted by the Council in 2006, it entered into force in January 2007, with a transitional period until 31 May 2010 for some provisions. The MEDREG contains technical measures as well as a set of management measures to be adopted by the Member States (e.g. obligation to adopt national management plans for certain fisheries or specific gears). It also encompasses rules for the protection of sensitive habitats (e.g. obligation to adopt Fisheries Protected Areas, protection of *Posidonia* beds, etc.).

Currently, small pelagic species (anchovy and sardine) in the Adriatic are managed in the territorial waters of Italy, Croatia & Slovenia by means of three **national management plans**, adopted under Article 19 of the MEDREG. These combine in particular effort management with specific technical measures. In addition, several additional measures have been adopted in recent years in these Member States, as detailed below.

Croatia

A management plan for Srdelara purse seine fisheries was adopted in 2014 in Croatia[16]. This plan is applicable for 3 years. Its aim is to maintain the stocks within safe biological limits which is primarily reflected in the retention of the current trends of biomass and recruitment of the species targeted with this fishing gear. The plan does not contain an MSY target or a date by which to reach this.

The measures to be implemented to achieve the aims are the following

- Permanent cessation in order to reduce capacity (through buy-off of the licences, transfer into another type of fisheries or leaving fisheries entirely).
- Temporary cessation in special situations affecting the biomass but the plan does not include specific measures in this regard, only examples of possible measures such as monthly closures during spawning periods)
- Freezing the issuance of fishing licenses to prevent new vessels entering the fleet
- Prohibiting purse seine net fishing two days prior and two days after the dark moon period.
- Minimum mesh size (14mm) and minimum catch size (11cm for sardines and 9cm for anchovies) set in accordance with the MEDREG
- A closure period is observed from 15th December to 15th January from the Croatian purse seiners.

In addition, since then, Croatia has adopted additional measures in order to implement the GFCM Recommendations:

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First, an Ordinance on commercial fishing using purse seine net – srdelara[130] was adopted in 2014, under which criteria for obtaining the authorisation for fishing with purse seine net – srdelara were modified.

Another Ordinance on spatial and temporal restrictions regarding the commercial fishing using purse seine net – srdelara was also adopted in 2014[131]. It includes provisions on temporal closure of fishing using purse seine net - srdelara in the entire Croatian fishing sea during the period from 1 to 31 December with the interruption during the period from 14 to 24 December 2014 in such a way that during this period each vessel could have had maximum 5 fishing days. It also implements a temporal closure of fishing using the purse seine net – srdelara for vessels larger than 12 m during the period from 21 August till 24 December 2014 in the part of channel area, covering around 28% of the Croatian inner fishing sea. These measures continued also in 2015 starting from 1 January to 31 January. The Ordinance also introduced the temporal restriction on using the purse seine net – srdelara in the entire Croatian fishing sea during the warm part of the year in period from 1 May to 31 May for the purpose of protection of anchovy during its spawning season.

Slovenia

A management plan covering different types of fishing gears, including surrounding nets targeting small pelagic, was adopted in 2014 in Slovenia[15]. The aim of the management plan is to adjust the fishing effort is to adjust the fishing capacities and fishing opportunities for that segment of fisheries that uses purse seines. To achieve this, the following measures are included:

- Temporary suspension of the granting of commercial fishing licences for purse seines
- Review of commercial fishing licences to remove inactive vessels from the register.
- Reduction in the fishing effort of vessels that use purse seines through permanent cessation (scrapping of vessels or their reallocation to activities outside fisheries) and temporary cessation. A reduction in the capacity of the active fleet of at least 5% (expressed in gross tonnage) is expected compared to the active fleet in 2010).

The plan does not contain an MSY target or a date by which to reach this.

In addition to this management plan, Slovenia has adopted additional national technical measures. First, fishing logbooks are required for all vessels with purse seines and for all quantities and species of fish caught. Furthermore, all Slovenian fishing vessels active with purse seines have VMS installed although they are all under 15 m of length overall[132].

130 The Ordinance on commercial fishing using purse seine net – srdelara ("Official gazette" No 101/2014, 106/2014, 125/2014, 140/2014, 147/2014, 2/2015, 37/2015 and 44/2015)

131 Ordinance on spatial and temporal closures regarding commercial fishing at sea by using purse seine net – srdelara in 2014 („Official gazette" No. 101/2014, 106/2014 and 132/2014)

132 Regulation on the traceability of catches, Official Journal of the Republic of Slovenia No 2/13

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Italy

1. **A management plan for surrounding nets and for pelagic trawl nets (circuizione e traino pelagico) was adopted in 2011 by means of a Directorial Decree in Italy**[14]. The aim of the management plan is the recovery or the maintenance of stocks within safe biological limits. It intends to achieve this by controlling the rate of exploitation and the continuous monitoring of the available biomass. The plan does not contain an MSY target or a date by which to reach this.

The management plan includes the following measures:
-a 15% reduction in fishing effort via **a reduction of 3% in fishing capacity** through permanent cessation and via **a reduction of 12% in fishing activity** through a reduction in fishing days from 5 to 4 per week for certain periods and through temporary cessation.
-setting of catch limits
-making fishing on these stocks conditional on the vessel being issued with a fishing permit under certain conditions. The number of licenses may vary from year to year only on the basis of scientific monitoring of the results.
- setting up a system to regulate the removal of biomass from the sea according to the market needs.

Besides, Italy has been enforcing for years a general regulation concerning the fishing gears and since 1988 a suspension (of around one month) of fishing activity of pelagic trawlers in summer[11].

A closure period of 60 days (August and September) and a closure period of 42 days were endorsed respectively in 2011-2012 and in 2013 by the Italian fleet[11].

In addition to the management plan adopted in 2011, new decrees were adopted in Italy in 2014 and 2015:

- A Ministerial decree from 2014[133] modify the closure period of 42 consecutive days for vessels registered the maritime districts from Trieste to Rimini. This temporary suspension is enforced from 28th of July to 7th September 2014 instead of 11th August to 21st August for the other vessels.
- A ministerial decree was adopted in 2015[134] implementing GFCM recommendations. This sets a limit of 144 days at sea for active vessels targeting anchovy resources and introduces a 30-day period in which pelagic fisheries are prohibited (from July 1 to July 30, 2015) in the Adriatic Sea between Monfalcone and Termoli, within six miles from the coast.

133 Italian Ministerial Decree 23/7/2014
134 Italian Ministerial Decree 16/3/2015

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2. Management at EU level

At **EU level**, the landing obligation is applicable since 2015 in the Mediterranean for small pelagic fisheries and the first Discard Plan entered into force on 1 January 2015, until end 2017, covering notably anchovy and sardine in the Northern and Southern Adriatic fished with mid-water pelagic trawls and purse seines[17]. This Discard Plan provides for certain derogations from the landing obligation for small pelagic in the Adriatic:

- in the Northern Adriatic, up to 5 % of the total annual catches of anchovy and sardine in the small pelagic mid-water trawl and purse seines fisheries may be discarded;
- in the Southern Adriatic: (i) up to 3 % of the total annual catches of anchovy and sardine in the small pelagic purse seines fisheries; and (ii) up to 7 % in 2015 and 2016 and up to 6 % in 2017 of the total annual catches of anchovy and sardine in the small pelagic mid-water trawl fisheries;

In accordance with the CFP, the provisions of this Discard Plan must be integrated into the future multi-annual plans for the fisheries concerned if such a plan is adopted.

Another important tool to manage fisheries in the EU has been to prescribe **technical measures**, i.e. measures establishing conditions for the use and structure of fishing gear and restrictions on access to fishing areas. So far, the technical measures in place for fisheries exploiting stocks in the Mediterranean, including in the Adriatic, are enshrined in the MEDREG. The measures include gear specifications, minimum conservation reference sizes for certain species, conditions for the use of certain gears (e.g. minimum distance from the coast and/or depth for deployment) as well as a number of provisions for the protection of sensitive habitats. The reasons for the technical measures vary but very often they are in place to protect juveniles and to avoid unwanted catches, and thus reduce discards.

On 11 March 2016, the Commission adopted a proposal for a new **framework for technical measures** in line with the logic of the reformed CFP[69]. This proposal aims to bring together in a single framework the provisions relating to fisheries technical measures (i.e. relating to use of fishing gear, mesh size, spatio-temporal closures, minimum conservation reference sizes etc) which are currently spread out in many pieces of legislation, and to set minimum standards in this respect. The proposal also puts in place the process of regionalisation whereby the technical measures set out in this proposal can be modified on the basis of joint recommendations by Member States which, if scientifically justified and valid, and in the context of EU multi-annual plans, are then adopted through Commission delegated acts. Annex IX of the proposal includes the following technical measures specifically for the Mediterranean: Minimum conservation reference sizes, minimum mesh sizes, restrictions on the use of fishing gears, mitigation measures for sensitive species.

Data collection is part of the core functioning of the CFP. Reliable and complete data are central to well-functioning fisheries management as they provide the basic information for scientific advice and for the monitoring of the European fisheries sector. For this reason, an **EU framework for the collection and management of fisheries data** was

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established in 2000[135], and then reformed in 2008 resulting in the Data Collection Framework (DCF)[129]. The DCF establishes a harmonized set of EU rules governing the collection of biological, environmental, technical, and socio-economic data on the fishing sector, the aquaculture and processing sector striving for better availability of data to the scientists resulting in improved advice to data users including the Commission. In order to align the DCF to the reformed CFP, the Commission made a proposal in 2015 to recast the DCF Regulation[107].

The fisheries Control Regulation[60] establishes a framework for the control of fishing activities, which apply to all EU fisheries. Under this Regulation, some of the key provisions of relevance to the Adriatic small pelagic fisheries are the following:

- An EU fishing vessel operating in EU waters shall be authorised to carry out specific fishing activities only insofar as they are indicated in a valid **fishing authorisation** (Article 7);
- Without prejudice to specific provisions contained in multiannual plans, a fishing vessel of 12 metres' length overall or more shall have installed on board a fully functioning device which allows that vessel to be automatically located and identified through the **vessel monitoring system** (VMS) by transmitting position data at regular intervals (Article 9);
- A fishing vessel exceeding 15 metres' length overall shall be fitted with and maintain in operation an **automatic identification system** (AIS) (Article 10);

135 **Council Regulation (EC) No 1543/2000** of 29 June 2000 establishing a Community framework for the collection and management of the data needed to conduct the common fisheries policy

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- Without prejudice to specific provisions contained in multiannual plans, masters of EU fishing vessels of 10 metres' length overall or more **shall keep a fishing logbook of their operations**, indicating specifically all quantities of each species caught and kept on board above 50 kg of live-weight equivalent (Article 14);
- Masters of EU fishing vessels of 12 metres' length overall or more shall use **electronic logbooks** and shall send it by electronic means to the competent authority of the flag Member State at least once a day (Article 15);
- Each Member State shall **monitor, on the basis of sampling, the activities of fishing vessels which are not subject to logbook requirements** (i.e. vessels under 10 m) in order to ensure compliance by these vessels with the rules of the common fisheries policy (Article 16);
- Member States must **provide to the Commission on a monthly basis** and electronically **data on the quantities of each stock or group of stocks subject to TACs or quotas** landed during the preceding month. For species not subject to TAC and quota Member States must report data on their catches on a quarterly basis (Article 33).
- When adopting a multiannual plan, **a threshold may be established**, applicable to the live weight of species subject to a multiannual plan, above which a fishing vessel shall be required to **land its catches in a designated port** or a place close to the shore (Article 43).

The **financial instrument** to support the implementation of the CFP is the **European Maritime and Fisheries Fund (EMFF)**[2] 2014-2020. The bulk of the funds are managed jointly with the Member States (shared management) and are destined to support:

- CFP implementation, aquaculture and bottom-up local development;
- Mmarketing and processing, producer organisations, production sectors, and compensation for operators in the outermost regions;
- Control, inspection and enforcement;
- Fisheries-related data collection;
- A number of key pan-European objectives such as marine knowledge and integrated maritime surveillance.

Each Member State details the use of the funds received in shared management in an operational programme, covering the period 2014-2020, which has to contribute to four of the eleven thematic objectives[136] of the ESI funds and translate the Europe 2020 strategic objectives into investment priorities. The EMFF is not only directed to fisheries and innovation in fisheries, aquaculture and processing but also to support diversification and promote the economic development of fisheries dependent areas.
The EU has, and continues to provide **financial assistance** to Member States to the fishing industry and coastal communities to help them adapt to changing conditions in the sector and become economically resilient and ecologically sustainable. For the period 2014-2020, the European Maritime and Fisheries Fund (EMFF)[2] provides funding for the EU's fisheries and maritime policies. This includes 537 million Euros allocated to Italy, 253 million Euro for Croatia and 25 million Euro for Slovenia[137].

The EMFF specifically provides funding to help fishermen in the transition to sustainable fishing, to support coastal communities in diversifying their economies and to finance

[136] Thematic objectives (TO): TO 3: competitiveness of SMEs in the fisheries sector; TO 4: supporting the shift towards a carbon-free economy; TO 6: preserving and protecting the environment and promoting resources efficiency; TO 8: promoting sustainable and quality employment.

[137] http://ec.europa.eu/fisheries/cfp/emff/index_en.htm

projects that create new jobs in coastal communities. Specifically, the EMFF contains provisions whereby support can be provided to fishermen for:

- **Temporary cessation of fishing**, when based on scientific advice, and under a Multiannual Plan, a reduction of fishing effort is needed in order to achieve MSY.
- **Permanent cessation** (scrapping of vessels or removing them from the fishing fleet for other purposes) in cases where a fleet segment is not effectively balanced with fishing opportunities available to that segment[138].
- **Diversifying their sources of income** e.g. by carrying out touristic activities with their boats,
- **Retraining** into a new job.
- **Replacement of gears** (e.g. to be more selective)
- **Measures to reduce the impact on the environment.**

The EMFF also contains provisions covering the design and maintenance of systems for **allocating fishing opportunities** (i.e. national quotas under a TAC & quota system) (Article 36) and relating to the development of Control systems such as the installation of electronic logbooks or VMS (Article 76).

3. Management at international level

At **international level**, the General Fisheries Commission for the Mediterranean (GFCM) adopted in 2013, on the basis of an EU proposal, a management plan to regulate the exploitation of the small pelagic stocks, sardine and anchovy, in the Adriatic[139], which was amended in 2014[143]. The GFCM management plan sets specific objectives for the Northern Adriatic (GSA17). It fixes a maximum exploitation rate (E)[140], a precautionary level of spawning stock biomass (SSB), a maximum fishing fleet capacity, maximum fishing days per year and safeguard rules (i.e. a pre-agreed plan for adjusting management of the fish stocks based on its perceived status). All vessels actively fishing for anchovies and sardines in GSA17 are subject to the provisions of this plan.

For the Southern Adriatic (GSA18), transitional conservation measures are applied because the Scientific Advisory Committee (SAC) of the GFCM was not in a position to establish a formal assessment (see Annex VI - Box 1). The objective of the transitional measures for the small pelagic fishery in GSA 18 is to start preparing the ground for a future management plan while reducing the risk that, in the absence of relevant scientific assessment, the biomass level of the stock could drop below undesirable levels. Therefore, the specific objectives are set provisionally until identification of reference points[141] in line with MSY by the SAC.

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138 STECF (2015) Assessment of balance indicators for key fleet segments and review of national reports on member States efforts to achieve balance between fleet capacity and fishing opportunities (STECF-15-15)

139 **Recommendation GFCM/37/2013/1** on a multiannual management plan for fisheries on small pelagic stocks in the GFCM-GSA 17 (Northern Adriatic Sea) and on transitional conservation measures for fisheries on small pelagic stocks in GSA 18 (Southern Adriatic Sea).

140 E (exploitation rate) = F (Fishing mortality)/Z (total mortality) ie the exploitation rate is the fraction of the total mortality that is due to fishing.

141 In order to define long-term objectives in fisheries management, one has to consider the values of the fishing level, which allow bigger catches in weight, whilst also ensuring the conservation of the stocks. The extreme values of the biomass or the fishing level, which might seriously affect the self-renovation of the stocks, also have to be considered. These fishing level values, of catch and biomass are designated as biological reference points (BRP).

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In terms of effort management, the vessels fishing actively for small pelagics have a limit of activity of 20 days per month with a total maximum of 180 days per year. The GFCM recommendation also includes fish capacity control as well as national programmes for control, monitoring and surveillance of the fishing activities are also part of this recommendation.

Furthermore, some technical measures were established under this management plan, including *inter alia* the prohibition of fishing for individuals below the minimum conservation reference size (9 cm and 11 cm, respectively for anchovy and sardine) and the prohibition of using certain fishing gears within 3 nautical miles of the coast or 50 m depths.

The management plan also provides for situations in which the GFCM should adopt emergency measures (when the size of the stock of either anchovy or sardine is below a pre-defined reference point).

In 2014, the SAC established that the stock of anchovy was over-exploited and advised to decrease fishing mortality.

In addition, the scientific revision of the assessment models and reference points included in the management plan (recommendation **GFCM/37/2013/1)** revealed some uncertainties and potential biases8. For this reason, the original recommendation was slightly revised, and the GFCM adopted **emergency measures for the year 2015** for the Northern Adriatic[142]. Maximum fishing days for vessels targeting anchovy were reduced to 144 per year. In addition, in order to protect nursery and spawning grounds, the countries active in this fishery in the Northern Adriatic had to apply spatio-temporal closures of no less than 15 continuous days between 1 April and 31 August.

In 2015, the SAC found that the anchovy stock continued to show a declining trend of SSB, while the stock of sardine was over-exploited. The GFCM adopted **emergency measures for 2016** (a roll-over of the measures adopted for 2015), but this time the spatio-temporal closures were applied for both the Northern and Southern Adriatic[143].

In 2016, the GFCM adopted further emergency measures for 2017 and 2018. These were based on previous emergency measures but expanded to include a freeze on catches (at 2014 levels) and a freeze on capacity (above a certain threshold) as well as an obligation for Parties to close 30% of their nursery area for at least 6 months (for vessels over 12m).[19]

Certain provisions from the GFCM management plan (Recommendations GFCM/37/2013/1 and GFCM/38/2014/1) have been transposed into EU law through Regulation (EU) 2015/2102[144].

Retrospective evaluation of the national management plans adopted under the MEDREG

[142] Recommendation GFCM/38/2014/1 amending Recommendation GFCM/37/2013/1 and on precautionary and emergency measures for 2015 on small pelagic stocks in the GFCM GSA 17.

[143] Recommendation GFCM/39/2015/1 establishing further precautionary and emergency measures in 2016 for small pelagic stocks in the Adriatic Sea (GSA 17 and GSA 18)

[144] Regulation (EU) 2015/2102 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU) No 1343/2011 on certain provisions for fishing in the GFCM (General Fisheries Commission for the Mediterranean) Agreement area

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National management plans adopted by Member States under the MEDREG **have been thoroughly analysed** by the STECF[30] based on a dedicated study[145]. The conclusions were that despite the fact that sardine and anchovy are covered by national plans adopted by the relevant Member States, they are not currently exploited at sustainable levels as required under the new CFP. The plans were in fact developed and implemented prior to the reform of the CFP and therefore are not in line with the objectives of the new Basic Regulation.

The main problems with the national management plans is the following:

- Targets: they are not ambitious enough in their targets to ensure that the stocks will be fished sustainably as required under the CFP: the target dates laid down in the plan are outdated with respect to the CFP objectives and need to be updated to ensure achieving the maximum sustainable exploitation rate by 2020 at the latest.
- The approach is, by definition, national, which means that:

  - these national management plans include a number of biological limit and target reference points for anchovy and sardine that were determined at a national level rather than for the stock (region) as a whole.

  - there are different measures in each of the three Member States, whereas the two stocks are a shared resource fished throughout the Adriatic. Management of the stocks therefore needs to take place at a regional level to be effective and to ensure that the stock, as a whole can reach sustainable levels.

  - the plans only cover national waters whereas the two fish stocks are found also in international waters: the national plans therefore have gaps in their coverage and don't cover the activities of all fleets exploiting the resources (see Figure 1).

- The plans need to be updated and improved in terms of their management measures to align them to international standards for fisheries management.

As a general remark, STECF considers that for **shared stocks**, fisheries' management plans need to take into account the impacts of all fleets and countries involved in the fisheries exploiting such stocks rather than just a national/fishery-specific approach. Therefore, STECF considers that in general, broader scale regional management plans, which encapsulate all fleets exploiting the stocks identified within the plans, would be more appropriate. STECF concludes that a management plan, which covers all fisheries for sardine and anchovy in the Adriatic, should be developed for these shared stocks[30].

STECF concludes that under the existing national management plans, reductions of the catches are **insufficient to reach sustainable fishing levels by 2020** and therefore, STECF considers that, unless changes in the above aspects are made to the national management plans, it is very unlikely that the objectives of the CFP will be achieved[30].

Retrospective evaluation of the GFCM management plan for small pelagics

[145] MAREA: MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE - SPECIFIC CONTRACT n° 9, Task 4 - Ad hoc scientific advice in support of the implementation of the Common Fisheries Policy, "Scientific advice on the conformity of management plans with the requirements of the Common Fisheries Policy in the Mediterranean Sea"- Revised report 08.08.2014.

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A **workshop on bioeconomic assessment of management measures** (WKMSE) was held at the GFCM headquarters, Rome, Italy, from 1 to 3 February 2015[50]. The key objectives of the meeting were to: i) review the existing methodologies to perform Management Strategy Evaluation (MSE) simulations and the different harvest control rules used in the GFCM and other RFMOs and ii) assess the biological, economic and social implications of alternative management scenarios for the small pelagic fishery in the Adriatic Sea.

Simulations showed that under current fishing mortality, anchovy and sardine in the Adriatic remained outside safe biological limits. Simulations show that current fishing mortalities (F is maintained at the current level (average of last 3 years – 2012-2014) are too high and if continued, stocks would remain outside biological safe limits, remaining at stable levels without signs of improvement, or even collapse between 2020 and 2030 (depending on the assumptions regarding recruitment of young fish).

The emergency measures adopted under the GFCM for 2015, which consist of a reduction of catches and of fishing mortality by 9%, did not seem to have any positive effect on the stocks status, and the outcomes in terms of risk of stock collapsing were similar to the status quo (no management measure at all).

The **reference points in the GFCM Management Plan** have also undergone numerous reviews by the scientific community since the GFCM management plan was adopted in 2013 and there is agreement that the values in the plan are not appropriate[23]. During the 2014 SAC, scientists concluded that the reference points established in the management plan needed to be revised; they were, however, not in a position to propose new reference points in line with MSY. In 2015, the SAC was again unable to propose suitable reference points and considered that a comprehensive revision of the scientific analysis should be carried out. In 2016, the SAC published the new reference points based on the updated scientific assessment of both stocks which could for the basis for an update of the GFCM management plan.

Complexity of the current management framework

Tables 1 and 2 below present an overview of the management measures adopted at national and international level, illustrating how these change between countries and also how they have changed over time.

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Table 1 Closed seasons for fishing sardine and anchovy under GFCM and in the three Adriatic Member States

	GFCM	Croatia	Italy	Slovenia
2011			60 day closure period	
2012			60 day closure period	
2013	Spatio-temporal closures for nursery areas to be implemented.	15th December to 15th January	42 day closure period	
2014		1 to 31 December with the interruption during the period from 14 to 24 December 2014. Also for vessels larger than 12 m during the period from 21 August till 24 December 2014 in the part of channel area, covering around 28% of the Croatian inner fishing sea.	Closure from 28th of July to 7th September 2014 for vessels registered the maritime districts from Trieste to Rimini. Closure from 11th August to 21st September for the other vessels. In addition, from 28th July 2014 to 31st October 2014 in the maritime waters of the Adriatic, except those of Monfalcone and Trieste and in the Ionian sea, bottom trawl and pelagic trawl fisheries are banned within 6 miles from the coast or at depths of less than 60 meters. Exemption: From July 28th to October 31st 2014, vessels registered in category IV licenced for local coastal fisheries within six miles of the coast and fishing vessels with an overall length of up to 15 meters, are authorized to fish from 4 miles offshore	
2015	15-30 days continuous closure between 1 April – 31 August in GSA17	1 January to 31 January for vessels larger than 12 m during the period from 21 August till 24 December 2014 in the part of channel area, covering around 28% of the Croatian inner fishing sea. And	July 1 to July 30 in the Adriatic Sea between Monfalcone and Termoli, within six miles from the coast."	1-15 April 2015 closure all waters

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	GFCM	Croatia	Italy	Slovenia
		closure in all Croatian sea from 1 May to 31 May.		
2016	15-30 days continuous closure between 1 April – 31 August in GSA17 & GSA18			
2017	15-30 days continuous closure between 1 Oct – 31 March for sardine & 1 Apr – 30 Sept for anchovy in GSA17 & GSA18 and close 30% nursery area for > 6 months (for vessels > 12m)			

Table 2 Measures adopted under the GFCM relating to fishing effort, capacity and to catches

	Fishing effort	Fishing capacity and catches
2013	Freezing effort at 2011 levels & 180 fishing days/year & 5 fishing days/week in GSA17	Freeze capacity at 2011 levels. Ban fishing for juveniles. Min. catch size 9cm (anchovy) and 11cm (sardine)
2014	180 fishing days/year & 20 fishing days/month in GSA17	
2015	144 fishing days/year if targeting anchovy in GSA17	
2016	144 fishing days/year if targeting anchovy in GSA17	
2017	180 fishing days/year for fleet with max 144 fishing days if targeting anchovy or sardine in GSA17 & 18	Freeze catches at 2014 level. Freeze capacity at 2014 level (except SI).
2018	180 fishing days/year for fleet with max 144 fishing days if targeting anchovy or sardine in GSA17 & 18	Freeze catches at 2014 level. Freeze capacity at 2014 level (above a threshold).

As demonstrated above, there has been a **lack of stability** in the measures adopted both at international level (GFCM rules) and at national level (national management plans adopted under the Mediterranean Regulation).

The international rules have changed on a yearly basis since the GFCM management plan was adopted in 2013:

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- In 2014 this management plan was amended, inter alia to change the effort limitation of 5 fishing days/week to 20 fishing days/months, and additional emergency measures were adopted (reducing annual fishing effort from 180 days to 144 days for vessels targeting anchovy and the obligation for Partoes to adopt spatiotemporal closures of 15-30 days/year for the Northern Adriatic).
- In 2015 new emergency measures were adopted and the spatiotemporal closures were extended to the Southern Adriatic.
- In 2016, the GFCM just adopted further emergency measures, extending the 144 fishing day limit to vessels targeting sardine, and introducing a freeze in catch and capacity levels (at 2014 levels) for the years 2017-2018, changing the periods of the year during which spatiotemporal closures should take place, introducing a further obligation to close 30% of nursery areas to fishing.

The national measures have also changed frequently in Croatia, Italy and Slovenia:

- A management plan was adopted in Croatia in 2014 and since then the management rules for this fishery have been changed through two additional pieces of national legislation.
- A management plan was adopted in Slovenia in 2014 and since then the management rules for this fishery have been changed through an additional pieces of national legislation.
- A management plan was adopted in Italy in 2011 and since then the management rules for this fishery have been changed through four additional pieces of national legislation.

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ANNEX XII: PAST TRENDS IN SOCIO-ECONOMIC PERFORMANCE OF THE FISHING SECTOR FOR ANCHOVY AND SARDINE

Table 1 presents recent trends in key economic and social parameters for the main fleet segments exploiting the anchovy and sardine fishery between 2008 and 2014. Across all fleet segments, on average, salaries have declined or remained stable over that period. In all but two fleet segments, both short-term profitability (=Current revenue/Break-even revenue - CR/BER) and long-term profitability (=Return on Investments - ROI) as well as overall revenues (for anchovy and sardine) have declined or remained stable over the period. In 7 out of 11 fleet segments, employment has declined or remained stable. The only positive trend has been for revenues specifically from sardines which have increased in recent years for 5 out of 11 fleet segments. If nothing changes, then on the basis of recent trends, the overall outlook does not appear positive in either biological or socio-economic terms.

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Table 1 Traffic light table on the socio-economic performance of the fleets targeting small pelagics (red=recent negative trend; green=recent positive trend; yellow=stable situation or variable but without any trend).

	% of total fishing pressure	Salary (euro)	CR/BER	ROI	Overall Revenues (thousand euros)	Revenues anchovy (thousand euros)	Revenues sardine (thousand euros)	Employment (number of units)
All fleets								
ITA17_TM_1218	10.0							
ITA17_TM_1824	8.0							
ITA17_TM_2440	24.7							
ITA17_PS_2440	6.3							
HRV17_PS_1218	2.7							
HRV17_PS_1824	10.7							
HRV17_PS_2440	17.7							
SVN17_PS_1218	0.1							
ITA18_TM_VL_2440	14.7							
ITA18_PS_VL_2440	5.0							

Key: CR/BER = ratio between current and break-even revenues. ROI = Return on Investment. The green values represent a trend > +5%, the red ones represent a decline > 5% and the yellow ones represent a trend of between -5% and + 5%. For fleet segment codes, see Annex III - Table 4.

Source: Management scenarios study[66] – the tables with detailed values for the socio-economic parametres above, by fleet segment, can be found in Annex IV.

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ANNEX XIII: COHERENCE BETWEEN DIFFERENT EU MULTI-ANNUAL PLANS AND OVERVIEW OF EU MULTI-ANNUAL PLAN FOR BALTIC FISHERIES

Coherence between EU multi-annual plans for fisheries

One of the key tools provided by the CFP is the **EU multi-annual plan**. Since the entry into force of the current Basic Regulation in 2014, only one EU multi-annual plan has been adopted, concerning the Baltic Sea[7].

At the time of submission of this Impact Assessment, the Commission was also finalising its proposal for the multi-annual plan for fisheries concerning demersal fish (who live at or near the bottom of the sea) in the North Sea, and work is ongoing on the proposals for multi-annual plans for fisheries in the western EU waters and in the Western Mediterranean.

The coherence between the multi-annual plan for small pelagics in the Adriatic and the other multi-annual plans referred to above relate to their shared objectives of reaching sustainable fishing levels by 2020 at the latest. The multi-annual plans also all include provisions to facilitate the implementation of the landing obligation, and to enable the process of regional decision making for concrete management and conservation measures. Within this shared framework, each multi-annual plan retains specificities stemming from the particular characteristics and problems faced by the fisheries and sea basins concerned. In the small pelagic fishery in the Adriatic, for example, by-catch and discarding is not an important problem whereas it may be a key problem for other fisheries or sea basins.

Baltic Multi-annual plan

In July 2016, the multi-annual plan for Baltic fisheries was adopted. The main elements are presented below.

The Regulation establishes a multiannual plan for stocks of cod, herring and sprat in the Union waters of the Baltic Sea and for the fisheries exploiting the stocks concerned. It also contains measures concerning plaice, flounder, turbot and brill caught as by-catch in the Baltic Sea.

Fishing mortality ranges

The plan will include fishing mortality targets in the form of F_{MSY} ranges, which will be stipulated in an annex to the plan, for the stocks covered by the plan. The F_{MSY} ranges will be split into two parts and the use of the upper part of the ranges will be conditioned as follows: the upper part of the range may only be used due to mixed-fisheries issues, to avoid serious harm to a stock caused by intra- or inter-species stock dynamics, or to limit variations in fishing opportunities between consecutive years to not more than 20%.

The plan does not include an empowerment to the Commission to update the ranges when scientific advice changes.

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Safeguards
The plan stipulates biomass safeguards for the main targeted stocks. Whenever the biomass of a stock falls below a certain threshold, stipulated in an Annex to the plan, remedial action shall be taken. This includes setting a TAC at a fishing mortality level below the FMSY ranges if the biomass falls below the respective triggers, and taking further measures, including a suspension of the targeted fishery for the stock in question, if the biomass falls below the respective limit reference point.

Regionalised measures
The plan empowers the Commission to adopt specific conservations measures when scientific advice states that remedial action is required to protect any of the stocks covered by this regulation. The plan also empowers the Commission to adopt follow-up measures of the current "discard plans", i.e. exemptions from the landing obligation. As established in Art. 18 of the Basic Regulation, both kind of regionalised measures will be based on Joint Recommendations from the Member States concerned and will be adopted as delegated acts.

Control measures
The plan sets out additional control measures, such as the use of prior notifications and logbooks and establishing thresholds for the obligation to land catches in designated ports as required by the fisheries Control Regulation Regulation (EC)[60].

Evaluation of the plan
The Commission shall report to the European Parliament and to the Council on the results and impact of the plan on the stocks covered by this Regulation three years after the date of entry into force of the Regulation and every five years thereafter.

ANNEX XIV: OVERVIEW OF THE PREFERRED OPTION – MAIN ELEMENTS OF AN EU MULTI-ANNUAL PLAN FOR SMALL PELAGICS AND THEIR FISHERIES IN THE ADRIATIC

Context

The following provisions of the Basic regulation are of relevance to the plan:

- Article 9 and 10 of the Basic Regulation contains provisions on the **objectives and contents of multi-annual plans**. In accordance with Article 10 of the Basic Regulation multi-annual plans should contain quantifiable **targets**. Such targets should be supplemented with **safeguard provisions** linked to a trigger **conservation reference point**.

- Pursuant to Article 15 of the Basic Regulation **the landing obligation** applies to small pelagic fisheries (i.e. fisheries for mackerel, herring, horse mackerel, blue whiting, boarfish, anchovy, argentine, sardine, sprat), anywhere in EU waters, since 1 January 2015. In accordance with Article 15(5) of the Basic Regulation, Details of the implementation of the landing obligation shall be specified in multiannual plans, including:

  (a) specific provisions regarding fisheries or species covered by the landing obligation;

  (b) the specification of exemptions to the landing obligation;

  (c) provisions for *de minimis* exemptions of up to 5 % of total annual catches of all species subject to the landing obligation, in order to avoid disproportionate costs of handling unwanted catches

- According to Article 16(7) of the Basic Regulation, when **allocating fishing opportunities pertaining to mixed fisheries**, Member States should take account of the likely catch composition of vessels participating in such fisheries. In order to achieve this, Member States may adopt national measures, such as retaining certain reserves of the national quota available or carrying out quota swaps with other Member States.

- In accordance with Article 18 of the Basic Regulation, Member States having direct management interest may submit **joint recommendations** for, amongst others, certain measures to be adopted, where the Commission has been granted power to adopt implementing or delegated acts for achieving the objectives of a multi-annual plan.

The plan also contains specific **control provisions** destined to adapt to the specific context of the Adriatic small pelagic fisheries, the general control measures established in Regulation 1224/2009[60], which provides for the legislative framework of control, inspection and enforcement to ensure compliance with the rules of the CFP. The relevant provisions of Regulation 1224/2009 are the following:

- According to Article 9, a fishing vessel of 12 metres' length overall or more shall have installed on board a fully functioning device which allows that vessel

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to be **automatically located and identified through the vessel monitoring system** by transmitting position data at regular intervals. It shall also allow the fisheries monitoring centre of the flag Member State to poll the fishing vessel.

- According to Article 15, masters of EU fishing vessels of 12 metres' length overall or more shall use **electronic logbooks** and shall send it by electronic means to the competent authority of the flag Member State at least once a day.

- According to Article 17 of this Regulation, masters of EU fishing vessels of 12 metres' length overall or more engaged in fisheries on stocks subject to a multiannual plan, which are under the obligation to record fishing logbook data electronically, must **notify the competent authorities** of their flag Member State at least four hours before the estimated time of arrival at port a set of information about the vessel and catches.

It may be appropriate to adapt both these provisions to the specific nature of a given fishery via a multi-annual plan.

- In line with Article 43 of this Regulation multi-annual plans may determine the thresholds above which catches of stocks subject to multi-annual plans be landed in **designated ports**.

Contents

In accordance with the overall ambition of the CFP on the conservation of fisheries resources and with specific regards to Articles 9 and 10 of the Basic Regulation, the main elements of the plan would be:

- **The scope of the plan** is small pelagic stocks, specifically anchovy, sardine as primary species, as well as mackerel and horse mackerel, and the fisheries exploiting those stocks in the Adriatic Sea.

- **The objectives of the plan** are to contribute to the achievement of the objectives of the CFP, and especially reaching and maintaining MSY for the stocks concerned, achieving a sustainable fisheries sector and providing an effective management framework. The plan also contributes to facilitate the implementation of the landing obligation.

- The proposed **targets** are expressed as fishing mortality ranges around F_{MSY} as advised by STECF with a deadline of 2020 at the latest. These F_{MSY} ranges allow for a maximum sustainable yield-based management for the stocks concerned and provide a high level of predictability to the sector. Targets in terms of fishing mortality ranges would be included for anchovy and sardine and the ranges were advised by the STECF[11]**Error! Bookmark not defined.**. These ranges allow for a MSY-based management for these stocks, and appear to allow for adaptations in case of changes in the scientific advice, while at the same time preserving a high level of predictability. For fish stocks for which available (anchovy and sardine), these reference points are expressed as a spawning stock biomass.

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- **The conservation reference points**, expressed in tonnes of spawning stock biomass or abundance in numbers, included in the plan are determined by STECF.

- **Safeguards and specific conservation measures** are linked to the conservation reference points. When scientific advice states that any of the stocks concerned is below that point, the TAC for that stock should be reduced. This measure may be complemented as necessary by measures such as technical measures, Commission or Member State emergency measures. Some of these measures may be adopted through regionalisation.

- **Total allowable catches** the plan includes a provision requiring Member States to ensure that the national quota is allocated within the national fleet in accordance with the composition of the catches that the vessels are likely to take, to reduce the risks that quotas are exceeded.

- **Provisions linked to the landing obligation** to be adopted under regionalisation are necessary to prolong (and/or amend) exemptions from the landing obligation for species for which scientific evidence demonstrates high survival rates, and "*de minimis*" exemptions, in line with the development of scientific advice. Currently such exemptions, adopted under the Discard Plan for the Mediterranean[17], have a three year lifespan.

- The plan establishes **regional cooperation** among Member States in respect of adopting provisions for the landing obligation and specific conservation measures, including technical measures, for certain stocks.

- **Control provisions** are provided on vessel monitoring system (VMS), prior notification, logbooks and designated ports. Regarding prior notification, it is necessary to adapt the general rules of Regulation 1224/2009 to the particularities of the Adriatic Sea and its small pelagic fisheries. Regarding logbooks and VMS, the provisions included in Regulation 1224/2009 are expanded to cover all vessels above 8 metres length overall to improve control of the fisheries covered by the plan. Regarding designated ports, a threshold is provided in the proposal above which anchovy and sardine should only be landed in ports with enhanced control.

- **Periodic evaluation** of the plan based on scientific advice: the plan should be evaluated every five years. This period allows, initially, for the full implementation of the landing obligation and for regionalised measures to be adopted, implemented and to show effects on the stocks and fishery. This is also a minimum required period by scientific bodies[37.]

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