

Towards a Mediterranean network of EFH

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One of the aspects behind the critical situation of Mediterranean stocks is the **high exploitation rate of juveniles** in many demersal fisheries. The fisheries management in place today has brought most of assessed stocks outside safe biological limits (FAO, 2017) and some of them face a high risk of biological collapse, such as commercially-important hake (see Figure 1).

Given this alarming status, the reduction in juvenile mortality is particularly relevant and is considered one of the main prerequisites for the future sustainability of Mediterranean fisheries (Colloca, 2015). In the same line, the protection of spawning areas would also contribute to improve stocks recruitment.

The need to identify nursery areas for overexploited species has been highlighted in previous sessions of the SAC. In fact, according to the last SAC advice related to stock status (Slovenia, May 2017) it was stated that **“For all priority demersal species, proposed measures to reduce fishing effort included the improvement of exploitation patterns and the protection of the most vulnerable life stages of the population through closure areas and additional FRAs. This implies the identification of nursery areas”**.

Following commitments made under the Malta MedFish4Ever Declaration and at the last GFCM Commission, the next steps to protect EFH are outlined in **Resolution GFCM/41/2017/5 on a network of Essential Fish Habitats (EFH) including Sensitive Habitats (SH)**. Therefore, technical elements to contribute to the implementation of this Resolution should be presented at the 20th Session of the SAC along with a timeline containing quantified objectives. Technical elements mean the scientific tools that would serve as the basis to defining EFH sites.

In the last decades, a wide variety of studies, surveys and research projects have been conducted in the Mediterranean Sea aiming to identify key areas where juveniles and/or spawners aggregate. Such investigations with substantial scientific literature on the matter deserve special attention from fisheries managers. However, this information has not yet contributed to the proper implementation of spatial management tools except for limited and recent cases (e.g. designated FRA in the Strait of Sicily and Jabuka/Pomo Pit). As an example, the MEDISEH project, which directly addresses this issue, has produced relevant information to map spawning and nursery grounds (see Figures 2 and 3) and should serve as the basis for EFH definition in the basin.

Recalling the 41st Commission’s mandate (Montenegro, October 2017), Oceana has identified the most relevant scientific pieces of information related to EFHs in the Mediterranean and prepared a **Preliminary scientific catalogue of technical elements for EFH identification** (see Annex 1).

Additionally, and according to the information in this catalogue, a short list of sites has been outlined that would serve as the initial steps to create an EFH network, fulfilling last year’s commitment (see Annex 2).

Aiming to contribute to the Resolution’s implementation process, Oceana recommends to the 20th Session of the SAC:

- To endorse a list of scientific technical elements, to initiate designation of areas to complete an EFH network for the Mediterranean (see Annex 1);
- To elaborate and agree on the list of basic regional-wide criteria which apply to the selection of future EFH sites (see Table 1);
- To look for a proper spatial balance on FRA designation for EFH, to contribute to stocks recovery in each subregion;
- To strengthen monitoring and enforcement requirements of fishing activities within GFCM FRAs.

Essential Fish Habitats

are the waters and substrates vital for fish to spawn, breed, feed, and grow to maturity (Valavanis, 2008)

80%

of the stocks assessed in the Mediterranean are outside biologically safe limits (SAC, 2017)

Figure 1. How many times fishing mortality of hake is above sustainable levels per GSA.
Source: GFCM SAC 2017

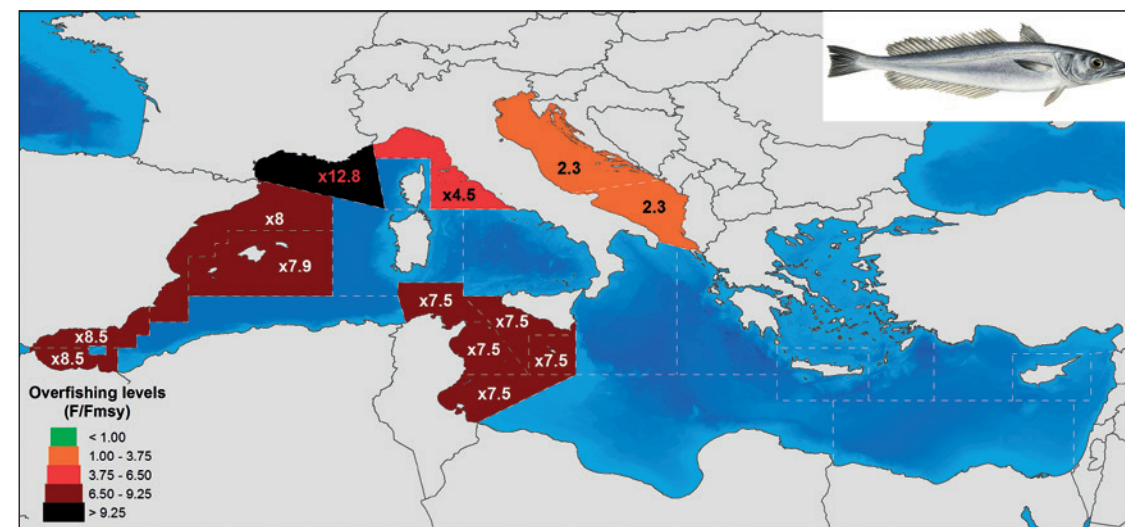


Figure 2. Identified spawning grounds for some priority demersal species according to MEDISEH (including *A. foliaceus*, *A. antennatus*, *M. merluccius*, *M. barbatus*, *M. surmuletus*, *P. longirostris*)

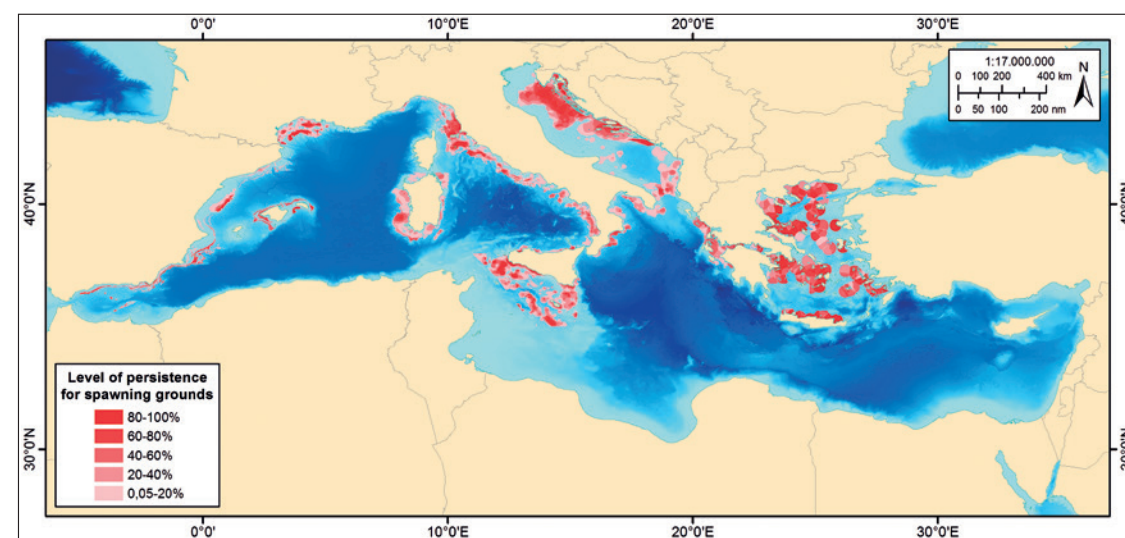
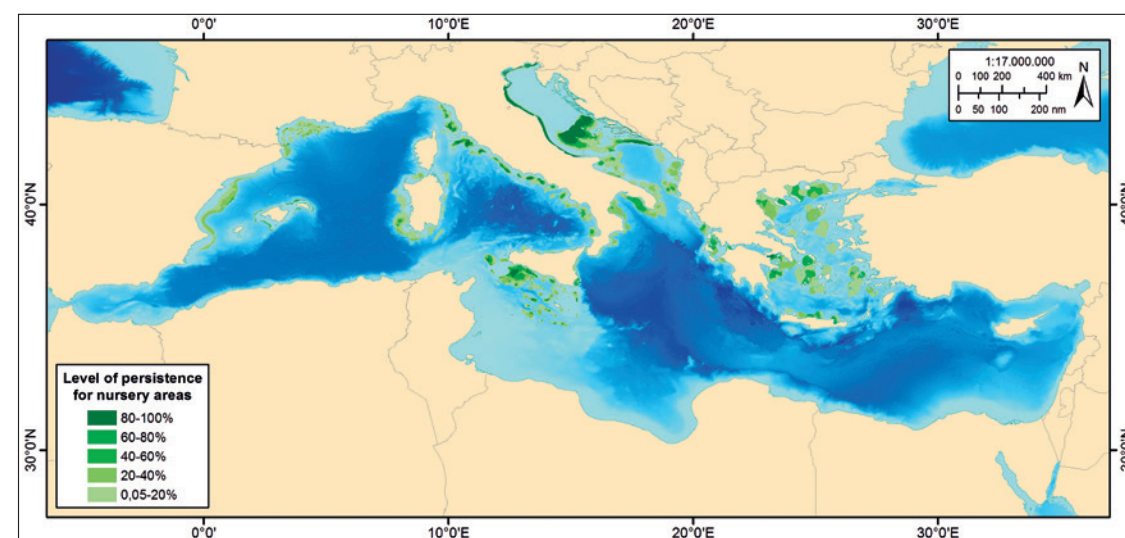


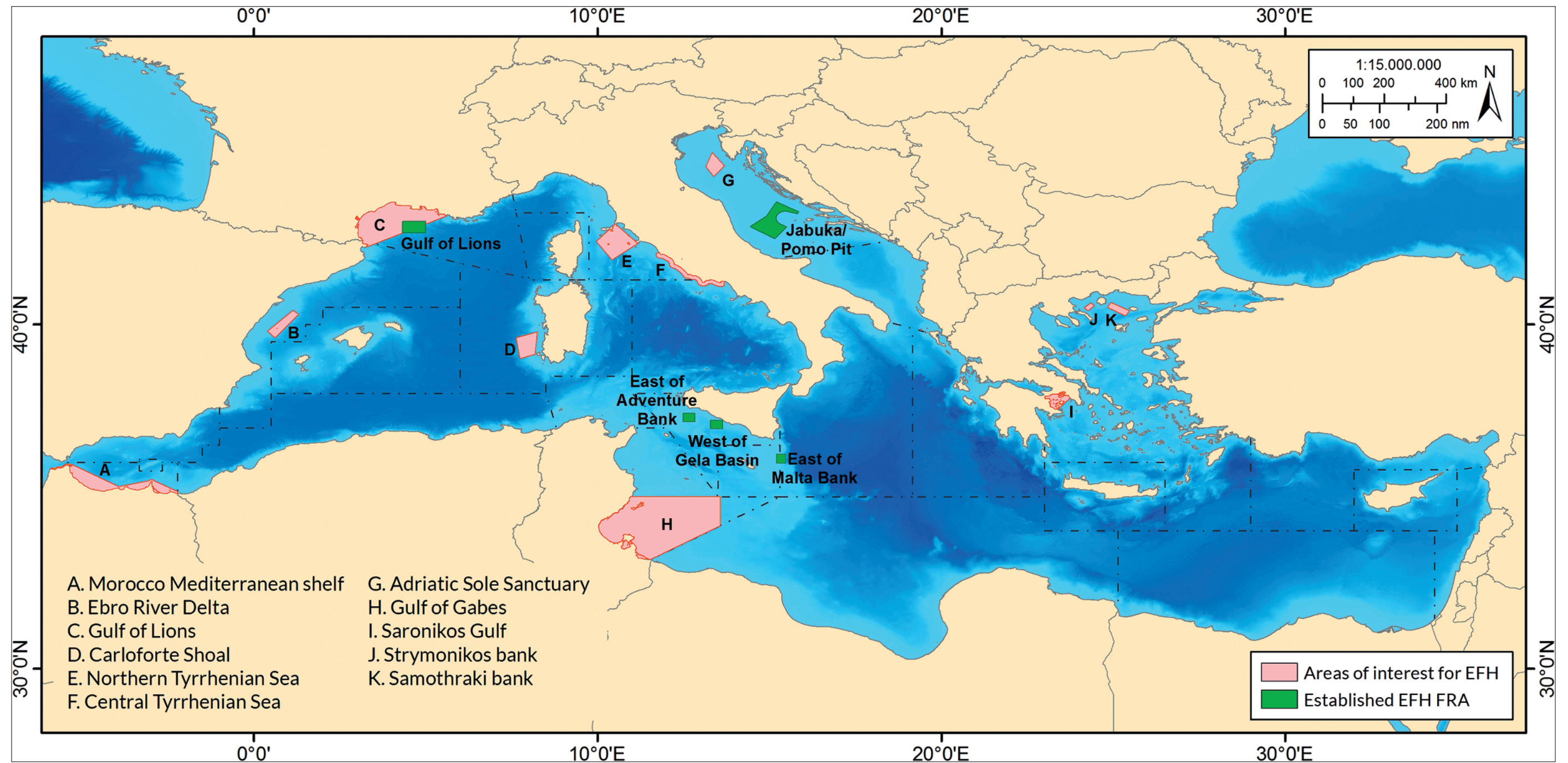
Figure 3. Identified nurseries for some priority demersal species according to MEDISEH (including *A. foliaceus*, *M. merluccius*, *M. barbatus*, *M. surmuletus*)



Annex 1. Preliminary approach to a scientific catalogue of technical elements for EFH identification in the Mediterranean

- **PROTOMEDEA** (ongoing project) (Petza et al, 2017). European project with the ultimate goal of designing a Marine Protected Area network in the Eastern Mediterranean also considering the protection of EFH. Identification of EFH is one of the expected outcomes. The project also focuses on achieving the Maximum Sustainable Yield (MSY).
- **Identification and Characterization of Nursery Areas of Red Mullet *Mullus barbatus* in the Central Tyrrhenian Sea** (Criscoli et al, 2017). This research is specifically focused on the identification and characterization of five nursery areas highly persistent through time using spatial interpolation techniques.
- **MANTIS: Marine protected Areas Network Towards Sustainable fisheries in the Central Mediterranean** (Fiorentino et al, 2016). Along this project have been identified permanent nursery areas for several commercial species. This information supported the designation of the FRA in the Strait of Sicily (Recommendation GFCM/40/2016/4).
- **The Seascape of Demersal Fish Nursery Areas in the North Mediterranean Sea, a First Step Towards the Implementation of Spatial Planning for Trawl Fisheries** (Colloca et al, 2015). This study identifies nursery grounds of exploited stocks and analyses the distribution of nursery areas of 11 important commercial species of demersal fish and shellfish in EU Mediterranean waters.
- **Modelling of European hake nurseries in the Mediterranean Sea: an ecological niche approach.** (Druon et al, 2015). This model provides avoidable areas for trawling because the occurrence of nursery areas for hake.
- **MAREA Project. STOCKMED. Stock units: Identification of distinct biological units for different fish and shellfish species and among different GFCM-GSA** (Fiorentino et al 2014). This project aims to identify stock units for the most relevant demersal and small pelagic species in the Mediterranean to contribute to the improvement of their assessment. Areas with high percentage of females in spawning stage for key targeted species has been also identified and mapped.
- **Mediterranean Sensitive Habitats (MEDISEH)** (Giannoulaki et al, 2013). This European project review and map all existing information on historical and current data of nurseries and spawning grounds of certain small pelagic and demersal species that are included in the EU Data Collection Framework for the Mediterranean and subjected to minimum landing size based on Council Regulation.
- **Setting Priorities for Regional Conservation Planning in the Mediterranean Sea** (Micheli et al, 2013). This paper reviews and integrates different plans with the goal of identifying priority conservation areas that represent the current consensus among different initiatives. The need for spatial prioritization within a comprehensive framework for regional conservation planning is also highlighted.
- **Mediterranean Submarine Canyons: Ecology and Governance** (Würtz, 2012). This report highlights the importance of submarine canyons as key geological features where sensitive habitat occur and which may act as essential habitats for feeding and spawning for commercial species.
- **Persistence and co-occurrence of demersal nurseries in the Strait of Sicily (central Mediterranean): Implications for fishery management** (Garofalo et al, 2011). This study investigated the nurseries of seven commercially important demersal species of the northern sector of the Strait of Sicily: red mullet, European hake, horned octopus, deep-water rose shrimp, greater forkbeard, Norway lobster and giant red shrimp. Furthermore, it suggests spatial protection measures that could complement conventional management approach for ensuring the long-term sustainability of these fisheries and stocks conservation.
- **SoleMon surveys** (Bastardie et al, 2017; Santelli et al, 2017; Scarcella et al, 2011; Domenichetti et al, 2009). It aimed to collect data on distribution and relative abundance, with biological information on commercial fish species in Northern Adriatic, to provide useful data for stock assessment and fishery management with a focus in common sole. One of the main outcomes from this survey is the identification of a spawning ground for *Solea solea*.
- **A conceptual framework for the protection of vulnerable habitats impacted by fishing activities in the Mediterranean high seas** (de Juan and Leonart, 2010). This work aims to compile knowledge on ecologically rich habitats that deserve special protection (including EFH) in the Mediterranean high seas and currently threatened by fishing activities.
- **Fisheries conservation management and vulnerable ecosystems in the Mediterranean open seas, including the deep sea** (UNEP-MAP-RAC/SPA, 2010). This document identifies faunal assemblages and geological and oceanographic features which can be relevant for fisheries management (e.g. habitat-structuring fauna, complex geological features or oceanographic features).
- **Identification of deep-water pink shrimp abundance distribution patterns and nursery grounds in the eastern Mediterranean by means of generalized additive modelling** (Politou et al, 2009). Modelling techniques were used to predict abundance of deep-water pink shrimp (*Parapenaeus longirostris*) with data collected during MEDITS surveys in Greek seas. The most important nursery ground identified was located in the Saronikos Gulf and a secondary in the Thracian Sea. Adult specimens were mainly located in the Saronikos Gulf, the Thracian Sea, the Thermaikos Gulf, the Cretan Sea and the eastern part of the Aegean.
- **Identification of hake distribution pattern and nursery grounds in the Hellenic seas by means of generalized additive models** (Tserpes et al, 2008). This work analyses time series of hake (*Merluccius merluccius*) abundance data from "MEDITS" surveys in Greek seas which were modelled to generate density distributions maps. These maps revealed that nursery grounds are restricted in specific regions with the most important of them being in the Saronikos Gulf and its surrounding area.

Figure 4. Selection of areas to be included in the Mediterranean network of EFH according to the current scientific technical elements. Source: VVAA



Annex 2. Selection of areas to be included in the Mediterranean network of EFH

Areas to be included in the EFH network should respond to the current needs for improving fisheries management and being properly framed in an ecosystem-based approach. Bearing this in mind, Oceana has defined a set of criteria (see Table 1) to be considered when it comes to new sites to be incorporated to the network.

Table 1. Oceana's criteria set for selection of EFH

CRITERIA	DESCRIPTION
1. Focus primarily on demersal species	Considering that: - the network of EFH will be established under GFCM competences; - currently EFH for small pelagic stocks have not yet been properly mapped and are possibly highly variable in time and space
2. Give priority to protection of nursery grounds	Juveniles are a target or secondary catch of the Mediterranean multi-species fisheries. Nevertheless, protection of spawners should not be ignored when necessary, as illustrated in the Gulf of Lion (Würtz, 2012)
3. Cover - but not limited to - GFCM priority stocks	As identified in the GFCM Mid-Term strategy
4. Stock status	As reported by SAC 2017
5. Catch volumes and landing value	Importance of stocks on this behalf
6. Protection of sensitive species and habitats	Species caught as by-catch, particularly sharks, and sensitive habitats distribution evidence
7. EFH overlapping	Prioritizing when nursery and/or spawning grounds of different species overlap
8. Measures already established	Aiming to reduce the impact and fishing pressure of bottom trawling
9. Precautionary principle	According to the FAO Code of Conduct for Responsible Fisheries

Oceana's approach

The initial network of EFH should be at least outlined by existing FRAs aiming EFH protection: Gulf of Lion, Strait of Sicily and Jabuka/Pomo Pit (see Box 1). Furthermore, taking into account the scientific information available (see Annex 1), a list of additional areas may be considered (see Box 2). They have been selected according to the beforementioned list of criteria although main description for their selection is also provided (see Figure 4):

Box 1. List of existing FRAs aiming to EFH protection in the GFCM area of application

EXISTING GFCM FRAs ADDRESSING PROTECTION OF EFH

GULF OF LIONS. Spawning ground for hake. REC.CM-GFCM/33/2009/1 On the establishment of a Fisheries Restricted Area in the Gulf of Lions to protect spawning aggregations and deep sea sensitive habitats

STRAIT OF SICILY. Nursery areas and other essential fish habitats that are important for the stocks of hake and deep-water rose shrimp. Recommendation GFCM/40/2016/4 establishing a multiannual management plan for the fisheries exploiting European hake and deep-water rose shrimp in the Strait of Sicily (GSAs 12 to 16)

JABUKA/POMO PIT. Essential fish habitats for demersal stocks such as European hake and Norway lobster. Recommendation GFCM/41/2017/3 on the establishment of a fisheries restricted area in the Jabuka/Pomo Pit in the Adriatic Sea

Box 2. List of additional areas to be considered in the EFH network

ADDITIONAL SITES TO BE CONSIDERED

MOROCCO MEDITERRANEAN SHELF. Demersal species of the continental shelf

EBRO RIVER DELTA. Nursery area for hake (*Merluccius merluccius*); Spawning ground for red mullet (*Mullus barbatus*)

GULF OF LION. Nursery and spawning grounds for hake (*Merluccius merluccius*) and red mullet (*Mullus barbatus*); Sensitive Habitats: *Isidella elongata*, cold water corals, *Callogorgia verticillata*

NORTHERN TYRRHENIAN SEA. Nursery grounds for hake (*Merluccius merluccius*), *Eledone cirrhosa*, *Galeus melastomus*, *Parapenaeus longirostris*; Sensitive Habitats: black coral forest (*Parantiphatas larix*) off Montecristo Island

CENTRAL TYRRHENIAN SEA. Nursery grounds for *Mullus barbatus*

CARLOFORTE SHOAL. Nursery ground for hake (*Merluccius merluccius*), *Aristeomorpha foliacea*, *Eledone cirrhosa*, *Illex coindetii*, *Parapenaeus longirostris*, *Raja clavata*; Spawning ground for *Aristeomorpha foliacea*, *Aristeus antennatus*, *Eledone cirrhosa*, *Merluccius merluccius*, *Mullus barbatus*, *Parapenaeus longirostris*; Sensitive Habitats: coral gardens (*Callogorgia verticillata* and black corals)

EBRO RIVER DELTA. Nursery area for hake (*Merluccius merluccius*); Spawning ground for red mullet (*Mullus barbatus*)

GULF OF GABES. Spawning ground for different species of elasmobranch, and possible nurseries of *Merluccius merluccius*, *Mullus barbatus*, *Parapenaeus longirostris*

SARONIKOS GULF. Nursery ground for *Merluccius merluccius*

STRYMONIKOS BANKS. Nursery ground for *Merluccius merluccius*

SAMOTHRAKI BANKS. Nursery ground for *Merluccius merluccius*

ADRIATIC SOLE SANCTUARY. Spawning ground for *Solea solea*

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