

OCEANA contribution to the
European Commission's public
consultation on the "Multiannual
plan for the fisheries exploiting
demersal stocks in the Western
Mediterranean Sea"

Oceana¹ is a non-profit organization working in Europe to protect marine ecosystems and to recover marine stocks as to ensure the long-term sustainability of the fisheries. Oceana is therefore contributing to the public consultation on the “Multiannual plan for the fisheries exploiting demersal stocks in the Western Mediterranean Sea” open on the DG MARE website on 30th of May 2016².

Contact persons:

Marta Carreras
Marine Scientist

mcarreras@oceana.org

Ilaria Vielmini
Marine Scientist

ivielmini@oceana.org

Agnes Lisik
Policy Advisor

alisik@oceana.org

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Executive summary

The entry into force of the new European Common Fisheries Policy (CFP) in 2014 was an historic benchmark as it defines the path towards European Union (EU) stocks recovery mainly through Multiannual Management Plans (MAP). These should be aimed at rebuilding stocks to Maximum Sustainable Yield (MSY) levels and implementing an ecosystem-based approach to fishing management.

In light of the new EU Commission Consultation for a MAP in the Western Mediterranean, Oceana wants to provide its vision on how to transform this plan into a model of CFP implementation that can bring health back to depleted Mediterranean stocks.

This document provides a framework for the new Western Mediterranean MAP and details the key elements it should include. In particular:

- **The scope of the plan.** The plan should include all fish stocks commercially exploited by the EU fleet in the Western Mediterranean area (as defined by the FAO) and which are non-shared stocks with third countries, regardless of the jurisdictional status of the waters.
- **Objectives, a timeframe, quantifiable reference points and safeguards.** The plan should aim at restoring and maintaining all commercially exploited demersal stocks above levels capable of producing MSY, no later than 2020, as laid out in the CFP.
- **Changing the paradigm: fishing opportunities according to scientific advice.** Input controls currently used in the Mediterranean Sea as national fishing effort limits and technical measures, have been proven to be absolutely inefficient in rebuilding depleted demersal stocks. Oceana proposes setting output control rules, i.e. catch limits, in addition to input rules, i.e. effort limits.
- **Reducing unwanted catches.** As an essential element of the EU landing obligation, Oceana proposes the adoption of spatial management measures and the definition of specific rules when a given threshold of unwanted catches is met.
- **Protecting juveniles and spawners.** Juveniles and spawners are essential to restoring and maintaining healthy stocks. Therefore, we propose the adoption of a network of “stock recovery areas”, a minimum conservation reference size (MCRS) according to the scientifically assessed size of reproductive maturity of the concerned species, and an extension of the bottom-towed gears ban until 100m depths.
- **Ensuring the conservation of sensitive habitats (SH) and vulnerable marine ecosystems (VME).** Identify and close the areas where these habitats are present to all bottom-towed gears.
- **Monitoring, control and surveillance (MCS).** A comprehensive set of MCS measures is essential to ensuring the effectiveness of the plan’s implementation.
- **Data collection, scientific advice and scientific research.** Reliable data and scientific information is essential to be able to establish accurate and effective fisheries management. It is therefore necessary to increase the number of stocks assessed and the frequency of the assessments, as well as improve catch register statistics to make them more reliable.

1. Introduction

Overfishing in the Mediterranean Sea is most commonly believed to have begun around the '70s (Quetglas et al., 2013; Tsikliras et al., 2013), when fishing efforts increased considerably due to technological developments that allowed fleets to displace themselves at a greater distance from the coast, fish at greater depths, explore new fishing grounds and thus increase yields. However, when estimated unreported catches are factored in (Coll et al., 2014), it turns out that overfishing disturbingly started as early as in the 50's or 60's.

The latest assessments of Mediterranean fish stocks revealed that **96%³ of stocks fished exclusively by EU countries are overexploited** above levels that are considered sustainable (i.e. Maximum Sustainable Yield, MSY⁴). Moreover, it has been estimated (Osio et al., 2015) that 98% of the yet-to-be assessed demersal stocks could also be overfished.

Recently, the European scientific community (STECF, 2015a) warned that the **severe overexploited state of Western Mediterranean stocks poses a high risk of their biological collapse**. The study also highlights that the current overexploitation of Mediterranean stocks is undermining the potential yield of fisheries. Therefore scientists have recommended undertaking management actions to reverse this situation with no further delay.

The alarming state of Mediterranean fish stocks is the result of decades of mismanagement, misreporting, and illegal fishing. Decision-makers have repeatedly ignored scientific advice, failed to implement existing measures, and failed to set adequate control measures for those that were implemented.

The National Management Plans (NMPs) adopted so far - under article 19 of the Mediterranean Regulation⁵ - **have failed to set clear management objectives to halt overfishing** and are reported to have been insufficiently effective to meet the CFP obligations to recover stocks at sustainable levels by 2015, or 2020 at the very latest. Therefore, the need is now urgent to establish new effective MAPs to address the depletion of Mediterranean fish stocks.

In line with the CFP principles⁶ and scientific advice (STECF, 2015a), MAPs have been identified as the most suitable measure to address overfishing.

Oceana strongly supports the development of a MAP for demersal fisheries in the Western Mediterranean that secures the full implementation of the objectives laid out in the CFP from rebuilding stocks to MSY levels, to a real enforcement of ecosystem based management.

³ COM(2015) 239 final. Consultation on the fishing opportunities for 2016 under the Common Fisheries Policy.

⁴ As defined in CFP, art. 4, MSY *“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”*.

⁵ 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.

⁶ CFP introductory paragraph (23) states that *“the objective of sustainable exploitation of marine biological resources is more effectively achieved through a multiannual approach to fisheries management, establishing as a priority multiannual plans reflecting the specificities of different fisheries”*.

2. The bleak reality of Western Mediterranean demersal stocks as a consequence of ignoring scientific advice

In recent years, 41 stocks have been assessed by the EU Scientific Technical Economic Committee for Fisheries (STECF) and the Scientific Advisory Committee (SAC) of the General Fisheries Commission for the Mediterranean and Black Sea (GFCM) in the Western Mediterranean. All of them have been repeatedly assessed as overfished except for one: deep-water rose shrimp in GSA 09 (see Annex I).

More alarming is that some key commercial stocks, including hake (*Merluccius merluccius*), red mullet (*Mullus surmuletus*), blue whiting (*Micromesistius poutassou*) and blackbellied anglerfish (*Lophius boudegassa*), have reached critical overexploitation levels: **more than 9 times higher than what is considered to be sustainable** (Annex I).

Over the past decade, scientists have continuously recommended drastic reductions in fishing mortality as the key measure to ensure stock recovery. However, scientific advice has been repeatedly ignored and fishing mortality levels and exploitation rates have remained constant or even increased in the last ten years, as is the case for red mullet and hake (Fig. 1), leading to the current high level of overfishing.

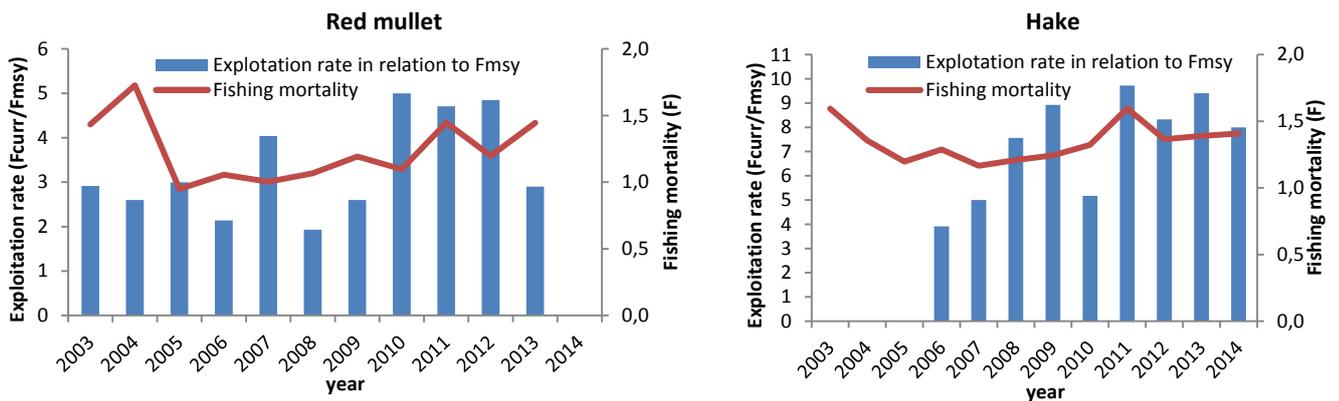


Figure 1: Exploitation rates in relation to F_{msy} (blue bar) and fishing mortality (red line) for red mullet and hake from 2003 to 2014 in the Western Mediterranean Sea. Values displayed are the average of the data available by year for all GSA of the Western Mediterranean Sea. Source: STECF and GFCM.

3. Oceana proposals for a multi-annual management plan for demersal stocks in the Western Mediterranean Sea

In line with the CFP provisions, and in particular its articles on the principles, objectives and content of MAPs (Art. 9 and Art. 10), Oceana outlines below its proposals for a MAP for demersal stocks in the Western Mediterranean Sea ("the plan" thereafter).

3.1 The scope of the plan

a) Area of application

The Western Mediterranean corresponds to FAO fishing area FAO 37.1⁷. This includes the FAO statistical divisions of Balearic, Gulf of Lion and Sardinia, respectively 37.1.1; 37.1.2; 37.1.3 (Table 1).

In 2009, the GFCM established management units defined as GSAs⁸, which for the Western Mediterranean, correspond to GSAs 1 through 12 (Tab. 1), encompassing EU and non-EU waters (Fig. 2).

FAO SUBAREA	FAO STATISTICAL DIVISIONS	GFCM GSA	Name
Western 37.1	37.1.1 Balearic	1	Northern Alboran Sea
		2	Alboran Island
		3	Southern Alboran Sea
		4	Algeria
		5	Balearic Islands
		6	Northern Spain
	37.1.2 Gulf of lion	11.1	Western Sardinia
		7	Gulf of Lion
	37.1.3 Sardinia	8	Corsica
		9	Ligurian Sea and Northern Tyrrhenian Sea
		10	Southern and Central Tyrrhenian Sea
		11.2	Eastern Sardinia
12		Northern Tunisia	

Table 1. Western Mediterranean FAO subareas.

⁷ FAO area 37.1, as defined in the Regulation (EC) No 216/2009 of the European Parliament and of the Council of 11 March 2009 on the submission of nominal catch statistics by Member States fishing in certain areas other than those of the North Atlantic.

⁸ Res. GFCM/33/2009/2 Establishment of Geographical Sub-Areas in the GFCM area

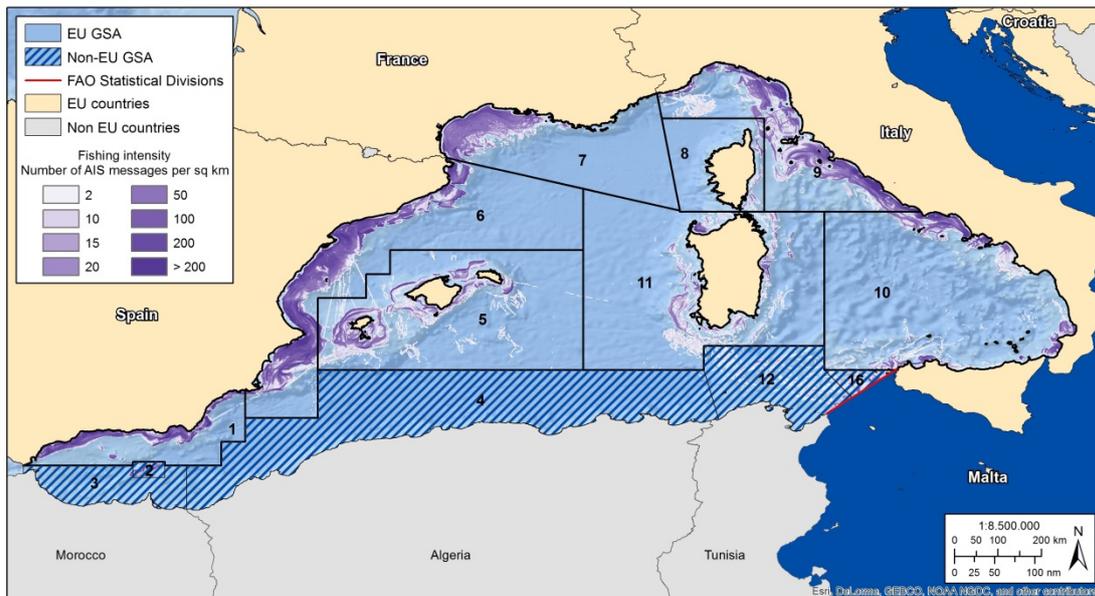


Figure 2. Western Mediterranean map with GSAs as identified by GFCM (numbers from 1 to 12) and FAO sub area 37.1, marked by the red line. Shaded GSAs shows non-EU waters. Main demersal fishing grounds are shown in purple.

OCEANA PROPOSAL:

- The plan should **comprise the entire Western Mediterranean area as defined by the FAO.**

b) Member States concerned

Oceana acknowledges that the plan should encompass all EU vessels involved in demersal fisheries within the Western Mediterranean Sea, regardless of the jurisdictional status of the waters that they operate in.

In line with Art. 18.4 of the CFP, the management of shared stocks in the Western Mediterranean should be also coordinated with third parties, and its objectives shared within the context of the GFCM.

The allocation of fishing authorizations for EU vessel activities in GFCM waters and third countries waters in the Mediterranean Sea should be granted under the EU Fishing Authorization Regulation⁹.

⁹ Council Regulation (EC) No 1006/2008 of 29 September 2008 concerning authorizations for fishing activities of Community fishing vessels outside Community waters and the access of third country vessels to Community waters, amending Regulations (EEC) No 2847/93 and (EC) No 1627/94 and repealing Regulation (EC) No 3317/94

OCEANA PROPOSAL:

- The plan should apply to **all EU vessels involved in demersal fisheries within the Western Mediterranean area**, regardless of the jurisdictional status of the waters.
- For **stocks shared with third parties, the EU should propose and ensure their sustainable management within the GFCM** so as to meet CFP and GFCM Agreement objectives.

c) Stocks and fisheries under the scope of the plan

The national management plans (NMPs) currently in place have attempted to regulate national demersal fishing fleets, not stocks, and they have failed to identify measures to address the management of shared demersal stocks (Bargelloni et al., 2003; Espino & del Hoyo, 2006; Hamdi et al., 2012; Fiorentino et al., 2014) which can be targeted by different national fleets and are subject to different fishing strategies. Thus, to be able to manage demersal stocks properly, the entire distribution of stocks should be taken into account.

OCEANA PROPOSAL:

The scope of the plan should address the management of **all commercially exploited demersal stocks** with distributions that falls in more than one GSA and beyond national waters, **including target and bycatch species, as well as all the métiers involved in their fishery.**

To this aim, Oceana proposes:

- 1. Including all stocks assessed by the STECF and/or the GFCM in the area and all métiers involved** as reported in Annex I.
- 2. Ensuring that demersal stocks characterizing each fishing bathymetric range are included.** To this aim, the following depth ranges should be considered:

Bathymetric range	Approximated depth range (m)*
Shallow shelf (SS)	0-100
Deep shelf (DS)	100-200
Upper slope (US)	200-400
Middle slope (MS)	400-1000

**Depending on the area of the western Mediterranean Sea, this range might variate.*

- 3. Including all commercially exploited species, both targeted and bycatch.** Management measures should ensure the sustainable exploitation of both targeted species and those caught as bycatch. This is relevant to the scope of the plan as species that are caught in trawling fisheries and are not yet fully assessed, such as some cephalopods and fish species included in the “mixed fish” category, result to be overfished (Quetglas et al., 2015; Ordines et al., 2014). In line with the precautionary approach driving the CFP, limitations, uncertainties or lack of data, cannot justify the absence of management measures, even more so given the current state of stocks – which can be called nothing short of an emergency.
- 4. Ensuring that coastal demersal stocks are also included in the plan.** A majority of species exploited by small-scale (SSF) and recreational fleets are considered to be poor-data stocks and have therefore not been properly assessed. However, these stocks should also be considered within the scope of the plan, in addition to implementing data collection for both SSF and recreational fisheries.

Oceana has compiled information from Spanish fisheries to put together an example proposal of stocks to be included in the plan in Annex II.

3.2. Objectives, a timeframe, quantifiable reference points and safeguards

Objectives, timeframe, reference points and safeguards of the plan should guarantee the recovery of the overexploited stocks in due time and the long-term sustainable management of the fisheries.

OCEANA PROPOSAL:

- The overall aim of the plan should be to **restore and maintain all commercially exploited demersal stocks above levels capable of producing MSY as soon as possible, by 2020 at the very latest**, in accordance with Article 2(2) of CFP.
- In order to achieve the main objective, **quantifiable target reference points in line with scientific advice to achieve MSY** for all stocks targeted in the plan should be set. Quantifiable targets should be based both on spawning stock biomass (SSB) and fishing mortality rates, so as to ensure that the stock biomass is at level above **B_{msy}** and current fishing mortality is below **F_{msy}** (**F_{curr} < F_{msy}**).
- When biomass reference points are not yet defined, fishing mortality limit should be set on the basis of the **precautionary approach** (i.e. 20% lower than **F_{msy}**).
- The plan should **include safeguards to ensure that quantifiable targets are met and remedial actions are undertaken in due time** to avoid putting at risk the sustainability of the stocks.

As there is currently poor data on biomass defined by scientists for demersal stocks in the Mediterranean, Oceana supports the following **reference points and safeguard measures**:

Reference point	Exploitation rate	Safeguards
Threshold reference point	$1 \leq F_{curr}/F_{msy} < 2$	Reduce fishing mortality to achieve F_{msy} and set fishing opportunities in line with scientific advice
Limit reference point	$F_{curr}/F_{msy} \geq 2$	Close fisheries until the stock biomass is rebuilt to B_{msy} level or F_{curr}/F_{msy} < 2

- **Reference points and safeguards for data-poor stocks.** There are important commercial demersal stocks exploited in the Western Mediterranean that have not yet been assessed due to data deficiency. However, these stocks should be taken into account in the plan, which is in line with the precautionary approach driving the CFP. Therefore, proxies for MSY and historical catch levels for data poor stocks should be considered to ensure that CFP objectives are fulfilled for all demersal commercial stocks.

3.3. Changing the paradigm: fishing opportunities according to scientific advice

Mediterranean fisheries are managed differently from the majority of the EU fisheries, on the basis of input control rules, i.e. fishing effort regulations and technical measures (Vasilakopoulos et al., 2014). This - combined with the high degree of inconsistency of these measures, with respect to the scientific advice and lack of adequate control and enforcement (Colloca et al., 2013) - has led Mediterranean stocks to their current state. Until now, the nominal effort reduction applied to the Mediterranean fishing fleets has proven to be ineffective and no adequate improvement in the stock status has been recorded (STECF, 2015a).

Over the past decades, while the state of stocks in the Mediterranean Sea has been getting worse, the North East Atlantic stocks have shown an overall positive recovery trend (EU, 2016). This improvement is clearly related to an increase in catch limits set according to scientific advice (Carpenter et al., 2016).

Oceana believes that the “Mediterranean fisheries paradigm”, under which only effort controls have been accepted as management tools, should be changed, particularly as it has been proven to be one of the main causes behind the current stock status. Fishing opportunities should also be adopted in the Mediterranean for demersal stocks.

OCEANA PROPOSAL:

- **Adopt fishing opportunities based on catch limits** and, where that is impossible, based on effort limits, to reach and maintain stocks at MSY levels.
- **Fishing opportunities should be based on scientific advice** (i.e. on the basis of the catches forecast provided yearly by STECF) and, whenever possible, predictions of effort limits should include projections by fleet segment.
- **Fishing opportunities should be set taking into account the principles set in Art. 17 of the CFP**, thus incorporating environmental, social and economic criteria to ensure fair allocations.
- **Preferential access to fishing opportunities should be granted to gears proven to be more selective and with low impact on the marine ecosystem**, in line with Art. 7.1.d) of the CFP.
- In the case of **mixed fisheries**, the **likely composition of catches should be taken into account in determining limits**, so as to ensure that all species are exploited within safe limits.
- For **data-poor stocks**, for which **fishing opportunities cannot be identified**, the **precautionary approach must be applied**, as indicated by the CFP.

3.4. Reducing unwanted catches

Reducing unwanted catches is a key element that should go hand in hand with the implementation of the landing obligation that will enter into force for this area in January 2017. The discards Atlas provided under CFP Article 14, can contribute to the information required to implement the following measures proposed by Oceana.

OCEANA PROPOSAL:

- Adopt **spatial management measures based on scientific advice to minimize unwanted catches** along with catches of undersized (see also Paragraph 3.5 in relation to Stock Recovery Areas).
- In order to achieve better and significant selectivity, **the percentage of unwanted catches should be reduced to a minimum**. To this aim, Oceana proposes setting a **threshold percentage of unwanted catches**. Once this threshold has been exceeded, the fishing vessel should abandon the fishing ground for a period of time. The set threshold should factor in target species and total catch, also including species with little or no commercial value:
 - **Maximum threshold for total catches.** GFCM (2016) considers three categories depending on discard rates: high discard fisheries (> 40% of total catch), medium discard fisheries (15–39%) and low discard fisheries (< 15%). Based on these, we propose a **maximum threshold of unwanted catches for all catches ≥ 15%**.
 - **Maximum threshold for each target species.** Discard rates for target species such as blue and red shrimp, white shrimp and mullets are very low, typically less than 10% for fish species and lower for shrimp species (<2%) (STECF, 2015b). Discards of targeted species mainly stem from individuals under MCRS. We propose a **maximum of unwanted catches in relation to each target species of 5%**.

Furthermore, as the Mediterranean bottom trawling produces the bulk of discards (Tsagarakis et al., 2014) - mainly in shallow waters (Moranta et al, 2000; Massutí et al., 2005) – efforts and solutions should focus in reducing discards from this gear.

3.5. Protecting juveniles and spawners

Protecting the key stages of the life cycle of species, such as juveniles and spawners, is essential to restore and maintain healthy populations. However, areas where juveniles and spawners concentrate are exposed to high fishing pressure in the Mediterranean (Mauillot et al., 2011).

OCEANA PROPOSAL:

- **Establish a network of Stock Recovery Areas:** on the basis of the outcomes of the MEDISEH¹ and STOCKMED projects – which have identified areas where persistent aggregations of spawners and juveniles of key commercially exploited species occur (EC, 2016). A network of areas to be closed to demersal fisheries should be included in the plan. This should ensure that critical life-stages are not the object of fisheries and thus contribute to the stock productivity, in line with Art. 8 of the CFP. Oceana proposes – as an example, the following immediate closure:
 - **Any demersal fishery in the Fishing Restricted Area (FRA) of the Gulf of Lions¹:** this is an important spawning area for hake. However, the measure to limit the number of vessels for demersal stocks at the level applied in 2008 has not been effective.
- **Extend the bottom-trawling ban to 100m deep:** The current trawling ban, which extends to a depth of 50m (Mediterranean Regulation) doesn't protect an important fraction of juvenile fishes in the littoral zone (EC, 2016). Increasing this depth to 100m, as suggested by the Commission (2016), would ensure the protection of the juveniles of several different species.
- **Adjust the MCRS to the size of reproductive maturity of the species:** The MCRS set by the Mediterranean Regulation in many cases do not correspond to maturity size and many exploited species lack of this conservation measure. Oceana proposes increasing the current MCRS for specific species (stated at Annex III) and include, as much as possible, MCRS for all exploited species. Thus, measures such as the selectivity of fishing gear and closures in areas of juvenile aggregation have to be set according to these MCRS.

3.6. Ensuring the conservation of sensitive habitats (SH) and vulnerable marine ecosystems (VMEs) relevant to demersal fisheries

The CFP shall implement the ecosystem-based approach to fisheries management so as to ensure that negative impacts of fishing activities on the marine ecosystem are minimized (Art. 2.3). In line with its Art. 2.5.j, the CFP shall also be coherent with EU environmental legislation, in particular with the objective of achieving a good environmental status by 2020, as set out in Art. 1(1) of Directive 2008/56/EC.

Currently, the Mediterranean Regulation prohibits bottom trawling and similar gear on habitats such as maërl and coralligenous. Nevertheless, despite bottom trawling being considered the most destructive human activity currently affecting these habitats (Barbera, 2003; Ballesteros, 2003; UNEP, 2008), there is a lack of effective implementation of this regulation (UNEP, 2009; Salomidi et al., 2012; Moranta et al, 2014). Furthermore, other SH identified as Essential Fish Habitats for commercial fish stocks (STECF, 2006) have not been protected from some damaging gears despite their fragility and ecological importance for commercial and non-commercial species.

Additionally, according to UNGA Resolutions 59/25, 61/105 and 64/72 and FAO Deep-Sea Guidelines, the proper protection of VMEs should be considered to ensure the sustainability of demersal fish stocks and other key species that depend upon them.

OCEANA PROPOSAL:

- **Freezing the footprint of bottom-towed gears and effectively banning their use over SH and VMEs** (see proposal in Annex IV).

In order to make this prohibition effective:

- Member States, within one year after the entry into force of the plan, should provide a detailed cartography of existing fishing grounds on the basis of VMS, AIS and existing scientific literature, including areas where VMEs and sensitive habitats have been identified.
 - All bottom-towed fishing activities should be halted over areas where the presence of VMEs and SH has been demonstrated (via peer-reviewed publications).
 - No later than two years after the entry into force of the plan, identified fishing grounds will be delimited and considered as “authorized fishing grounds”. No authorizations will be granted for fishing outside these areas to bottom-towed gears without a prior impact assessment demonstrating the viability of these fishing operations.
- **Avoid bycatch of protected and threatened species.** To this end, establish proper measures aimed to avoid the bycatch of species listed under Habitats Directive Annexes II¹ and IV¹; Annex II¹ of the SPA/BD Protocol of the Barcelona Convention and the IUCN Red Lists.

3.7. Monitoring, control and surveillance (MCS)

MCS measures are essential to ensure the effective implementation of fisheries management measures (Colloca et al., 2013). However, management measures currently in place in the Mediterranean are often poorly enforced (Tsikliras et al., 2013).

OCEANA PROPOSAL:

- **All vessels accessing any fishery should be equipped with active Vessel Monitoring Systems (VMS)** regardless of their length overall (LOA), with a frequency of position transmission as close to real time as possible. Some Member States are already implementing this system for the artisanal fleet in the region with very positive results¹⁰.
- **Set up detailed and clear cartography to enforce rules.** Specify with clear coordinates, the polygons whether each gear is allowed to fish based on the presence of Stock Recovery Areas, sensitive habitats, etc.

3.8. Data collection, scientific advice and scientific research

Fishing data in the Mediterranean Sea has been improving over the last decades thanks to a Data Collection Framework (DCF)¹¹ and stock assessments carried out by the GFCM and the STECF. However, approximately 75% of Mediterranean species have not been assessed (Osio et al., 2015).

Furthermore, catch statistics are not accurate enough as there is an important fraction that is not registered at official landings. These unreported catches (including black market, discards, recreational fishing and illegal fishing) are estimated to be 1.7 times higher than official catches in the Spanish mainland Mediterranean Sea (Coll et al., 2014), 2.3 times higher in the Balearic Islands (Carreras et al., 2015) and five times higher in Corsica.

Fisheries management relies heavily on scientific advice and is therefore dependent on accurate, relevant and up-to-date data that increases the reliability of scientific assessments, and eliminates uncertainties in long-term management planning.

¹⁰ The Andalucía region in Spain has installed a regional VMS system called “green boxes” in its fleet that performs in real time for all fleet segments and provides efficient monitoring and fisheries information system by crossing this information with scientific information and sales notes.

¹¹ COMMISSION DECISION of 6 November 2008 adopting a multiannual Community programme pursuant to Council Regulation (EC) No 199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the CFP.

OCEANA PROPOSAL:

- **Increase the number of stocks assessed** to ensure that all commercially exploited stocks included in the plan are analyzed.
- **Ensure that all stocks covered by the plan are assessed at least every two years.**
- **Increase the time series of assessed stocks as far back as possible** to include historical data in stocks assessments.
- **Improve catch data collection;** particularly in the small scale fleet (see also 3.7 MCS).
- **Make data reporting from recreational fisheries mandatory** and include it in the stock assessments.

GLOSSARY AND ACRONYMS

B_{msy}, Biomass at MSY. Biomass corresponding to Maximum Sustainable Yield from a production model or from an age-based analysis using a stock recruitment model. Often used as a biological reference point in fisheries management, it is the calculated long-term average biomass value expected if fishing at FMSY (FAO glossary).

B_{lim} - Limit reference point for spawning stock biomass (SSB). Below it, there is a high risk that recruitment will 'be impaired' (seriously decline) and on average be significantly lower than at higher SSB (ICES definition).

Ecosystem-based approach to fisheries management: means an integrated approach to managing fisheries within ecologically meaningful boundaries which seeks to manage the use of natural resources, taking account of fishing and other human activities, while preserving both the biological wealth and the biological processes necessary to safeguard the composition, structure and functioning of the habitats of the ecosystem affected, by taking into account the knowledge and uncertainties regarding biotic, abiotic and human components of ecosystems.

F_{msy}: The fishing mortality rate which, if applied constantly, would result in Maximum Sustainable Yield (MSY).

F_{curr}: current fishing mortality.

GFCM: General Fisheries Commission for the Mediterranean.

Metier: defined at DCF as a group of fishing operations targeting a similar (assemblage of) species, using similar gear, during the same period of the year and/or within the same area and which are characterised by a similar exploitation pattern."

MCRS, Minimum Conservation Reference Size Means the size of a living marine aquatic species taking into account maturity, as established by Union law, below which restrictions or incentives apply that aim to avoid capture through fishing activity; such size replaces, where relevant, the minimum landing size" (CFP definition).

MSY, 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 (CFP definition)

'Precautionary approach to fisheries management', as referred to in Article 6 of the UN Fish Stocks Agreement, means an approach according to which the absence of adequate scientific information should not justify postponing or failing to take management measures to conserve target species, associated or dependent species and non-target species and their environment (CFP definition).

SSB, Spawning stock biomass: The total weight of the spawning stock. (Usually males and females combined, but sometimes female SSB, alone, is used) (FAO glossary).

STECF: The Scientific, Technical and Economic Committee for Fisheries.

Metiers glossary			
Gear		Target assemblage	
DRB	Boat dredge	CEP	Cephalopods
FPO	Pots and Traps	DEMF	Demersal fish
FYK	Fyke nets	DEMSP	Demersal species
GNS	Set gillnet	DWSP	Deep water species
GTR	Trammel net	MDDWSP	Mixed deep water species
LHM	Pole lines	MOL	Molluscs
LHP	Hand lines		
LLS	Set longlines		
OTB	Bottom otter trawl		
TBB	Beam trawl		

ANNEX I

EU stocks assessed and exploitation rate in Western Mediterranean in the recent years, including fleet segment and main country targeting them. Red value indicate unsustainable exploitation pattern with actual fishing mortality higher than sustainable levels. “Metier” is defined in DCF by gear type-target assemblage. See glossary at Annex.

Species	GSA	Exploitation rate (Fcurr/Fmsy)	Metier ¹²	MS ¹³ operating in the GSA	Stock assessment reference
Blackbellied angler (<i>Lophius budegassa</i>)	1	1.56	- OTB-DEMSP: 93.7% - OTB-MDDWSP: 3.8% - OTB- DWSP: 1.3% - GTR- DEMSP: 1.2%	ES	STECF, 2015
	5	10.50	- OTB-DEMSP: 61.6% - OTB- DWSP: 20.0% - OTB-MDDWSP: 18.3%	ES	STECF, 2015
	6	6.50	- OTB-DEMSP: 95.8% - OTB-MDDWSP: 2.2% - OTB- DWSP: 2.0% - GTR- DEMSP: 1.4% - GNS- DEMSP: 0.7%	ES	STECF, 2014
Blackmouth catshark (<i>Galeus melastomus</i>)	9	2.69	- OTB-DEMSP: 100%	IT	STECF, 2010
Blackspot seabream (<i>Pagellus bogaraveo</i>)	1	1.70	- LLS-DEMF: 69.6% - LHM-DEMF: 25.3% - OTB- DWSP: 5.1%	ES	GFCM, 2013
Blue and red shrimp (<i>Aristeus antennatus</i>)	1	2.00	- OTB- DWSP: 84.3% - OTB-MDDWSP: 15.7%	ES	STECF, 2014
	5	5.50	- OTB- DWSP: 63.0% - OTB-MDDWSP: 37.0%	ES	GFCM, 2016
	6	2.00	- OTB- DWSP: 78.3% - OTB-MDDWSP: 21.7%	ES	GFCM, 2013
	9	1.94	- OTB- DWSP: 71.9% - OTB-MDDWSP: 28.1%	IT	STECF, 2010
Blue whiting (<i>Micromesistius poutassou</i>)	6	9.50	- OTB-DEMSP: 83.1% - OTB-MDDWSP: 9.7% - OTB- DWSP: 7.2%	ES	STECF, 2014
	9	1.19	- OTB-DEMSP: 64.4% - OTB-MDDWSP: 31.9% - OTB- DWSP: 2.4% - GNS-DEMF: 1.0% - GTR- DEMSP: 0.4%	IT	STECF, 2014
Common pandora (<i>Pagellus erythrinus</i>)	9	1.31	- OTB-DEMSP: 74.9% - GTR- DEMSP: 11.4% - GNS-DEMF: 7.4% - OTB-MDDWSP: 6.4%	IT	STECF, 2010
European hake (<i>Merluccius merluccius</i>)	1	6.40	- OTB-DEMSP: 87.5% - GTR- DEMSP: 3.4% - OTB- DWSP: 3.1% - LLS-DEMF: 2.9% - OTB-MDDWSP: 2.1% - GNS-DEMSP: 0.9%	ES	GFCM, 2016
	5	5.90	- OTB-DEMSP: 75.1% - OTB-MDDWSP: 14.5%	ES	GFCM, 2016

¹² Joint Research Centre (JRC), Data Collection Framework (DCF). Landing data from 2010 to 2014: <https://datacollection.jrc.ec.europa.eu/dd/medbs>

¹³ Member States.

Species	GSA	Exploitation rate (Fcurr/Fmsy)	Metier ¹²	MS ¹³ operating in the GSA	Stock assessment reference
			- OTB- DWSP: 10.4%		
	6	9.87	- OTB-DEMSP: 85.8% - LLS-DEMF: 5.8% - OTB-MDDWSP: 2.9% - OTB- DWSP: 2.8% - GNS-DEMSP: 1.6% - GTR- DEMSP: 1.1%	ES	STECF, 2014
	7	9.82	- OTB-DEMSP: 83.0% - GNS-DEMSP: 13.8% - LLS-DEMF: 1.6% - GTR- DEMSP: 0.7% - OTB- DWSP: 0.4% - OTB-MDDWSP: 0.2% - LLS-DESP: 0.1%	FR, ES	GFCM, 2016
	9	5.91	- OTB-DEMSP: 58.9% - GNS-DEMF: 27.3% - OTB-MDDWSP: 8.0% - OTB- DWSP: 0.3%	IT	STECF, 2014
	10	7.14	- GNS-DEMF: 28.5% - OTB: 20.4% - LLS-DEMF: 18.2% - GTR- DEMSP: 16.7% - OTB-DEMSP: 8.5% - OTB-MDDWSP: 3.9% - LLD-LPF: 2% - GNS-SLPF: 0.7% - OTB- DWSP: 0.3% - PS-SPF: 0.1%	IT	STECF, 2013
	11	9.41	- OTB: 95,3% - GTR: 4.7%	IT	STECF, 2015
Giant red shrimp (<i>Aristaeomorpha foliacea</i>)	9	1.72	- OTB-MDDWSP: 78.8% - OTB- DWSP: 20.6% - OTB-DEMSP: 0.6%	IT	STECF, 2013
	11	2.00	- OTB: 100%	IT	STECF, 2010
Mantis shrimp (<i>Squilla mantis</i>)	9	2.30	- OTB-DEMSP: 86.2% - OTB-MDDWSP: 7.5% - GTR- DEMSP: 3.7% - GNS-DEMF: 2.5%	IT	STECF, 2010
	10	2.63	- OTB: 54.8% - GTR-DEMSP: 24.0% - OTB-DEMSP: 18.1% - OTB-MDDWSP: 3.1%	IT	STECF, 2012
Norway lobster (<i>Nephrops norvegicus</i>)	5	1.71	- OTB-DEMSP: 63.3% - OTB- MDDWSP: 26.4% - OTB- DWSP: 11.3%	ES	STECF, 2015
	6	3.93	- OTB- DEMSP: 75.6% - OTB- DWSP: 13.4% - OTB- MDDWSP: 11.0%	ES	STECF, 2014
	9	2.05	- OTB- DEMSP: 52.2% - OTB- MDDWSP: 46.1% - OTB- DWSP: 1.6%	IT	STECF, 2014
Pink shrimp (<i>Parapenaeus</i>)	1	1.65	- OTB- DEMSP: 99.3% - OTB- MDDWSP: 0.7%	ES	STECF, 2013
	5	1.24	- OTB- DEMSP: 100%	ES	STECF, 2013

Species	GSA	Exploitation rate (Fcurr/Fmsy)	Metier ¹²	MS ¹³ operating in the GSA	Stock assessment reference
<i>longirostris</i>	6	2.80	- OTB- DEMSP: 85.7% - OTB- MDDWSP: 14.3%	ES	GFCM, 2016
	9	0.95	- OTB- DEMSP: 75.1% - OTB- MDDWSP: 23.8% - OTB- DWSP: 1.1%	IT	STECF, 2015
	10	1.33	- OTB- DEMSP: 42.6% - OTB- MDDWSP: 28.3% - OTB: 25.5% - OTB- DWSP: 3.3% - GNS-DEMF: 0.3%	IT	STECF, 2013
	11	1.41	- OTB: 100%	IT	STECF, 2012
Poor cod (<i>Trisopterus minutus</i>)	9	1.22	- OTB- DEMSP: 66.9% - GNS- DEMF: 17.5% - OTB- MDDWSP: 10.6% - GTR- DEMSP: 5.0%	IT	STECF, 2012
Red mullet (<i>Mullus barbatus</i>)	1	3.40	- OTB- DEMSP: 89.6% - GTR- DEMSP: 10.4%	ES	GFCM, 2016
	5	6.20	- OTB- DEMSP: 94.3% - OTB- MDDWSP: 5.7%	ES	STECF, 2014
	6	3.27	- OTB- DEMSP: 90.5% - OTB- MDDWSP: 5.7% - GTR- DEMSP: 8.6% - OTB- MDDWSP: 0.9%	ES	STECF, 2014
	7	3.21	- OTB- DEMSP: 91.2% - GNS- DEMSP: 5.5% - GTR- DEMSP: 2.9%	FR, ES	GFCM, 2016
	10	2.53	- OTB- DEMSP: 56.0% - OTB- MDDWSP: 22.9% - GTR- DEMSP: 12.2% - GNS- DEMF: 7.2%	IT	STECF, 2012
	11	9.70	- OTB: 100%	IT	STECF, 2014
Striped red mullet (<i>Mullus surmuletus</i>)	5	3.00	- OTB- DEMSP: 68.6% - OTB- MDDWSP: 17.2% - GTR- DEMSP: 14.2%	ES	GFCM, 2016
	9	1.81	- GTR- DEMSP: 63.0% - GNS- DEMF: 18.2% - OTB- DEMSP: 16.7% - OTB- MDDWSP: 2.1%	IT	STECF, 2010

ANNEX II

Examples of possible key species or groups of species to be included in the plan. Main depth strata, fishing gears, bycaught species and other gears involved with by-catch species, are also identified. Source: Oceana own made, based on several scientific references (Goñi et al., 2005; Forcada et al., 2010; Marengo et al., 2014; STECF, 2015b).

Species or group of species that define the fishery	Main depth strata	Main fishing gears	Main by-caught species	Other gears involved*
Red mullet (<i>Mullus spp.</i>)	Shallow continental shelf	<ul style="list-style-type: none"> - OTB - GTR - GNS 	Horned and musky octopuses (<i>Eledone sp.</i> ; <i>Octopus vulgaris</i>); Ommastrephid squids (<i>Illex coindetii</i> ; <i>Todaropsis eblanae</i>), mantis shrimp (<i>Squilla mantis</i>), Spotted dogfish (<i>Scyliorhinus canicula</i>)	<ul style="list-style-type: none"> - TBB - FPO - FPO - LHM
Sparidae (e.g. <i>Dentex dentex</i> , <i>Dicentrarchus labrax</i> , <i>Sparus aurata</i> , <i>Diplodus sargus</i>) and serranidae (e.g. <i>Epinephelus marginatus</i>)	Shallow continental shelf	<ul style="list-style-type: none"> - LLS - GTR - GNS - Recreational gears 	-	<ul style="list-style-type: none"> - OTB - FYK - FPO
Spiny lobster (<i>Palinurus elephas</i>)	Shallow and deep continental shelf	<ul style="list-style-type: none"> - GTR 	European lobster (<i>Hommarus gammarus</i>), red scorpionfish (<i>Scorpaena scrofa</i>) monkfish (<i>Lophius piscatorius</i>), rays (<i>Rajaspp.</i>)	<ul style="list-style-type: none"> - OTB

Species or group of species that define the fishery	Main depth strata	Main fishing gears	Main by-caught species	Other gears involved*
European hake (<i>Merluccius merluccius</i>)	Deep continental shelf and upper continental slope	<ul style="list-style-type: none"> - OTB - LLS - GNS - GTR - DRB 	Deep-water rose shrimp (<i>Parapenaeus longirostris</i>), Angler fish (<i>Lophius</i> sp.), Spotted dogfish (<i>Scyliorhinus canicula</i>), horned and musky octopuses (<i>Eledone</i> sp)	-
Norway lobster (<i>Nephrops norvegicus</i>)	Upper continental slope	<ul style="list-style-type: none"> - OTB 	Blue whiting (<i>Micromesistius poutassou</i>), greater forkbeard (<i>Phycis blennoides</i>), Blackmouth catshark (<i>Galeus melastomus</i>)	-
Blackspot seabream (<i>Pagellus bogaraveo</i>)	Upper and medium slope	<ul style="list-style-type: none"> - LLS - GNS - GTR 	-	- OTB
Blue and red shrimp (<i>Aristeus antennatus</i>)	Middle continental slope	<ul style="list-style-type: none"> - OTB 	Giant red shrimp (<i>Aristomorpha foliacea</i>), blue whiting (<i>Micromesistius poutassou</i>), greater forkbeard (<i>Phycis blennoides</i>), Blackmouth catshark (<i>Galeus melastomus</i>)	-

* Gears that catch species that define the fishery as bycatch and/or catch bycaught species as main target species.

ANNEX III

Species	Current MCRS	Revised MCRS on the basis of L_{50} ¹⁴	Reference
Bass (<i>Dicentrarchus labrax</i>)	25 cm	30 cm	Tsikliras et al., 2014
Sharpsnout sea-bream (<i>Diplodus puntazzo</i>)	18 cm	22 cm	Tsikliras et al., 2014
Groupers (<i>Epinephelus</i> spp.)	45 cm	55 cm	Tsikliras et al., 2014
Hake (<i>Merluccius merluccius</i>)	20 cm	30 cm	Tsikliras et al., 2014
Red mullets (<i>Mullus</i> spp.)	11 cm	13 cm	Tsikliras et al., 2014
Spanish sea-bream (<i>Pagellus acarne.</i>)	17 cm	18 cm	Tsikliras et al., 2014
Wreckfish (<i>Polyprion americanus.</i>)	45 cm	80 cm	Tsikliras et al., 2014
Common pandora (<i>Pagellus erythrinus</i>)	15 cm	16 cm	Tsikliras et al., 2014
Common sea-bream (<i>Pagrus pagrus</i>)	18 cm	31 cm	Vassilopoulou and Papaconstantinou (1992)
Common sole (<i>Solea vulgaris</i>)	20 cm	25 cm	Tsikliras et al., 2014
Gilt-head sea-bream (<i>Sparus aurata.</i>)	20 cm	36 cm	Tsikliras et al., 2014
Norway lobster (<i>Nephrops norvegicus</i>)	20 mm CL*	30 mm CL	Orsi et al., 1998
Deep water rose shrimp (<i>Parapenaeus longirostris</i>)	20 mm CL*	27 mm CL	Guijarro et al., 2009

* Carapace length

¹⁴ L_{50} is defined as the length at which 50 percent of the population is estimated to be mature.

ANNEX IV

Proposed sensitive habitats and VME to be protected by the plan. It is stated their main bathymetric distribution and examples of commercial species related to them. This initial list shall be extended according to deliberations under GFCM regarding the protection of VMEs. Oceana own made, based on scientific literature (Ballesteros et al., 2003; Colloca et al., 2004; STECF, 2006; Aguilar et al., 2008; GFCM, 2009; D’Onghia et al., 2010; Oceana, 2011; Pardo et al., 2011; Templado et al., 2012; Martin et al 2014, IUCN Mediterranean Red List Initiative¹⁵).

Habitats	Bathymetric area	Examples of related commercial species
Maërl beds	Shelf	<i>Serranus cabrilla</i> , <i>Scorpaena scrofa</i> , <i>Scyliorhinus canicula</i> , <i>Pagellus erythrinus</i> , <i>Scorpaena notata</i> , <i>Spicara smaris</i> , <i>Octopus vulgaris</i> , <i>Loligo vulgaris</i>
Coralligenous	Shelf	<i>Epinephelus marginatus</i> , <i>Sciaena umbra</i> , <i>Dentex dentex</i> , <i>Phycis phycis</i> , <i>SerranusCabrilla</i> , <i>Palinurus elephas</i> , <i>Scyllarides latus</i> , <i>Homarus gammarus</i> , <i>Octopus vulgaris</i> , <i>Sepia officinalis</i>
Crinoid beds (<i>Leptometra phalangium</i>)	Shelf edge and upper slope	<i>Merluccius merluccius</i> , <i>Micromesistius poutassou</i> , <i>Mullus barbatus</i> , <i>Lophius spp</i> , <i>Trisopterus minutus capelanus</i> , <i>Lepidorhombus boscii</i> , <i>Scyliorhinus canicula</i> , <i>Zeus faber</i> , <i>Raja clavata</i> , <i>Helicolenus dactylopterus</i> , <i>Phycis blennoides</i> , <i>Parapenaeus longirostris</i> . Crustacean recruits and significant abundance of spawners.
Seapen beds (<i>Funiculina quadrangularis</i> , <i>Pennatula spp.</i>)	Shelf to bathyal plain	Commercial crustacean species, in particular <i>Parapenaeus longirostris</i> and <i>Nephrops norvegicus</i>
Brachiopods beds (<i>Gryphus vitreus</i>)	Shelf edge to deep bathyal	<i>Merluccius merluccius</i> , <i>Raja clavata</i> , <i>Mullus surmuletus</i> , <i>Zeus faber</i> , <i>Eledone cirrhosa</i>
Gorgonian gardens and black coral gardens (<i>Isidella elongata</i> and <i>Leiopathes glaberrima</i> , <i>Parantipathes larix</i> , <i>Antipathes dichotoma</i>)	<i>Isidella elongata</i> gardens: middle slope to deep bathyal plain Black coral gardens: continental shelf to deep bathyal	<i>Aristeus antennatus</i> , <i>Aristaeomorpha foliacea</i> Black corals act as refuge for numerous invertebrates and fish species; occasionally may act as fish nursery; the arborescent colonies offer shelter to numerous species of crabs, shrimps and fish; supports a rich benthic and pelagic biodiversity including commercial fish species.
Cold water corals reefs (as <i>Madrepora oculata</i> , <i>Lophelia pertusa</i> , <i>Desmophyllum dianthus</i>)	Middle slope to deep bathyal	<i>Pagellus bogaraveo</i> , <i>Helicolenus dactylopterus</i> , <i>Merluccius merluccius</i> , <i>Scorpaena sp.</i> , <i>Micromesistius poutassou</i>

¹⁵ <http://www.iucnredlist.org/initiatives/mediterranean>

Sensitive habitats and VMEs are frequently found in association with particular features of the seabed that also should be protected. We propose the following:

Seabed features	Bathymetric area	Examples of related commercial species
Seamounts	Variable	<i>Pagellus bogaraveo, Lophius piscatorius, Mullus surmuletus, Solea solea, Palinurus elephas, Palinurus mauritanicus, Aristeus antennatus, Nephrops norvegicus, Loligo vulgaris, Sepia officinalis</i>
Submarine canyons	Variable	<i>Merluccius merluccius, Aristeus antennatus, Aristeomorpha foliacea</i>

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