STANDARD FORM FOR THE SUBMISSION OF PROPOSALS FOR GFCM FISHERIES RESTRICTED AREAS (FRAs) IN THE MEDITERRANEAN AND THE BLACK SEA

Proposal revised by (SAC technical group/subregional committee):

Date of endorsement:

Name of the FRA

Deep water essential fish habitats and sensitive habitats in the South Adriatic.

Submitted by (institution, scientists, GFCM contracting parties, etc.):

[Logos of MedReAct and Adriatic Recovery Project]

Date of submission:

March 31, 2018
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1. EXECUTIVE SUMMARY
   Summary of the information contained in sections 2 to 8, including expected results (500 words maximum).

The Adriatic is one of the most productive seas of the Mediterranean. Adriatic assessed fish stocks are overexploited and fisheries management has failed to reverse this trend. In particular, demersal fisheries in the Adriatic have overexploited commercial fish stocks, altered Essential Fish Habitats (EFHs) and caused a loss of Vulnerable Marine Ecosystems (VMEs). Promoting the recovery of EFHs and vulnerable ecosystems is a key priority for rebuilding fish stocks and supporting sustainable fisheries.

The GFCM has the authority to adopt spatial measures to improve the sustainability of fisheries, on shared stocks and limit their ecological impacts. Spatial measures can support the recovery of depleted fish populations and degraded habitats by protecting Vulnerable Marine Ecosystems and Essential Fish Habitats, contributing to a sustainable use of marine resources in the Adriatic Sea.

The Fisheries Restricted Area (FRA) proposed herein is located in the South Adriatic Pit area (GSA18). The area has been clearly identified as (1) a site of unique physical features influencing the dynamics of waters circulation and water exchange with the whole Mediterranean basin; (2) an important EFHs for valuable species such as deep water shrimps (e.g. Aristeomorpha foliacea), deep-water rose shrimp (Parapeneus longirostris), European hake (Merluccius merluccius) and blackmouth catshark (Galeus melastomus); (3) a key area for sea turtles, tuna, swordfish, sharks and an important migratory corridor for megafauna like cetaceans; and (4) an area containing VMEs that could be significantly impacted by bottom trawling.

The South Adriatic Sea makes a substantial contribution to fish production. However, the steep slopes, with a maximum depth of more than 900 m, together with the presence of hard bottoms (such as deep water corals), oil and gas extraction, military and explosive sites located in the proposed FRA restrict trawling activities. This is indicative of the limited socio-economic impact of the proposed FRA.

MedReAct on behalf of the Adriatic Recovery Project, is submitting a proposal to establish a Fisheries Restricted Area (FRA) in the South Adriatic Pit area.

The proposed FRA core area covers important nursery and spawning grounds of valuable deep-water stocks and VMEs species. The core area is surrounded by a buffer zone where other important nurseries and spawning grounds and complex and heterogeneous habitats are found. The goals of this proposed FRA are to protect EFHs and VMEs, and support the recovery of key demersal stocks. The establishment of this FRA would contribute to the long-term sustainability of these fisheries, meet the management objectives of the GFCM, and is based on the best available scientific information.
2. AREA IDENTIFICATION

2.1. GFCM GEOGRAPHICAL SUBAREA

www.fao.org/gfcm/data/map-geographical-subareas

GSA 18

2.2. NAME OF THE FRA

Deep water essential fish habitats and sensitive habitats in the South Adriatic.

2.3. GEOGRAPHICAL LOCATION

2.3.1. General location

Location of the proposed FRA (Fig 1.)

![Map of the Mediterranean Sea and location of the proposed FRA in the Adriatic Sea, zone GSA18.](image-url)

Fig. 1: Map of the Mediterranean Sea and location of the proposed FRA in the Adriatic Sea, zone GSA18.
2.3.2. Precise location of the proposed core area
Provide geographical coordinates (latitude and longitude in degrees, minutes and seconds) for the vertex of a polygonal area.

The core area is delimited by the vertices having the following coordinates (GCS WGS 1984) (Fig. 2):

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Longitude</th>
<th>Vertex</th>
</tr>
</thead>
<tbody>
<tr>
<td>40°54'00&quot; N</td>
<td>18°12'00&quot; E</td>
<td>1</td>
</tr>
<tr>
<td>41°00'00&quot; N</td>
<td>18°48'36&quot; E</td>
<td>2</td>
</tr>
<tr>
<td>40°55'48&quot; N</td>
<td>19°00'00&quot; E</td>
<td>3</td>
</tr>
<tr>
<td>40°45'00&quot; N</td>
<td>19°01'48&quot; E</td>
<td>4</td>
</tr>
<tr>
<td>40°44'24&quot; N</td>
<td>18°57'36&quot; E</td>
<td>5</td>
</tr>
<tr>
<td>40°38'24&quot; N</td>
<td>19°02'24&quot; E</td>
<td>6</td>
</tr>
<tr>
<td>40°10'48&quot; N</td>
<td>19°10'12&quot; E</td>
<td>7</td>
</tr>
<tr>
<td>40°09'36&quot; N</td>
<td>18°46'48&quot; E</td>
<td>8</td>
</tr>
<tr>
<td>40°24'36&quot; N</td>
<td>18°39'00&quot; E</td>
<td>9</td>
</tr>
</tbody>
</table>

2.3.3. Buffer area (if applicable)
Provide geographical coordinates (latitude and longitude in degrees, minutes and seconds) for the vertex of a polygonal area.

The buffer area is delimited by the vertices having the following coordinates (GCS WGS 1984) (Fig. 2):

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Longitude</th>
<th>Vertex</th>
</tr>
</thead>
<tbody>
<tr>
<td>41°03’28.8” N</td>
<td>17°32’20.4” E</td>
<td>10</td>
</tr>
<tr>
<td>41°00’13.32” N</td>
<td>19°08’23.28” E</td>
<td>11</td>
</tr>
<tr>
<td>40°03’36” N</td>
<td>19°18’10.8” E</td>
<td>12</td>
</tr>
<tr>
<td>39°58’35.4” N</td>
<td>19°09’37.68” E</td>
<td>13</td>
</tr>
<tr>
<td>39°59’45.6” N</td>
<td>18°44’52.8” E</td>
<td>14</td>
</tr>
</tbody>
</table>
2.3.4. Location map

Include geographical coordinates of the core and buffer areas, bathymetry and boundary of international waters. Add a global reference map of the Mediterranean with the location of the site.

Fig. 2: Top: Location of the proposed FRA on the Mediterranean reference map. Bottom: Detailed position of the proposed FRA in the Adriatic Sea, GSA18. The numbers indicate the corresponding vertex of the core and buffer areas.
2.3.5. Depth range
In meters. Specify core and buffer area, if applicable.

<table>
<thead>
<tr>
<th>Core area</th>
<th>Buffer area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. depth (m)</td>
<td>Max. depth (m)</td>
</tr>
<tr>
<td>200</td>
<td>968</td>
</tr>
</tbody>
</table>

2.4. SURFACE AREA
In ha and km². Specify core and buffer area, if applicable.

<table>
<thead>
<tr>
<th>Core area</th>
<th>Buffer area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface (km²)</td>
<td>Surface (ha)</td>
</tr>
<tr>
<td>3545.22</td>
<td>354522</td>
</tr>
</tbody>
</table>

3. SITE DESCRIPTION

3.1. MAIN PHYSICAL FEATURES

3.1.1. Geology/Geomorphology
Briefly describe geological aspects, sedimentation and erosion processes observable in the area and other geomorphologic features or geological risks. Indicate bibliographical sources.

The Adriatic Sea is a semi-enclosed and elongated basin (about 200 x 800 Km) with the major axis in the northwest–southeast direction, located between the Italian and the Balkan peninsulas. It is divided into three sub-basins showing clear morphological differences (Artegiani et al., 1997). While the Northern Adriatic is flat and shallow (average depth 70 m), the Southern Adriatic is morphologically more complex and deeper. The deepest part reaching down to 1200 m is the South Adriatic Depression, between the Apulian Platform and the Montenegro/Albanian Continental Margin (Del Bianco et al., 2014).

The South Adriatic Basin is part of the complex Apennine foreland dating back at least to the Oligocene (Argnani et al., 1991) (Fig. 3). The general submarine morphology of this region approximates an irregular club-like shape basin reaching down to 1200 m, rimmed by steeped flanks, and narrowing southwards where it opens to the Ionian Sea (Taviani et al., 2016). More in detail, the morphology is quite complex and definitely asymmetrical.

The South West Adriatic Margin (SAM) includes a steep and morphologically complex continental slope stretching about 600 km from the Pelagosa sill to the Otranto Strait, that is a 70 km wide channel connecting the Adriatic and the Ionian Seas (Mediterranean) over the 800 m deep sill (Foglini et al., 2016). The SAM is dominated in the north by the presence of widespread mass-failure features, the largest of which is Gondola slide (Minisini et al., 2006). In the south, there are multiple slope incisions, the major of which is the Bari Canyon System, which includes a channel-levee complex active until the early stages of the post-glacial sea level rise (Trincardi et al., 2007). The northern domain is also dissected by the cross-slope Gondola deformation belt, which connects downslope to
the Dauno Seamount (Fig. 3).
The eastern side margin displays an overall less pronounced topographic roughness (Taviani et al., 2016). The eastern slope of the southern Adriatic basin has originated from a thick stack of sedimentary prograding units, fed by sediments coming from the adjacent Dinaride-Hellenide fold-and-thrust belt (Argnani et al., 2006). The shelf edge is now relict because of the combined contribution of foredeep subsidence and Late Quaternary sea level fluctuations, with sediments currently stored closer to the coastline. Swath bathymetry shows that the eastern slope of the South Adriatic basin is incised by a large number of scars of variable size that are not connected to a subaerial drainage system. These erosional features are possibly due to submarine landslides (Argnani et al., 2006, 2011). The frequent scalloped features present along the slope suggest repeated events of retrogressive land sliding that possibly initiated during the last sea-level lowstand and then continued until present (Angeletti et al., 2014). The investigation of the Montenegrin continental slope in the south-eastern Adriatic Sea has started recently. The recent Remote Operated Vehicle (ROV) inspection of the Montenegrin canyons revealed the existence of cold water corals communities (Angeletti et al., 2014) and led to an unexpected discovery of a field of columnar carbonates along the continental slope in the south-eastern Adriatic Sea (Angeletti et al., 2015).

Fig. 3: Left: The geological setting showing the Apulian Ridge as the foreland system of both the Appennines and Hellenic fold-and-thrust belts (picture from Savini et al., 2014); Right: Multibeam bathymetry of the South Adriatic Margin, with the main geological features: Gondola and Vieste Slides, Gondola deformation belt, Dauno Seamount and Bari Canyon (picture from Foglini et al., 2016).

The seabed on the continental shelf has a slight slope and is almost exclusively sedimentary. As the distance from the coastline and the gradient in the seabed gradually increase, together with the lower hydrodynamism, mud gradually becomes prevalent, favouring the establishment of biotic communities of muddy sands (Cataudella and Spagnolo (Eds), 2011).
3.1.2. Other relevant physical or chemical features
E.g. hydrodynamics, frontal areas, upwelling, etc.

Due to its bathymetry, geographical position and climatological characteristics, the Adriatic Sea represents one of the most important formation sites of bottom waters in the whole Mediterranean (Lascaratos et al., 1999; Canals et al., 2009) as a result of wind forcing leading to strong seasonality-dependent cooling (Fig. 4). The South Adriatic Pit is the dominant morphological feature of the Southern Adriatic. It is an area of open ocean convection and dense water formation, whose intensity depends on the air-sea heat flux and buoyancy content. In general, three main dense-water masses are recognized in the South Adriatic Basin (Cushman-Roisin et al., 2001): the Levantine Intermediate Water (LIW) coming from the Eastern Mediterranean through the Otranto Straits, the North Adriatic Dense Water (NAdDW) and the South Adriatic Dense Water (SADW) forming in the northern and southern Adriatic respectively. The NAdDW forms in the North Adriatic through winter cooling and evaporation of shelf waters associated with local wind forcing (Bora events). The NAdDW is active every year for a relatively short interval and moves to the south along the Italian coast around the Gargano promontory (Cushman-Roisin et al., 2001). It represents the densest water in the entire Mediterranean (reaching density excess of 29.8 kg/m$^3$) and it may sink all the way to the basin floor at 1200 m. During its flows across the southern Adriatic margin slope, the NAdDW strongly interacts with the slope topography (Vilibić and Orlić, 2002), and mixes with the LIW. The LIW’s less energetic but more steady through the year and impacts the upper slope between 200 and 600 m (Verdicchio and Trincardi, 2008). The SADW, including a small proportion of LIW and NAdDW, tends to flow out of the basin through the Otranto Strait forming a dense water outflow current and contributing to the formation of the Eastern Mediterranean Deep Water (Artegiani et al., 1989; Bignami et al., 1990; Artegiani et al., 1997).

![Fig. 4. Location of the Adriatic in the Mediterranean Sea, with schematic circulation path of the Levantine Intermediate Waters (LIW), the North Adriatic Deep Waters (NAdDW) and the Adriatic Deep Waters (ADW); deep water formation occurs through shelf water cooling, in the north, and open ocean convection in the South Adriatic Pit (SAP). Section A–B schematically shows the intermediate-deep water circulation on the Southwestern Adriatic Margin slope. (from Foglini et al., 2016).](image-url)
3.2. BIOLOGICAL FEATURES

3.2.1. Habitats
Briefly describe the dominant marine habitats, including pelagic habitats, if applicable

Predominant habitats and biocenosis present in the proposed South Adriatic FRA area, listed as priority habitats by the SPA/BIO Protocol of the Barcelona Convention

IV. 2. 3. Biocenosis of shelf-edge detritic bottom
   IV. 2. 3. 2 Facies with *Leptometra phalangium*

V.1.1. Biocenosis of benthal mud
   V. 1. 1. 3. Facies of soft muds with *Funiculina quadrangularis*
   V.1.1.4. Facies of compact muds with *Isidella elongata*

V.3.1 Biocenosis of deep sea corals

3.2.2. List of species of regional importance
List the marine species protected under international agreements (specify which agreements) and/or included in the GFCM priority list. If applicable, indicate the IUCN category. Any other species may be listed if they are clearly considered of regional importance given their high representation in the area. For each species indicate: 1) relative abundance (common [C], uncommon [U] or occasional [O]); 2) regional status (rare [r], endemic [e] and/or threatened [t]); and 3) local status as an important resident population (R), or important for breeding (B), feeding (F), wintering (W) or migratory passage (M).

<table>
<thead>
<tr>
<th>Species</th>
<th>1 - Relative abundance (C) (U) (O)</th>
<th>2 - Regional status (r) (e) (t)</th>
<th>3 - Local status (R) (B) (F) (W) (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Eledone cirrosa</em></td>
<td>C</td>
<td></td>
<td>R</td>
</tr>
<tr>
<td><em>Eledone moschata</em></td>
<td>C</td>
<td>e</td>
<td>R</td>
</tr>
<tr>
<td><em>Loligo vulgaris</em></td>
<td>C</td>
<td>e</td>
<td>R</td>
</tr>
<tr>
<td><em>Lophius budegassa</em></td>
<td>C</td>
<td>R</td>
<td>GFCM priority list</td>
</tr>
<tr>
<td><em>Lophius piscatorius</em></td>
<td>U</td>
<td>R</td>
<td>GFCM priority list</td>
</tr>
<tr>
<td><em>Merluccius merluccius</em></td>
<td>C</td>
<td>t</td>
<td>R, B</td>
</tr>
<tr>
<td><em>Micromesistius pourassou</em></td>
<td>C</td>
<td></td>
<td>R</td>
</tr>
<tr>
<td><em>Pagellus erythrinus</em></td>
<td>C</td>
<td>R</td>
<td>GFCM priority list</td>
</tr>
</tbody>
</table>
**PROPOSAL FOR A GFCM FISHERIES RESTRICTED AREA (FRA) IN THE MEDITERRANEAN AND THE BLACK SEA**

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>Remarks</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mullus barbatus</td>
<td>C</td>
<td>R</td>
<td>GFCM priority list</td>
</tr>
<tr>
<td>Nephrops norvegicus</td>
<td>C</td>
<td>R</td>
<td>GFCM priority list</td>
</tr>
<tr>
<td>Parapenaeus longirostris</td>
<td>C</td>
<td>R,B</td>
<td>GFCM priority list</td>
</tr>
<tr>
<td>Aristomorpha foliacea</td>
<td>C</td>
<td>R</td>
<td>GFCM priority list</td>
</tr>
<tr>
<td>Aristaeus antennatus</td>
<td>C</td>
<td>R</td>
<td>GFCM priority list</td>
</tr>
<tr>
<td>Squatina squatina</td>
<td>Rare</td>
<td>t</td>
<td>IUCN Critically Endangered</td>
</tr>
<tr>
<td>Mobula mobular</td>
<td>Unknown</td>
<td>e/t</td>
<td>R</td>
</tr>
<tr>
<td>Lamna nasus</td>
<td>Unknown</td>
<td>r/t</td>
<td>Possible B/F IUCN Critically Endangered; Annex II SPA/BD protocol</td>
</tr>
<tr>
<td>Centrophorus granulosus</td>
<td>Unknown</td>
<td>t</td>
<td>IUCN Vulnerable</td>
</tr>
<tr>
<td>Hexanchus griseus</td>
<td>t</td>
<td>R</td>
<td>IUCN Vulnerable</td>
</tr>
<tr>
<td>Isurus oxyrinchus</td>
<td>Unknown</td>
<td>t</td>
<td>GFCM priority list; IUCN Critically Endangered</td>
</tr>
<tr>
<td>Cetorhinus maximus</td>
<td>Unknown</td>
<td>t</td>
<td>Possible B IUCN Endangered</td>
</tr>
<tr>
<td>Carcharodon carcharias</td>
<td>U</td>
<td>r/t</td>
<td>IUCN Critically Endangered</td>
</tr>
<tr>
<td>Chimaera monstrosa</td>
<td>Unknown</td>
<td></td>
<td>IUCN Near Threatened</td>
</tr>
<tr>
<td>Stenella coeruleoalba</td>
<td>C</td>
<td>t</td>
<td>R,F IUCN Vulnerable; Listed in the Annex II of SPA/BD Protocol</td>
</tr>
<tr>
<td>Ziphius cavirostris</td>
<td>Unknown</td>
<td></td>
<td>Listed in the Annex II of SPA/BD Protocol</td>
</tr>
<tr>
<td>Caretta caretta</td>
<td>C</td>
<td>e</td>
<td>Appendix I and II of the Convention on Migratory Species (CMS); Annex II of SPA/BD Protocol</td>
</tr>
<tr>
<td>Dendrophyllia cornigera</td>
<td>Unknown</td>
<td>t</td>
<td>R IUCN (in process)</td>
</tr>
<tr>
<td>Madrepora oculata</td>
<td>Unknown</td>
<td>t</td>
<td>IUCN Endangered</td>
</tr>
</tbody>
</table>
3.2.3. Occurrence of biological and ecological processes relevant to fish resources
E.g. essential fish habitats.

The oceanic characteristics and the dynamics of water masses of the Southern Adriatic (GSA 18) are intimately connected with those of the Ionian Sea (GSA 19). Thus, the variability of the spatial and temporal patterns of their currents influence the diversity and the spatial distribution of the biological marine resources, as well as important life stages of target species and their spawning behaviors (Spedicato et al., 2015). In GSA 18, the Southern Adriatic vortex produces an upwelling system, which enhances the productivity of the basin. Moreover, two main currents, the south-western, formed by colder and low salinity waters from the Po river and the south-eastern, carrying warmer and saltier waters from the eastern basin, contribute to the generation of favorable conditions for the occurrence of nursery areas (Colloca et al., 2015). The South Adriatic Pit and in particular the proposed FRA area, represents nursery areas for several commercially valuable species such as the blackmouth catshark (*Galeus melastomus*), the giant red shrimp (*Aristeomorpha foliacea*), the deep-water rose shrimp (*Parapeneus longirostris*) and the European hake (*Merluccius merluccius*) (Fig. 5). Generally, the nurseries of thermophile and halophile species, such as the deep-water rose shrimp, are mainly localized along the eastern side of the south Adriatic, where nurseries of other coastal and deep-water species also occur, possibly as an effect of a lower fishing pressure (Colloca et al., 2015). Adult aggregations (spawning areas) of *G. melastomus* are present in muddy bottoms with deep benthal biocenosis (VP) and *Gryphus vitreus* or *Isidella elongata* facies (MEDISEH, 2013). Spawner aggregation of the giant red shrimp (*A. foliacea*) partially overlap with its nursery areas, and are mainly localized along the eastern border of the South Adriatic pit offshore the Albania coasts (MEDISEH, 2013). Moreover, the proposed FRA also cover the only very high persistent (80-100%) hot spot of *Aristeus antennatus* spawning aggregation, localized along the western border of the South Adriatic pit at 500 m depth (MEDISEH, 2013) (Fig. 6).

The proposed FRA area contains important habitats for Mediterranean megafauna and for rare slow-growing deep-water corals. It hosts a variety of sensitive habitats, which affect the biodiversity and the ichthyofauna of the basin. It has been described as an hot-spot of deep habitats such as facies with the crinoid *Leptometra phalangium*, facies with the bamboo coral, *Isidella elongata* on bathyal muds and facies with the sea pen *Funiculina quadrangularis*. In proximity to the Otranto channel, deep-water corals such as *Madrepora oculata*, together with other colonial and solitary coral species, have been recorded (see paragraph 4.1, Fig. 11). As observed in the deep-water corals of the Bari Canyon, these habitats increase biodiversity and play a fundamental role in the South Adriatic ecosystems, providing refuge, feeding and
breading grounds for target species and deep-fish species (e.g. *Helicolenus dactylopterus* and *Pagellus bogaraveo*) (D’Onghia et al., 2015).

Fig. 5: Distribution maps of nursery areas for commercially important species. Persistence index of nursery areas of commercial species from analyses of MEDITS data (May-June 1994-2010; Colloca et al. 2015). From the top left: Blackmouth Catshark (*Galeus melastomus*); Giant red shrimp (*Aristomorpha foliacea*); Norway lobster (*Nephrops norvegicus*); Deep-water rose shrimp (*Parapeneus longirostris*) and European hake (*Merluccius merluccius*).
3.3. USE OF NATURAL RESOURCES

3.3.1. Current human use and development of fisheries
a) Briefly describe the current use of the area by artisanal, industrial and recreational fisheries, including information on:
   - Number of vessel by fishery operating in the area
   - Total annual catches by species for each fishery in the area
   - Percentage of total catches fished in the area in relation to the total
   - Value of catches fished in the area
   - Percentage of the value of catches in the area in relation to the total value
   - Bycatch rates of vulnerable species in the area
   - Number of fishers involved in the fisheries operating in the area
   - Name(s) of base port(s)

Fishing fleets operating in GSA 18 are mainly from Italy and Albania (Spedicato et al., 2015). The Italian fleet is mainly composed of demersal trawlers VL1218 and VL1824 with 13% of the larger vessels concentrated in GSA 18 (STECF, 2016).

In 2013, the Italian fleet in GSA 18 was composed by 1,037 vessels. Around 370 vessels operated with trammel and gillnets and around 400 vessels with trawl nets, most of which fished mainly in coastal areas and only few (around 27) could reach highest depth (bottoms of the end of the slope and
bathyal bottoms) (see Tab 1) (Spedicato et al., 2015). Trawling represents around the 75% of the total fishing capacity of GSA 18 and the 87% of the fishing effort (Spedicato et al., 2015).

Between 2012-2014 in the GSA 18:

- Bottom otter trawl targeting demersal species (DEMSP_OTB) was mostly composed by the segments VL1218 (56 %) and VL1824 (36 %). This fleet mainly operates on the muddy bottoms of continental slope and performed on average 100,411 GT*days at sea (STECF, 2015; Fig. 7).
- Bottom otter trawl fleet targeting mixed demersal and deep water species (MDDWSP_OTB), was mostly composed by the segments VL1824 (48 %) and VL2440 (45 %). This fleet performed on average 10,982 GT*days at sea and operated on the muddy bottoms of continental shelf and slope (STECF, 2015; Fig. 7).
- Trammel nets targeting demersal species (DEMSP_GTR), was mostly composed by the segments VL0006 (19 %) and VL0612 (87%) (Fig. 7), operating on the upper continental shelf. This fleet performed on average 6,656 GT*days at sea (STECF, 2015; Fig. 7).
- The fleet of set longlines targeting demersal fish (DEMF_LLS) was mostly composed by the segments VL0612 (23 %) and VL1218 (81 %), operating on the continental shelf and upper slope. This fleet performed on average 6,303 GT*days at sea (STECF, 2015; Fig. 7).
- Fisheries with set gillnets targeting demersal species (DE_MSP_GNS) are performed by fleets operating on the upper continental shelf. This fleet was mostly composed by the segments VL0006 (37 %) and VL0612 (63 %) and performed on average 5,784 GT*days at sea (STECF, 2015).

The EU fleet register reported 217 vessels registered in Croatian ports located in the GSA 18 area (December 2017). Of them, only twenty-one vessels are >12 m length and only eight had otter bottom trawl as main gear. According to AIS data from 2015, Croatia had fifteen trawling vessels operating in international waters of the GSA 18 and almost the totality from Dubrovnik, but no one inside the proposed FRA area (Elahi personal observation).

Tab. 1. Main fisheries and stocks in the western side of GSA 18 (Spedicato et al., 2015)

<table>
<thead>
<tr>
<th>GSA</th>
<th>Fishery</th>
<th>Average number of operating vessels</th>
<th>Target species (landings, tons)</th>
<th>Operating depth range (m)</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>mixed bottom trawl</td>
<td>~27</td>
<td><em>M. merluccius</em> = 48t, <em>P. longirostris</em> = 40t, <em>N. norvegicus</em> = 27t, <em>A. foliacea</em> = 8t</td>
<td>100-600m</td>
<td>continental shelf</td>
</tr>
<tr>
<td>18</td>
<td>bottom longliners</td>
<td>~16</td>
<td><em>M. merluccius</em> = 279t, <em>C. conger</em> = 72t, <em>E. gurnardus</em> = 62t</td>
<td>0-600m</td>
<td>continental shelf and slope</td>
</tr>
</tbody>
</table>
The Albanian fishing fleet includes 551 registered vessels, concentrated in four fishing ports of Durres (38% of the fishing fleet), Vlora (35%), Saranda (14%) and Shengjin (12%). Around 40% of the Albanian fishing fleet is composed of small polyvalent vessels of less than 6 m\(^1\).

As of 2017 Albania has 167 registered fishing vessels > 15 m (GFCM AVL). Trawlers represent 38% of the fleet.

**Total annual catches by species of each fishery in the area**

The Southern Adriatic Sea makes a substantial contribution to the Italian fishery production, with an input comparable to that of the Strait of Sicily, accounting for about 13% of production (Irepa, 2010). Deepwater rose shrimp (*Parapenaeus longirostris*) is an important species in GSA 18 demersal trawl fishery, as it is distributed mainly in the southern Adriatic. In GSA 18, Deepwater rose shrimp stock was found in overexploitation and at intermediate biomass levels (current F being 1.9 times higher than F0.1) (GFCM-SRC-AS-2016) whereas European hake is found in heavy overexploitation and at intermediate biomass levels, with current F 4.8 times higher than F0.1 (GFCM-SRC-AS-2016). This species depth distribution ranges between several meters in the coastal areas down to 800 m in the South Adriatic Pit (Kirinčić and Lepetić, 1955; Ungaro et al., 1993). In the South Adriatic largest individuals are caught in waters deeper than 200 m (Ungaro et al., 1993).

The main demersal stocks exploited in the GSA18 are *Merluccius merluccius*, *Nephrops norvegicus*, and *Parapenaeus longirostris*. The number of vessels exploiting these species from the western side of the South Adriatic (data referred to 2014) are reported in Table 1 (above). Table 2 shows the landings by species and gears for the GSA 18 as reported in 2014 (Cardinale and Scarcella, 2017). The main gears exploiting European hake are bottom trawls and longlines. In 2015 the largest landings of European hake in GSA 18 were recorded by the Italian trawler fleet segment VL1224

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with 1700 tons, while the Albania trawl fleet reported landings of 206 tons. Longlines are particularly important for the Italian side of the GSA 18 with reported landings of 427 tons (GFCM, 2016).

In 2014 landings of Norway lobster by the Italian trawlers amounted to 442.8 tons (STEF, 2017). The Italian landings of *Nephrops norvegicus* and *Merluccius merluccius* are entirely sold at local markets, and demand largely exceeds landings. The almost totality of *Nephrops norvegicus* and *Merluccius merluccius* from GSA 18 fishing grounds is landed in ports located in the same GSA, with only 1% for both species landed in GSA 17 (Russo et al., 2017).

In 2012 Albanian catches amounted to almost 2400 tons, with demersal species representing the 35-40% of total catches (Spedicato et al., 2015).

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### Tab. 2. Landings by species, GSA and gear in 2014 for species (from Cardinale and Scarcella, 2017)

<table>
<thead>
<tr>
<th>Species</th>
<th>Fishery</th>
<th>GSA 18 (Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue and red shrimp</td>
<td>Demersal deep trawl</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Passive gears</td>
<td></td>
</tr>
<tr>
<td>Giant red shrimp</td>
<td>Demersal deep trawl</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td>Passive gears</td>
<td></td>
</tr>
<tr>
<td>Deep-water rose shrimp</td>
<td>Demersal coastal trawl</td>
<td>615.5</td>
</tr>
<tr>
<td></td>
<td>Passive gears</td>
<td></td>
</tr>
<tr>
<td>Norway lobster</td>
<td>Demersal coastal trawl</td>
<td>444.7</td>
</tr>
<tr>
<td></td>
<td>Passive gears</td>
<td></td>
</tr>
<tr>
<td>European hake</td>
<td>Demersal coastal trawl</td>
<td>1560</td>
</tr>
<tr>
<td></td>
<td>Passive gears</td>
<td>303.6</td>
</tr>
</tbody>
</table>

**Value of catches**

Landing data and the related value of target species are available only at basin scale. Stocks of *Merluccius merluccius* and *Parapeneus longirostris* are shared among the fishing fleets operating in the southern part of GSA18 (mainly Italy, Albania and Montenegro) while *Nephrops norvegicus* is exploited essentially by Italy. Hake is landed mostly by Italian trawlers (90%) while landings of deep water pink shrimp are landed by Italian trawlers (66%), Albanian trawlers (33%) and Montenegrin trawlers (2%) (Bitetto et al., 2015).

**Italy**

The Italian fleet is highly diversified with a broad range of vessel types targeting different species, particularly in the Adriatic Sea. In 2013 the total production from GSA 18 was 24,410 tonnes or 133 million euro (Mannini and Sabatella, 2015). From 2013 to 2014, gross and net profit decreased by 14% and 23% respectively mainly due to a decrease of 14% in landings value.

The first most productive Italian fleet segment in terms of landings value (€158 million in 2014) consists of 1,254 vessels of 12-18m, operating mostly with bottom trawls and beam trawls. These
vessels represent 10% of the entire Italian fleet in terms of vessels number, contributing 13% of the volume and 19% of the landings value of the national fleet (STECF, 2016).

The main species for Italian demersal trawl and seine between 12-18 m is European hake (€15 million in 2014), followed by deep-water rose shrimp (€13.5 million). Italian demersal trawl and seine fleet segment VL 1824 mainly target both demersal and pelagic species. The most important species of this fleet segment are European hake and deep water rose shrimp, accounting for 14 and 12% of total landings value respectively. Other important species are Norway lobster and red mullet, which contributed to total landings value for 7% each. Finally, the larger demersal trawl and seine (between 24-40 m in length), represented 2% of the total Italian fleet but accounted for 10% of total Italian landings value. Their main target species are giant red shrimp and deep water rose shrimp, which account for more than a half of total landings value (31 and 22% respectively) (STECF, 2016).

According to the most recent DCF data, in the period 2012-2014, it has been recorded that the species accounting for 75 % of the cumulative distribution in term of landing value were:

- *Merluccius merluccius* (HKE), *Nephrops norvegicus* (NEP), *Mullus* spp (MUX), *Eledone* sp (OCM) and *Parapenaeus longirostris* (DPS) from bottom otter trawl targeting demersal species (DE MSP_OTB);

- *Nephrops norvegicus* (NEP), *Merluccius merluccius* (HKE), *Parapenaeus longirostris* (DPS), *Aristaeomorpha foliacea* (ARS), *Lophius* spp (MNZ) from bottom otter trawl targeting mixed demersal and deep water species (MDDWSP_OTB);

- *Sepia officinalis* (CTC), *Octopus vulgaris* (OCC) and *Mullus* spp (MUX) from trammel nets targeting demersal species (DE MSP_GTR);

- *Merluccius merluccius* (HKE) and *Eutrigla gurnardus* (GUG) for set longlines targeting demersal fish (DE MF_LLS);

- *Sepia officinalis* (CTC), *Mullus* spp (MUX) and *Octopus vulgaris* (OCC) from set gillnets targeting demersal species (DE MSP_GNS) (STECF, 2015).

Data from Albania are very limited. In 2014, fish exports were worth USD 31.5 million, with prepared and preserved anchovies representing the bulk of exports (89%). The catch composition has been dominated by valuable demersal species which have been mainly exported (largely to EU countries, such as Italy and Greece) as fresh fish. Consequently, trawlers are the dominant part of the fleet and the small and large pelagic fisheries are not developed (http://www.fao.org/fishery/facp/ALB/en).

Croatian landings originating from both GSA17 and GSA18 in 2015 included 110 species in total. Species targeted by demersal trawling, Norway lobster and hake, account for less than 0.4% and 1% respectively in terms of quantity, but over 5% and 4% respectively in terms of the value. The most important fleet segment in terms of contribution to total landings is purse seiners of VL 2440. This fleet segment accounted for almost 55% of landings in 2014 (STECF, 2016).

**Percentage with respect to the total**

In Italy, according to the most recent DCF data, in the period 2012-2014 it has been recorded:

- For **bottom otter trawl targeting demersal species (DE MSP_OTB)**: species which landing volume in percentage is accounting for 75 % of the cumulative distribution are: *Merluccius merluccius* (HKE), *Nephrops norvegicus* (NEP), *Mullus* spp (MUX), *Eledone* sp (OCM), *Parapenaeus longirostris* (DPS) and *Squilla mantis* (MTS);

- For **bottom otter trawl fleet targeting mixed demersal and deep water species (MDDWSP_OTB)**: species which landing volume in percentage is accounting for 75 % of
the cumulative distribution are: *Merluccius merluccius* (HKE), *Parapenaeus longirostris* (DPS), *Lophius* sp. (MNZ), *Nephrops norvegicus* (NEP), *Eutrigla gurnardus* (GUG), *Eledone* spp (OCM) and *Squilla mantis* (MTS).

- For **trammel nets targeting demersal species (DEMSP_GTR)**: the species which percentage in terms of value and volume of landings account for 75% of the cumulative distributions are: *Sepia officinalis* (CTC), *Octopus vulgaris* (OCC) and *Mullus* spp (MUX).

- For **set longlines targeting demersal fish (DEMF_LLS)**: the species which landing volume in percentage is accounting for the part of the cumulative distribution left to the slope change is *Merluccius merluccius* (HKE).

- For **set gillnets targeting demersal species (DEMSP_GNS)**: the species which landing value and landing volume is accounting 75% of the cumulative distributions are: *Sepia officinalis* (CTC), *Mullus* spp (MUX) and *Octopus vulgaris* (OCC) (STECF, 2015).

Data referred only to the proposed FRA are not available. Data for Albania are not available.

**By-catch rates of vulnerable species in the area**

In relation to the demersal fisheries (trawl and set nets) in the Adriatic Sea (GSAs 17, 18), minimum and maximum discards rates are provided for *Merluccius merluccius, Mullus barbatus* and *Mullus surmuletus* and *Solea solea*. Maximum discard rates for these species are higher than the required de minimis (STECF, 2016).

Studies on by-catch of cetaceans and other species of conservation concern such as sharks and rays, are scant in the Adriatic Sea (Fortuna et al., 2010). Results come mainly from pelagic trawl fisheries and suggested that further work is needed to evaluate the real impact of pelagic trawlers on a number of vulnerable species. However, a recent study reported that in 2014, more than 9000 sea turtles (*Caretta caretta*) were caught as bycatch in GSA 18 (Lucchetti et al., 2017). The most harmful fishing gears results to be trawl nets, showing the highest probabilities of turtle bycatch (>6000 catches in GSA 18) followed by set nets (>2800 capture events) (Lucchetti et al., 2017).

**Name(s) of base port(s)**

The landing points for *Nephrops norvegicus* and *Merluccius merluccius* species in the Italian part of GSA 18, are eleven and all located in the Apulian region (Russo et al., 2017). More in general, the main Italian fishing ports in GSA 18 are Manfredonia, Bisceglie, Molfetta, Mola di Bari and Monopoli (Cataudella and Spagnolo (Eds), 2011). Albania has four main fishing ports: Durres (38% of the fishing fleet), Vlora (35%), Saranda (14%) and Shengjin (12%).

No data are available for recreational fishing. In the Mediterranean Sea, it is estimated to account for more than 10% of the total fish catch (Randone, 2016).

**Number of fishers involved in the fisheries operating in the area.**

The number of fishers employed (full-time equivalent, and total number of person), day at sea and wages and salaries of the crew for the Italian country are reported in Table 3. Italy’s small-scale fleet (SSF) plays a significant social and economic role with more than 65% of the fishing fleet employing at least 50% of those workers directly engaged in fishing activity (STECF, 2016). Italian large-scale
fleets (LSF) is mainly composed of demersal trawlers VL 1218 and VL1824, with 13% of larger vessels concentrated in the GSA 18 (STECF, 2016).

In 2014, about 2250 persons were employed in Albanian fishing fleet (http://www.fao.org/fishery/facp/ALB/en).

Tab. 3: People employed in Italian fishing sectors (STECF, 2016)

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small-scale fleet (SSF)</td>
<td>Large-scale fleet (LSF)</td>
</tr>
<tr>
<td>Italy</td>
<td>9,379</td>
<td>11,315</td>
</tr>
<tr>
<td>Total employed (person)</td>
<td>13,114</td>
<td>13,819</td>
</tr>
<tr>
<td>Day at sea (thousand day)</td>
<td>931</td>
<td>502.1</td>
</tr>
<tr>
<td>Wages and salaries of crew (million €)</td>
<td>31.9</td>
<td>152.8</td>
</tr>
</tbody>
</table>

AIS data indicates that from January 2014 to July 2016 there were 174 trawlers operating beyond territorial waters (>12 nm) of GSA 18 (Fig. 8). Of these, only 28 trawled inside the core area of the proposed FRA and only 2 spent more than 25% of their fishing hours inside the core area (Fig. 8).

Fig. 8: Frequency distribution of fishing time per vessel from January 2014 to July 2016 in international waters of the GSA 18. The numbers in parenthesis reported the number of trawlers in international waters of the GSA 18 and inside the core area of the FRA (28 the total number of trawlers inside the core area, 2 the number of trawlers spending more than 25% of their fishing hours inside the core).
b) Provide the number of users depending on these resources, seasonality, assessment of the social and economic importance of their use and of the perceived impact on the conservation of the area, using a score of 0-1-2-3 (0: null, 1: low, 2: medium, 3: high).

<table>
<thead>
<tr>
<th>ACTIVITY AND CATEGORY</th>
<th>ASSESS THE IMPORTANCE OF</th>
<th>ESTIMATED NUMBER OF USERS</th>
<th>SEASONALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Artisanal</td>
<td>Small-scale fishing would not be directly affected</td>
<td>0</td>
<td>Data not available</td>
</tr>
<tr>
<td>- Industrial</td>
<td>Some impact for demersal fishing vessels</td>
<td>2</td>
<td>28 trawlers operated in the proposed FRA core area</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Aquaculture</td>
<td>No aquaculture activities in the area</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.3.2. Current human use and development other than fisheries

a) Briefly describe how the area is currently used by other economic sectors

In addition to fishing, a suite of marine sectors supports the marine economies of the Adriatic region.

The most valuable economic sector of the Adriatic is coastal and maritime tourism (€8 billion). Maritime transportation is also generally considered a key economic sector (€5.2 billion) for the presence of important industrial centers, especially along the western Adriatic coast, and for the presence of important shipping ports (such as Trieste, Venice, Koper and Rijeka) to other countries in Central Europe (Fig. 9) (Randone, 2016; EU, 2014).
PROPOSAL FOR A GFCM FISHERIES RESTRICTED AREA (FRA) IN THE MEDITERRANEAN AND THE BLACK SEA

The Adriatic Sea is one of the sub-regions of the Mediterranean with the highest concentration of oil and gas (O&G) activities. Gas and oil extraction activities, in particular offshore, are thus considered important for the Adriatic economy (€2.2 billion). Inside the proposed FRA there is an Italian active concession for extraction, with an offshore installation (Fig. 10).

Two military areas are present along the Italian side of the proposed FRA area (Fig. 10). There, the navigation and fishing activities are banned for the presence of unexploded ordnance. Moreover, two explosive sites are reported inside the proposed FRA area (dangerous circular area (r=5M) due to the presence on the bottom of ordnance dropped from aircrafts).

Fig. 9: In the left panel Adriatic Sea freight traffic and ports (2014); right panel passenger traffic (2014). (Pictures from Randone, 2016).

Fig. 10: Left: Map showing the active offshore mineral concessions and research permits (updated to 28 of February 2018) inside the proposed FRA area (data from: http://unmig.sviluppoeconomico.gov.it).
Right: Military sites inside the proposed FRA area (blue polygons) and the two explosive sites (orange circles representing the dangerous circular area (r=5M) due to the presence on the bottom of ordnance dropped from aircrafts).

b) Provide the number of users depending on these resources, seasonality, assessment of the social and economic importance of their use and of the perceived impact on the conservation of the area, using a score of 0-1-2-3 (0: null, 1: low, 2: medium, 3: high).

<table>
<thead>
<tr>
<th>ACTIVITY AND CATEGORY</th>
<th>ASSESS THE IMPORTANCE OF</th>
<th>ESTIMATED NUMBER OF USERS</th>
<th>SEASONALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOCI EO-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOMIC IMPACTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other activities</td>
<td>CONSERVATION IMPACTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tourism</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>- Transport</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>- Mining</td>
<td>0</td>
<td>3</td>
<td>One active</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>concession</td>
</tr>
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</tbody>
</table>

4. REGIONAL IMPORTANCE OF THE SITE
This section aims at stressing the importance of the site for conservation at a regional scale.

4.1. PRESENCE OF ECOSYSTEMS/HABITATS OF PARTICULAR IMPORTANCE FOR THE MEDITERRANEAN

The South Adriatic Pit, together with the northern Ionian Sea, were defined by the Convention on Biological Diversity as an Ecologically or Biologically Significant Area (EBSA)\(^2\). The core and buffer areas of the proposed FRA are inside the EBSA boundaries.

The South Adriatic Pit is less known than the northern-central portion of the Adriatic basin. However, it hosts species and habitats that deserve protection on the basis for their rarity, vulnerability and functional/ecological role. The selected FRA area, in particular includes:

- Essential Fish Habitat, such as key nurseries and spawning grounds for the giant red shrimps, deep-water rose shrimp (*Aristomorpha foliacea*, *Aristeus antennatus* and *Parapeneus longirostris* respectively) European hake (*Merluccius merluccius*) and blackmouth catshark (*Galeus melastomus*) (Fig. 5-6).

- Sensitive habitats. The Southern Adriatic has been indicated as a nursery area for females with juvenile animals for Cuvier’s beaked whales (UNEP-MAP-RAC/SPA, 2014). The area reported the presence other megafauna such as the giant devil ray (*Mobula mobular*), striped dolphin (*Stenella coeruleoalba*), and loggerhead turtle (*Caretta caretta*) all listed in Annex II of SPA/BD Protocol. Tuna, swordfish and sharks are also present in this area.

- Vulnerable Marine Ecosystems that comprise cnidarian-rich deep-sea habitats. Best known examples refer to the south-western margin of the basin where scleractinian–sponge

communities (i.e. Madrepora oculata, Lophelia pertusa, Dendrophyllia cornigera, Desmophyllum dianthus, Poecillastra compressa, Pachastrella monilifera) have been documented in the Bari Canyon, Gondola Slide and Dauno Seamount (Angeletti et al., 2014). More specific to the proposed FRA area are living colonies of cold water corals (L. pertusa and M. oculata) have been described offshore Otranto (Taviani et al., 2016) (Fig. 11). According to recent research, this area encompasses an almost continuous belt of patchy cold water coral sites along the entire south-western margin (Apulian), connecting the Adriatic populations with those inhabiting the Ionian margin - Santa Maria di Leuca coral province (Angeletti et al., 2014), which was declared a FRA in 2006. Facies with the crinoid Leptometra phalangium and facies with the bamboo coral, Isidella elongata on bathyal muds are also present in the proposed FRA area (Fig. 11). Several studies described the role played by bamboo corals and high densities of the crinoid L. phalangium as important areas for commercial fishery species and invertebrates. These species are more abundant or reach larger sizes in areas with high density of the coral, particularly the red shrimps Aristeus antennatus (Maynou and Cartes, 2012) and high density of juveniles and spawners of different benthopelagic fish have been described in areas with high density of crinoids (Colloca et al., 2004).

![Fig. 11: Current known distribution of some VMEs in the proposed FRA area and adjacent waters.](image)

4.2. PRESENCE OF HABITATS THAT ARE CRITICAL TO ENDANGERED, THREATENED OR ENDEMIC SPECIES

Indicate the habitat types and the species linked to them and provide information about their status (IUCN classification, etc.).
Species resident, occasionally or frequently observed in the South Adriatic proposed FRA listed as Endangered or Threatened in the Mediterranean Sea include:

- High valuable species such as Tuna (*Thunnus thynnus*) (Endangered, IUCN), swordfish (*Xiphias gladius*) (Near Threatened, IUCN), together with sharks.
- Elasmobranchs such as the Giant Devil Ray *Mobula mobular* (Endangered, IUCN), listed on Annex II of the Protocol for Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol).
- Cetaceans such as the striped dolphin, the Risso’s dolphin and the Cuvier’s beaked whale. The presence of the striped dolphin (*Stenella coeruleoalba*) is only regular in the southern part of the basin. Risso’s dolphins were only observed in the southern Adriatic along the steep slope areas with depths between 600-900m. Both species are listed as Vulnerable in the IUCN Red List. In the review paper by Holcer et al. (2007), the authors concluded that the Southern Adriatic Sea could be an important habitat for Cuvier’s beaked whale (*Ziphius cavirostris*).
- Close to the coral biocoenosis, some typical bathyal species also occur (e.g. *Chimaera monstrosa*, considered extremely rare in the Adriatic Sea, *Dalathias licha*, (Vulnerable, IUCN).
- Shark species *Centrophorus granulosus* and *Hexanchus griseus* (Vulnerable, IUCN), together with others not threatened bathyal species (e.g. *Galeus melastomus*, *Aulopus filamentosus*, *Chlorophthalmus agassizi*, *Helicolenus dactylopterus*, *Caelorinchus caelorhincus*) (Oceana, 2014).

4.3. **OTHER RELEVANT FEATURES**

4.3.1. **Educational interest**

E.g. particular value of the site for environmental education or awareness activities.

The area could represent a pilot case for the implementation of the ecosystem-based approach in the Mediterranean and for fostering cooperation amongst coastal states on marine resources conservation and management.

4.3.2. **Scientific interest**

Particular value of the site for research.

The proposed FRA area is located in a critical area of the Adriatic basin that has long attracted the interest of science due to the:
- Presence of Essential Fish Habitats for important commercial stocks such as *Aristomorpha foliacea*, *Aristeus antennatus* (MEDISEH).
- Presence of VMEs (CBD).
- Processes related to the formation of the Adriatic Dense Water.

The area is also relevant for the exploration of deep-sea biodiversity.

5. **IMPACTS AND ACTIVITIES AFFECTING THE AREA**
5.1. IMPACTS AND ACTIVITIES WITHIN THE SITE

5.1.1. Exploitation of natural resources
Assess if current exploitation rates of natural resources within the site (e.g. fishing, sand and mineral exploitation) are deemed unsustainable in quality or quantity, and possibly quantify these threats (e.g. percentage of the site area under threat, or any known increase in extraction rates).

In the Mediterranean Sea most demersal stocks targeted by the fisheries, including hake (*Merluccius merluccius*), red mullet (*Mullus barbatus*), striped red mullet (*Mullus surmuletus*), blue and red shrimp (*Aristeus antennatus*), giant red shrimp (*Aristaeomorpha foliacea*), pink shrimp (*Parapenaeus longirostris*), and Norway lobster (*Nephrops norvegicus*), are currently fully exploited or overexploited (Rossetto et al., 2015).

In GSA 18, some species such as the European hake are exploited both, with bottom longlines and trawling, although the fishing effort deployed by trawling is much higher. Trawl fishery mostly catch juveniles (first age and length cohorts) while bottom long-lining mainly exploits larger sizes (spawners) (Ungaro et al., 2005). Fishing grounds are located on the soft bottoms of continental shelves and the upper part of continental slope along the coasts of the whole GSA. Catches from trawlers are from a depth range between 50-60 and 500 m and hake occurs with other important commercial species as *Illex coindetii*, *M. barbatus*, *P. longirostris*, *Eledone* spp., *Todaropsis eblanae*, *Lophius* spp., *Pagellus* spp., *P. blennoides*, *N. norvegicus* (GFCM 2015).

The stock of European hake in GSA 17 and 18 shows a concerning trend, with total and spawning biomass depicting a decreasing trend with the lowest value in 2015 (29,870 tons). Fishing mortality by Italian bottom trawlers of GSA 18 shows a continuous increasing trend until 2011, then decreasing until 2014 to increase again in 2015. The total F estimated in GSA 18 for 2015 is split in 27% by Italian trawlers, 7% by Albanian trawlers, 4% by Italian longlines, 1.6% by Montenegrin trawlers (GFCM, 2016).

Most of the Italian vessels practicing bottom longlining are authorized to use the drifting longline for large pelagic fish (swordfish and tunas) as an alternative according to the season, the resource availability and the economic profit (Ungaro et al., 2005).

GSA 17-18 (Adriatic Sea), are a hotspot of loggerhead sea turtle (*Caretta caretta*) bycatch by trawl nets, which is considered the most harmful fishing gear for this species. Incidental catches seemed to be numerous throughout the year (Lucchetti et al., 2017).

The Strait of Otranto is the unique connection between the Adriatic Sea and the rest of the Mediterranean basin. Thus, all the maritime traffics and ship in transit from and to the Adriatic Sea would transit through the proposed FRA area.

Oil and gas exploration activities and the related impacts on EFHs may increase with the growing interest in oil and gas exploitations (see section 6.1).

5.1.2. Threats to habitats and species
Indicate any serious threat to habitats (e.g. modification, disturbance, pollution) or to species (e.g. disturbance, poaching, introduction of alien species, etc.) in the area.

Fishery: it is well known that bottom trawling has a negative impact on deep water corals (such as *Lophelia pertusa*, *Madrepora oculata* and bamboo corals *Isidella elongate*) and associated species by directly destroying or removing them, but also indirect impacts due to
increased resuspension of bottom sediment. Moreover, long-term indirect effects include an impoverishment of continental-slope ecosystems (Maynou and Cartes 2012). In addition to trawling nets, numerous other fishing gears can also potentially modify the integrity of benthic assemblages, such as: gillnets, trammel nets, long lines (Bo et al., 2014). The recovery of the direct and indirect damage produced by bottom trawling on these habitats may take decades or centuries, according to the slow growth rates of deep-water corals.

**Alien species:** alien species are an important stressor for the whole Adriatic basin, causing alteration of the original Adriatic biodiversity and ecosystem functioning. Recent estimates revealed that the Adriatic Sea counts more than 190 non-indigenous species (Zenetos et al., 2012).

5.2. **IMPACTS AND ACTIVITIES AROUND THE SITE**

5.2.1. **Pollution**
Sources and description of pollution.

Being a semi-enclosed sea with limited water circulation, the Adriatic is extremely vulnerable to pollution events (Fig. 12).

![Fig.12: Maritime accidents (left) and (right) overview of the pollution hotspot in the Adriatic Sea. The red priority sites are sites that require immediate actions (maps from Randone, 2016).](image)

Solid waste is often identified as the priority pollution source, particularly in the Eastern Adriatic. The prevailing sea currents carry the washed out waste along the eastern coast in the north-west direction. Waste originating from the Eastern Adriatic has been regularly found on the southern Croatian beaches and on one occasion as far north as on the island of Dugi Otok located in the Zadar region (Randone et al., 2016). Another potentially source of pollution in the Adriatic is the illegal dumping of toxic waste (including radioactive materials) through
ship sinking. The phenomenon occurred along the coast of the Puglia Region in Italy and actions have been undertaken to be able to map the sunken ships, and assess their contents (Randone et al., 2016).

5.2.2. Other external, natural and/or anthropogenic threats
Briefly describe any other external threat to the ecological, biological, aesthetic or cultural values of the area (such as unregulated exploitation of natural resources, serious threats to habitats or species, pollution issues, etc.) that are likely to affect the area.

Dredging (i.e., “extraction of marine aggregates”): Currently there are no deep sea mining projects in the Adriatic Sea, but exploration activities may reveal potential deposits in the future, particularly in the deeper southern part of the basin.

Tourism: The Adriatic Sea is an important coastal tourism destination, particularly in the Italian and Croatian regions, where the tourism sector contributes to the 10.5% and 21% of the national GDP respectively (Randone et al., 2016).

5.2.3. Sustainable development measures
Indicate if the area is covered by a management plan or is bordering with another zone subject to a management plan.

The proposed FRA area is covered by the following management measures:
- The Italian national management plan for trawl fisheries adopted according to Article 19 of Council Regulation 1967/2006. The Italian management plan for trawl fisheries in GSA 18 recalls that in the Zones of Biological Protection (ZTB) trawling is prohibited. In GSA 18 these areas are the ZTB of the Tremiti Islands and the ZTB offshore Bari. Furthermore, the management plan calls for specific protection measures in nursery areas, particularly for: Merluccius merluccius, Mullus barabatus and Parapenaeus longirostris.
- The GFCM emergency measures in 2017 and 2018 for small pelagic stocks in the Adriatic Sea (GSA 17 and GSA 18).

6. EXPECTED DEVELOPMENT AND TRENDS
These aspects are not always easy to assess. Therefore, filling out this section is not compulsory.

6.1. EXPECTED DEVELOPMENT AND TRENDS RELATED TO THE THREATS TO AND PRESSURES UPON THE AREA
Briefly describe the development of economic and other activities in the area.

Oil and gas production in the Adriatic Sea is expected to increase rapidly in the near future (Fig. 3). Expected development and trends mean the development which is most likely to occur in the absence of any deliberate intervention to protect and manage the site.
The Italian Apulia region is leading a strong movement against the development of the Trans Adriatic Pipeline (TAP). The underwater tract of the TAP will start from the city of Fier (Albania) and will end in proximity of San Foca (Apulia) (Fig. 14).

**Maritime traffic:** Trends in the development of maritime shipping activities will likely lead to an increased density of traffic in the future. Specifically, a significant increase in the volume of transport of oil and other harmful substances is expected, including liquefied natural gas (LNG). As the only connection between the Adriatic basin and the rest of the Mediterranean Sea, the risks for the area of the Strait of Otranto will remain high (Fig. 13).

![Fig. 13. Left panel: Offshore oil and gas contracts and potential concessions in the Adriatic Sea and in south Adriatic Sea. Right panel: Maritime traffic density in the Adriatic Sea (pictures from: Randone, 2016).](image-url)
Fig. 14: The Trans Adriatic Pipeline project crossing the Adriatic Sea (https://www.tap-ag.it/il-gasotto/il-tracciato).
7. MANAGEMENT AND PROTECTION REGIME

7.1. LEGAL STATUS
If applicable.

7.1.1. Historical background related to management in the area

GFCM Resolution 40/2016/5 establishing a minimum conservation reference size for European hake in the Mediterranean Sea.

GFCM Resolution 33/2009/1 on the management of demersal fisheries in the GFCM area.

GFCM Resolution 37/2013/2 on the management of fishing capacity in the GFCM area.

GFCM Resolution 33/2009/2 on the minimum mesh size in the cod-end of demersal trawl nets.

Additionally, Italy is subject to EU fisheries management regulations. These include technical measures such as: temporal fishing closure for trawling, prohibition to trawl within three nautical miles from the coast or at depths less than 50 m.

Albania fisheries law is based on the main principles of the CFP, reflecting EU Regulation 1224/2009; EU Regulation 1005/2008 CE; EU Regulation 2371/2002; EU Regulation 1198/2006; EU Regulation 1967/2006; EU Regulation 104/2000; EU Regulation 1543/2000 as well as the GFCM recommendations.

In Montenegro, fisheries management is based on technical regulations, such as mesh size (Official Gazette of Montenegro, 8/2011), minimum landing sizes (Official Gazette of Montenegro, 8/2011), regulated number of fishing licenses and area limitation (no-fishing zone up to 3 NM from the coastline or 8 NM for trawlers of 24+ m LOA). Currently there are no MPAs or fishing bans in Montenegrin waters.

7.1.2. Regulatory measures currently governing management on the site
Indicate if the area, or part of it, has been designated under an international conservation category and, if the case, when.

The proposed FRA is inside the boundaries of the South Adriatic Pit, an area identified as EBSA by the Convention on Biological Diversity4.

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4 https://chm.cbd.int/database/record?documentID=204126
7.1.3. Objectives
Indicate the objectives of the area (by order of importance) as stated in its legal declaration.

7.2. LEGAL BACKGROUND
Indicate if the area, or part of it, is subject to any legal claim, or to any pending legal case in this connection within the framework of an international body.

N/A

7.3. LEGAL PROVISIONS FOR MANAGEMENT

7.3.1. Zoning in the area
Briefly indicate if the legal texts protecting the area provide for different zones to allocate different management objectives in the area (e.g. core and scientific zones, fishing zones, etc.) and, if applicable, indicate the surface area of such zones. Provide a map in annex.

In the proposed FRA, the presence of explosive sites, military areas and extraction concession impose several fishing and navigation restrictions (see paragraph 3.3.2).

7.3.2. Legal competence
Legal competence and responsibility with regard to administration and implementation measures.

The proposed FRAs covers fisheries for GFCM priority stocks in the Adriatic (European hake) and other species such as Blackmouth Catshark (Galeus melastomus), Giant red shrimp (Aristeomorpha foliacea), Norway lobster (Nephrops norvegicus) and Deep-water rose shrimp (Parapeneus longirostris).

These stocks are shared by GFCM CPs (mainly Italy, Montenegro, Albania).
7.3.3. Other legal provisions
Describe any other relevant legal provisions, such as those requiring a management plan or any other significant measure concerning the protection and management of the area.

8. OBJECTIVES OF THE FRA AND PROPOSED MANAGEMENT MEASURES

8.1. OBJECTIVES OF THE FRA
Indicate the rationale that justifies the designation of a FRA.

Output 4.2 of the GFCM mid-term strategy (2017-2020) calls for a healthier marine ecosystems and more productive fisheries through “the promotion of the identification and establishment of new FRAs to protect priority areas within ecologically or biologically significant marine areas (EBSAs), VMEs, etc. from harmful fishing activities, and the implementation of monitoring and control systems to ensure the efficiency of these spatial measures, also in relation to Target 3. This action should aim to achieve at least the protection of 10% of the coastal and marine areas, as expressed in Aichi Target 11. The CPCs should be closely involved in the definition of new FRAs”.

Furthermore in 2017 the Ministerial Conference on the Sustainability of Mediterranean Fisheries adopted the MedFish4Ever Declaration, committing signatories to further develop fisheries restricted areas in order to ensure an effective protection of at least 10% of the Mediterranean Sea by 2020. To this end the GFCM Contracting Parties and the SAC were invited to present to the GFCM annual session in 2018, proposals for the development of new FRAs. This was further reiterated by the resolution on Essential Fish Habitats and Sensitive Habitats network, adopted later in the year by the GFCM 41 session.

In order to contribute to this important objective, the proposed FRA has been identified within the South Adriatic Ionian Straight EBSA. In particular, the proposed area is where the Adriatic Sea meets the Ionian Sea. Water exchange with the Ionian Sea takes place through the Otranto Channel (Artegiani et al., 1996). The selected area contains important habitats for rare slow-growing deep-water corals, as well as facies of the bamboo corals (Isidella elgonata) and of the crinoid Leptometra phalangium, which are also considered important EFHs. Moreover, the identified FRA area contains key habitats for Mediterranean megafauna such as the giant devil ray (Mobula mobular), striped dolphin (Stenella coeruleoalba) and loggerhead turtle (Caretta caretta), all of which are listed in Annex II of SPA/BD Protocol.

The presence of cold water corals communities reported in the proposed FRA (offshore of Otranto), are part of an almost continuous belt of patchy cold water coral sites along the entire south-western margin (Apulian), connecting the Adriatic populations with those inhabiting the Ionian margin - Santa Maria di Leuca FRA coral province. Thus, the proposed FRA is a key measure for the protection and recovery of Essential Fish Habitats of deep-waters stocks and for the conservation of VMEs such as cold water-corals.

Empirical studies revealed the benefits of permanently restricting fishing activities, particularly trawling, for nursery and spawning grounds. They included increase of spawning- stock biomass and of demersal stocks, which could support increases in total catches (Murawski et al., 2000; Pipitone et al., 2002; Whitmarsh et al., 2003).
8.2. PROPOSED PROTECTION MEASURES FOR THE FRA

8.2.1. Management measures
Suggest management measures to be implemented in the FRA.

Core area of the FRA:

- Permanent closure of the area to any professional fishing activity with towed nets, bottom set nets, and set longlines.

Buffer area of the FRA:

1. Any demersal fishing activity shall be subject to a special fishing authorization if they can demonstrate that they have carried out fishing activities in the area in the last five years. Members and cooperating non-members of the GFCM shall compile and transmit to the GFCM Executive Secretary the list of authorized vessels. Vessels not complying with the GFCM conservation and management measures shall not be authorized to fish in the FRA buffer area.

2. The authorized vessels shall be allowed to fish for a maximum of two days per week.

Members and cooperating non members of the GFCM shall ensure that the area is protected from the impact of any other human activity jeopardizing the conservation of the EFHs, Sensitive Habitats and VMEs.

The GFCM shall conduct fishery independent assessments on the presence and status of EFHs, Sensitive Habitats and VMEs in the area and on the effects of the conservation measures introduced with the FRA.

Boundaries of the area and conditions to fish therein as referred to in previous paragraphs may change on the basis of SAC advice.

The buffer area of the proposed FRA covers only marginally the European hake nurseries areas, a GFCM priority species for the Adriatic. The largest part of these nurseries areas fall within the territorial waters of Italy and Albania. It would be therefore desirable that Italy and Albania extend the proposed fishing restrictions in order to protect these important EFHs in their territorial waters.

8.2.2. Monitoring, control and surveillance measures
Suggest measures to effectively enforce the FRA.

Authorized fishing vessels should be allowed to land catches of demersal stocks only in designated ports.

- Fishing vessels without a special fishing authorization and equipped with towed nets, bottom set nets, and set longlines shall transit inside through the FRA exclusively by keeping a direct course, at a constant speed exceeding 7 knots and with VMS and AIS active onboard.
Transit in the core area shall be prohibited to any vessel carrying on board set longlines.

The GFCM shall define mechanisms to ensure control and enforcement of the FRA, through vessel monitoring system (VMS), automatic identification systems (AIS) or remote control systems, as well as identify criteria for the regular evaluation of the status of the FRA.

Monitoring, Control and Surveillance (MCS) measures in the FRA could include:
- VMS onboard and transmitting position data at regular intervals in line with Recommendation MCS-GFCM/33/2009/7 and EU Regulation 1224/2009 for fishing vessels operating or transiting in the FRA;
- Automatic Identification System (AIS) onboard and transmitting for fishing vessels operating or transiting in the FRA.
- At sea inspections and possibly aerial controls by Flag states of vessels operating in the area, including.

The GFCM Compliance Committee should regularly review and assess the level of enforcement and compliance in the FRA and provide relevant recommendations.

8.2.3. Socio-economic impact(s) of the FRA

Indicate the potential socio-economic impact(s) of the proposed measures.

Predicting the long-term effects of the proposed FRA is difficult because relevant socioeconomic studies are limited. Ceriola et al., 2008 analysed the state of demersal fishery in the Southern Adriatic Sea (GFCM-GSA 18) from a biological, social and economic point of view using biological and socio-economic indicators (some of the used economic indicators described economic performance, productivity, costs and prices, and the overall economic sustainability of fishery in the GSA 18). Both fishery-independent and fishery-dependent indicators highlighted a progressive decline of the trawl fishery in the GSA 18. This decline is mainly related to the ongoing depletion of the target species (mostly long-living, late-maturing species) partially replaced by the increase of accessory species (generally short-living species), as well as to the reduction of productivity and increasing operating costs.

A more recent study, reported the results of applying a multi-criteria decision-making framework to assess the performances of alternative fisheries management policies in the GSA 18 (Rossetto et al., 2015). The framework is demonstrated by applying it to the demersal fishery of the GSA 18, for which a set of management scenarios were evaluated against their ability to cope with environmental, economic and social objectives. The results showed that, when applying the multi-criteria decision-making framework to the case of GSA 18, experts interviewed gave a remarkable importance to the objective of improving biological conservation. As most demersal stocks in the Mediterranean are currently severely overfished, it is not surprising that decreasing fishing pressure and supporting the recovery of the stocks are perceived as fundamental prerequisites to ensure the future viability of these fisheries. These outcomes may underline a growing awareness of the importance of maintaining healthy fish stocks (for both biological conservation and socioeconomic purposes) and avoiding overexploitation. In addition, the authors revealed that employment has also a high importance, together with yield, suggesting that maintaining a high biological productivity could be a desirable objective from the society's perspective. Instead, a low weight was
assigned to economic indicators (Gross value added and Ratio of revenues to break-even revenue), indicating that, although clearly desirable, economic efficiency was considered less important by the interviewed experts (Rossetto et al., 2015).

The potential costs and benefits of effort reallocation, related to the proposed permanent close area, remain unclear because of lack information on the landings or value derived specifically from the identified FRA. Nevertheless, the socio-economic impact of the proposed FRA should be sustainable for both Italian and Albanian fleets considering the relatively low number of vessels currently fishing in deeper areas (see Tab 1 and Fig. 8), and the relative low fishing effort in the selected FRA area (Fig. 15).

Fig. 15: Estimated fishing hours (Jan. 2014 – Jul. 2016), using AIS data, for trawlers operating in GSA 18. The grey polygon represents the boundary of the proposed FRA area.
8.2.4. Economic assessment of ecosystems services
Not only marketable services.

The proposed FRA is expected to provide an overall increase of ecosystem good and services.

The permanent closure of the core area of the proposed FRA to trawling and bottom longlines could play a fundamental role in the recovery of the important commercial species and associated ecosystems. The protection of nursery and spawning grounds is key to promoting the recovery of depleted target populations and can benefit adjacent fishing grounds and fisheries through larval, juvenile and adult spillover.

The increase of fish densities and biomasses observed in established no-trawl areas (Pipitone et al., 2000; Whitmarsh et al., 2003; Beukers-Stewart et al., 2005) may increase the productivity and reduce fishery costs (less time spent by the sea or shorter trip to obtain the same catches, if the density and biomass of target species increase).

An increased value of the catch is also expected. Fishes may reach larger sizes, resulting in greater commercial value and increased reproductive output (Giacalone et al., 2010).

The reduction of fishing effort can reduce fishing mortality for juveniles of commercially exploited stocks and for vulnerable marine megafauna, and consequently promote an increase in abundance, biomass and diversity of target and by catch species (Collie et al., 1997; Murawski et al., 2000).

A bottom trawl ban in an area, where VMEs and Sensitive Habitats are present, could provide additional benefits beyond fisheries.

9. OTHER RELEVANT INFORMATION


PROPOSAL FOR A GFCM FISHERIES RESTRICTED AREA (FRA) IN THE MEDITERRANEAN AND THE BLACK SEA


Cataudella, S. & Spagnolo M. (Eds.), The state of Italian marine fisheries and aquaculture, Ministero delle Politiche Agricole, Alimentari e Forestali, Rome (2011).


Fortuna, C. M., Vallini, C., Filidei Jr, E., Ruffino, M., Consalvo, I., Di Muccio, S., ... and Mazzola, A. (2010). By-catch of cetaceans and other species of conservation concern during pair trawl fishing operations in the Adriatic Sea (Italy). Chemistry and Ecology, 26(S1), 65-76.


10. RELEVANT CONTACTS

Stakeholders (if applicable), name(s), position(s) and contact address(es) of the person(s) who compiled the form and/or can provide further information.

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