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Thirteenth Meeting of Focal Points for Specially Protected Areas

Alexandria, Egypt, 9-12 May 2017

Agenda Item 5: Updating of the Action Plan concerning Marine and Coastal Birds listed in Annex II to the SPA/BD Protocol and proposals for amendment to Annex II to the SPA/BD Protocol

Proposals for Amendment to Annex II to the SPA/BD Protocol

UNEP/MAP
SPA/RAC - Tunis, 2017

Foreword

With reference to the amendment of the lists of species appearing in Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD) Protocol, the SPA/RAC has received from Spain on 9th of March 2017 four proposals on Anthozoan species to be included in Annex II, using as requested the "Form for proposing amendments to the Annex II and Annex III".

As stated in the **(Decision IG 17/14)** "**Common Criteria for proposing amendments to Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean**" adopted by the 15th Meeting of the Contracting Parties **(Almeria, Spain, 2008)**:

1. SPA/RAC has immediately forwarded the proposal, in its original version, to the other Parties and to the MAP Coordinator;

2. The proposal presented in this document will be submitted to the 13th meeting of the Focal Points for SPAs (Alexandria, Egypt 9-12 May 2017), which will proceed to evaluate it in the light of the common criteria for amending Annexes II and III of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (UNEP(DEPI)/MED WG.308/13);

3. To this end, SPA/RAC has proceeded to translate the original version (English) into French and made the two versions available to the SPAs Focal Points and to the relevant international organisations a month before the 13th SPA Focal Points meeting;

4. The proposal, accompanied by the recommendations from the Thirteenth Meeting of the Focal Points for Specially Protected Areas Alexandria, Egypt, 9-12 May 2017, will be submitted to the next Contracting Parties meeting (Tirana, Albania, 5-8 December 2017) for decision;

5. The possible amendment to the annexes must be conducted in conformity with the provisions of article 16 of the SPA/BD Protocol.

Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean

<table>
<tr>
<td rowspan="2">Proposed by :
(Indicate here the Party(s) introducing the amendment proposal)
Spain</td>
<td>**Species concerned: *Dendrophyllia cornigera***</td>
</tr>
<tr>
<td>**Amendment proposed :**

☒ **Inclusion in Annex II**
☐ Inclusion in Annex III
☐ Removal from Annex II
☐ Removal from Annex III</td>
</tr>
<tr>
<td>**Taxonomy**
Class : Anthozoa
Order : Scleractinia
Family: Dendrophylliidae
Genus and Species : *Dendrophyllia cornigera*
Known Synonym(s): *Caryophyllia cornigera* Lamarck, 1816
Common name (English and French): coral jaune (French), Coral amarillo, candelabras (Spanish; Castilian), Corallo giallo (Italian), Xirieira (Galician)</td>
<td>Inclusion in other Conventions :
(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention).

All stony corals are included in the Annex II of CITES

This species is included in the IUCN Red List and categorized as "ENDANGERED" in the Mediterranean http://www.iucnredlist.org/search</td>
</tr>
<tr>
<td colspan="2">**Justification for the proposal:**

Considering the available historical and actual scientific information on the *D. cornigera* populations documented for the Mediterranean Sea, this species should be considered endangered. Despite the fact that in most cases it is not possible to present quantitative data, there are several aspects, already known, which indicates this category as adequate, considering also the "precautionary principle"[1].
Considering (1) the known current distribution of the species, (2) the information on the distribution of the species from the beginning and the middle of the 20th century, (3) the paleorecords (subfossil specimens), (4) the threats the species is facing, especially bottom trawling and benthic long line fishing (also drilling activities, which is increasing elsewhere), and (5) the fact that although it is found on both rocky outcrops (which are less threatened by fishing) and flat bottoms (which are more threatened by trawling), the more dense populations are found on flat areas. Hence it can be assumed that the current populations suffered in the last 70-80 years a reduction around 50%, and that this reduction will continue as long as no mitigation measures are adopted to reduce the threats.</td>
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</table>

[1] The precautionary principle or precautionary approach to risk management states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is not harmful, the burden of proof that it is *not* harmful falls on those taking an action.

Biological data

Brief description of the species: *Dendrophyllia cornigera* forms colonies that can reach 100 cm in height and 10 cm in basal diameter. Well developed colonies of the species have several large and thick branches which originate from the main stem at different levels, but normally they are localised close to the basis of the colony. The large branches are normally covered by the coenosarc, which ensures the connectivity between the different polyps. The skeleton of the species is very fragile and porous in the areas close to the polyp calyx and massive in the thickest part of the branches. Lateral corallites are irregularly arranged in two longitudinal series, they are in general very short, being equal in height and width. The calyxes of the terminal polyps are generally much larger (up to 16 mm) than the lateral ones. The polyps are large (2 to 4 cm in diameter) and display a bright yellow coloration.
The species can be found between 80 and 800 m depth, but locally they are found in depth as shallow as 30 m depth (Castric- Fey 1996).

Distribution (current and historical): The currently known distribution of *Dendrophyllia cornigera* includes several locations in the Mediterranean Sea (In France: Marseille, Nice, Banyuls, Lacaza-Duthiers Canyon, Hyêres Islands, Corsica; In Greece: Aegean Sea, In Cyprus, In Italy: Ligurian Sea, Cerdenya, Tyrrhenian Sea, Sicily Strait, Ionian Sea, Jabuka depression, In Spain: NW Mediterranean, Cap de Creus Canyon, Costa Brava, La Fonera canyon (southern Catalan coast), Alboran Sea (Pérès and Picard 1964; Zibrowius 1980; Moreno et al. 2008; Freiwald *et al.* 2009; Orejas *et al.* 2009; Salomidi *et al.* 2010; Bo *et al.* 2011; Gori *et al.* 2013; Lastras et al. 2016), and the Eastern Atlantic from the south of Ireland to Cabo Verde (Le Danois 1948; Zibrowius 1980; Álvarez-Claudio 1994; Barton *et al.* 1998; Castaing *et al.* 1999; Brito and Ocaña 2004; Valencia *et al.* 2004; Sánchez *et al.* 2009; Braga-Henriques *et al.* 2013; Boavida et al. 2016). However, *D. cornigera* is absent from the northernmost area of the Atlantic, where cold-water coral framework are dominated by *L. pertusa* (Dullo *et al.* 2008; Roberts *et al.* 2009b; Huvenne *et al.* 2011; Purser *et al.* 2013).

Depth limits: 30-800 meter

Countries of occurrence: France, Greece, Corsica, Cyprus Italy, Morocco, Spain.

Population estimate and trends: Among the most important populations of *Dendrophyllia cornigera* in the Mediterranean Sea known up to date is the one located off Savona (Mantice Shoal, Ligurian Sea, Western Mediterranean Sea) where the species may reach up to 11 colonies m^{-2} (Bo *et al.* 2014). Recent investigations estimated a population of over 20,000 colonies (Bo, pers. obs., 2016). Similar densities have been observed also for a population on the Amendolara Bank, in the Ionian Sea at about 120 m depth (Bavestrello and Bo pers. obs. 2013). In these two sites, *D. cornigera* forms large patches on flat heavily silted grounds, while on rocky boulders, colonies are much more scattered (Bavestrello and Bo pers. obs. 2013). Studies on *D. cornigera* populations are scarce, but some have been conducted, principally in two canyons of the Gulf of Lions (Northwestern Mediterranean); the Cap de Creus and Lacaze-Duthiers canyons (Orejas et al. 2009, Gori et al. 2013) and recently in a canyon in the southern Catalan coast (La Fonera canyons) (Lastras et al. 2016). This species has been often observed also in the Sardinian canyons between 100 and 200 m depth, together with black corals and gorgonians (Bavestrello and Bo pers. obs. 2013). In these mentioned locations (Gulf of Lions canyons and Sardinian canyons), populations of the coral coexist at different spatial scales with populations of the white corals *Madrepora oculata* and *Lophelia pertusa* displaying different dominance patterns. However, in these canyons, *D. cornigera* occurs always as an associated species and presinents low densities, never forming large patches as observed in Savona (Bavestrello and Bo pers. obs. 2013).

Up to date, there is no information about population size and global trends for *D. cornigera* populations in the Mediterranean Sea, nor in other areas where the species occurs. The only quantitative data obtained, have been collected in the canyons of the Gulf of Lions, where maximum density ranged from 0.67 to 1.33 col/ m^{-2} have been recorded (Cap de Creus canyon, Orejas *et al*. 2009), as well as off Savona where densities of up to 11 colonies m^{-2} have been recorded by Bo et al. (2014).

Information on the species distribution through the bathymetric range is known from Cap de Creus and Lacaze-Duthiers canyons (Gori *et al*. 2013). The most recent information, presenting the complete known range of geographical distribution of the species is presented in Gori et al. (2014b)

Habitat (s): From the studies conducted up to date, *D. cornigera* seems to be a species mostly associated with hard substrates. However, it also appears in locations where sedimentation level is higher which may indicate that this species is more tolerant to sedimentation than other scleractinian species, such as *Lophelia pertusa* and *Madrepora oculata*.
In the investigated areas of Cap de Creus, Lacaze-Duthiers canyon, La Fonera canyon and Menorca Channel, the specimens grow mostly on rocky promontories, whereas in the areas documented by Bavestrello & Bo , the species seem to develop in flat areas of the shelf at relative shallow depth (around 80 m), possibly related to areas with high current speed.
In the SW Mediterranean, Punta de la Mona (Almuñecar, Granada), *D. cornigera* grow in the slope and at the edge of rocky cliffs (Ocaña et al. 2000), co-existing with the chandelier coral *Dendrophyllia ramea* and the orange coral *Astroides calycularis*. This is one of the shallowest populations (30-45 m depth) of *D. cornigera* documented in the Mediterranean (Terrón-Sigler pers. Obs.).

D. cornigera, builds three dimensional structures which can be used by a number of other mobile or sessile organisms as protection, refuge and nursery area. This role has been already demonstrated for several regions and species.

Related to the biology and ecology of this species, several studies have been conducted in aquariums with specimens collected mostly from the Cap de Creus canyon and the Menorca Channel. These studies aim at increasing the knowledge on the biology and ecophysiology of the species. Recent results pointed out the high thermal tolerance of *the species* (Naumann et al. 2013) along with other notes on feeding behavior, physiological performance under different current regimes, temperatures and pH which have been recently published (Gori et al. 2014a,b; Gori et al. 2015).

Until now, no studies on the population structure and dynamics have been developed for this species. This is mainly due to the difficulty in accessing the locations where the species live and also due to its scattered distribution. In fact, only by covering large areas of the sea floor it would be possible to spot enough specimens to conduct a field study on population structure. Currently no information is available on the reproductive cycle of the species, but studies on that are ongoing.

As mentioned before, no studies on the population dynamics of *D. cornigera* have been published, hence no information exists on surveys conducted in the same area several times. For this reason, it is not possible to assert if the Mediterranean populations are currently decreasing, because the scarce available data is very scattered. However, the large fossil records in the Mediterranean basin, as well as many records from dead colonies in other locations (Zibrowius 1980) show that the populations of this coral species were more abundant in former times. Some evidence suggests that the largest patches were found on heavily silted grounds. this way the colonies are not anchored on the underlying rock, making them more easy to be removeed (e.g. through long lines, anchorage, trawling...) than on hard bottoms where their thick, resistant, carbonate skeleton offers a greater resistance to dragging (Bo et al. 2014). If not completely silted, however, overturned colonies have shown abilities to continue growing vertically (Bavestrello and Bo pers. obs.). Unofficial reports obtained from Sicilian fishermen suggest that this coral is commonly found in trawling bycatch in the Sicily Channel. In this region, accumulated mounds of dead *D. cornigera* are often observed near large rocky boulders (Bavestrello and Bo pers.

obs.). However, large dead communities of this species have been often documented, and in this case, due to the fact that colonies are perfectly in their upright position, other sources of mortality should be taken into consideration (Bo et al. 2010). A recent study in the Maltese waters also revealed the presence of relatively recently died colonies of the species (Angeletti et al. 2015). Some available studies concerning the impact of fishing gears on deep benthic communities (where corals are present) (e.g. Maynou and Cartes 2011, Cartes et al. 2013) suggest a negative effect and slow recovery of these communities. These studies have been developed for several years mainly in the Atlantic waters dealing with different types of deep benthic communities (e.g. Collie et al. 2000, Jennings et al. 2001, Thrush and Dayton 2002, Hinz et al. 2009, Hinz 2016) but also in the Mediterranean Sea (e.g. de Juan et al. 2007). Therefore, it is suspected that the recovery of *D. cornigera* from anthropogenic impacts due to fishing activities would probably take an unexpected long time.

Threats

Existing and potential threats: *Dendrophyllia cornigera* populations are likely to be subjected to physical disturbance due to bottom trawling, benthic long- lines, drilling and mining activities, as well as anchorage or positioning of offshore structures on the seabed.
Even though there is no specific information on how drilling and mining activities would affect the populations of *D. cornigera* in the Mediterranean Sea, there are studies from the North Atlantic populations of the associated species *Lophelia pertusa* (Larsson and Purser 2011) that highlight the effects of sedimentation and drill cuttings on the colonies of this coral species. These different activities will eventually lead to the smothering of the coral tissue to a degree that will affect the survival of polyps. Hence, even if *D. cornigera* seems to be a species that tolerates sedimentation better than other cold-water coral species, this capacity has its limits and it is possible that continuous sedimentation may strongly affect *D. cornigera* polyps eventually by clogging their filtration mechanisms.

It is also important to stress that bottom trawling, together with other fishing methods, highly impact the sea floor and the consequences for the deep benthic communities is largely known from other regions. Fisheries based on deep-sea trawling have become important in the Mediterranean basin since 1950's, mainly targeting red shrimps (*Aristeus antennatus* and *Aristeomorphafoliacea*) and Norway lobster (*Nephrops norvegicus*) between 400 and 800 m, and eventually deep down to 1000 m. The negative effects of bottom trawling on cold water coral communities (CWC) have been documented in the last several years. this fishing gear break up the structure of the reef, resulting in the complete disintegration of the coral matrix (thus modifying the sea floor) as well as the associated fauna (thus shifting the species composition of the communities) (Rogers 1999, Fosså et al. 2002). The effect of bottom trawling is currently being studied and assessed, and several studies are emerging in the last years for several regions (Hall- Spencer et al. 2001, Althaus et al. 2009), including the Mediterranean Sea (Maynou and Cartes 2011, Cartes et al. 2013). The extensive use of bottom trawling in the Mediterranean basin represents a major threat for the CWC communities, especially for those thriving in submarine canyons and on isolated rocky shoals which are subjected to both professional and recreational fishing (using long lines, gill or trammel nets) (Orejas et al. 2009; D'Onghia et al. 2012; Bo et al. 2014; Mytilineou et al. 2014). These fishing methods have been already considered as "threats for CWC communities" in other areas (Lumsden et al. 2007).

Considering the destructive effect of bottom trawling on these reefs, and the slow growth rates of *D. cornigera*, it is clear that damages on these communities would have dramatic consequences. It is therefore suspected, that their recovery after trawling would take a long time for these deep- water communities. Another effect of trawling is the resuspension of sediment, which can cover large areas, and negatively affect filter feeding sessile organisms (Norse et al. 2012). This effect has also been documented during drilling events (Larsson and Purser 2011).
Because CWCs grow slowly and develop in aragonite-limited waters, they are considered potentially vulnerable to ocean acidification. However, up to date there is no clear evidence on how these organisms will cope with future pH decrease and/or how their populations will adapt to the changing environment. Works on the potential effects of ocean acidification on CWCs are being currently developed and some studies have already been published presenting different results, which seems to be species-specific, as well as associated to different experimental times, methodologies, age and size of the colonies (e.g. Maier et al. 2009, 2012, Movilla et al. 2014b). Among these studies, Movilla et al. (2014b) dealt specifically with the effect of ocean acidification on *D. dianthus* and *D. cornigera*, and showed species-specific responses. Their results suggest that *D. cornigera* is more tolerant to acidified conditions than *D. dianthus*, a fact which the authors suggested that it could be related to the slower calcification rates of *D. cornigera*.
A recent study explored the temperature acclimation potentiality of *D. dianthus* and *D. cornigera* (Naumann et al. 2014). The obtained results revealed species-specific physiological responses of the

two species, showing that *D. cornigera* displays higher growth rates under relative high temperatures (around 17ºC), which pointed out the plasticity of the species. Species-specific thermal acclimation may significantly affect the occurrence and local abundance of this species, influencing its role as ecosystem engineer in different thermal environments. To our knowledge, no studies have been conducted up to date to explore the higher temperature limits of the species.

Additionally, specimens from the SW Mediterranean populations have been observed damaged or detached due to recreational fisheries. Moreover, some SCUBA divers collect colonies for private aquaria as well as for decoration purposes. A final note to mention is that the species can be confused with *D. ramea* (Terrón- Sigler et al., 2015)

Exploitation: This coral is not used for commercial purposes

Proposed protection or regulation measures: There are no direct conservation measures in place for this species. The species is present within protected areas in the Mediterranean Sea. The Cap de Creus canyon has been already declared as a Natura 2000 site and the area harbors patches of *D. cornigera*.
This species, as part of the CWC communities, is included in the Annex I of the Habitats Directive as a natural habitat type of community interest. This habitat's conservation requires the designation of special areas of conservation.
An important conservation action for this (and other) CWC species in the Mediterranean Sea is including them in conservation lists, especially the Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/ BD) under the Barcelona Convention, as well as in regional and national specific catalogs of threatened species.
Also, as a scleractinian coral, this species is also included in the Annex II of CITES.

Knowledge on the population dynamics and reproduction ecology of this species in the Mediterranean Sea is among the most important aspect to be improved. That would serve as basis for the development of management and conservation plans for this and similar species. There are no published studies on the basic biological traits of *D. cornigera* in the Mediterranean Sea nor in other regions. However, there are some studies conducted currently on the biological characteristics of the species.

One of the main threats to *D. cornigera* populations are fisheries, a wide survey on coral captures from different gears is needed. Monitoring actions (such as this one) are poorly implemented in the Mediterranean Sea. However, it could be feasible to carry out this kind of monitoring considering the expertise available and the collaboration of the involved stakeholders (e.g. the fishermen). Another fact to consider would be to implement into the legislation of all Mediterranean countries the prohibition of bottom trawling fisheries on areas were *D. cornigera* populations are present and, in general, where benthic communities dominated by cold water coral species.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean	
Proposed by : *(Indicate here the Party(s) introducing the amendment proposal)* *Spain*	Species concerned: ***Desmophyllum dianthus*** Amendment proposed : ☒ Inclusion in Annex II ☐ Inclusion in Annex III ☐ Removal from Annex II ☐ Removal from Annex III
Taxonomy Class : Anthozoa Order : Scleractinia Family: Caryophylliidae Genus and Species : *Desmophyllum dianthus* Known Synonym(s): *Desmophyllum cristagalli* Milne Edwards & Haines 1848 Common name (English and French): Cockscomb cup coral (English), Coral cresta de gallo (Spanish; Castilian)	Inclusion in other Conventions: *(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention .)* All stony corals are included in the Annex II of CITES This species is included in the IUCN Red List and categorized as "ENDANGERED" in the Mediterranean http://www.iucnredli st.org/search

Justification for the proposal:

With the present information on the biology and ecology of the species, gained by means of aquariums experiments and ROV footage, as well as on the potential threats to these communities, it can be concluded that the species has a low resilience when encountering perturbations, and also that fisheries activities, as trawling and deep long lines, have negative consequences on the species. It is worthy to stress that although no studies have been published on *D. dianthus* population dynamics in the Mediterranean Sea, the co-occurrence of the species with other reef forming (cold water coral) species (e.g. *Lophelia pertusa* and *Madrepora oculata*), as well as the gained knowledge on the biology of these reef forming corals (e.g. growth rates and response to pH changes) conclude that similar threats can endanger *D. dianthus* populations as well.

Considering; (1) the known current distribution of the species;(2) the association of the species with the "white coral communities" (e.g. *L. pertusa* & *M. oculata*); (3) the information on the distribution of these white coral species from the middle of the 20th century; (4) the paleorecords (subfossil specimens); and (5) the threats they are facing especially bottom trawling and benthic long line fishing (also drilling activities, which increase elsewhere), it can be concluded that the current populations suffered in the last 60-70 years a reduction around 50%, and that this reduction would continue as long as no mitigation measures are adopted to reduce the threats. All this leads to the consideration of the species as endangered and emphasize its inclusion in Annex II.

Biological data

Brief description of the species:

Distribution (current and historical): *Desmophyllum dianthus* is a cosmopolitan species. In the Mediterranean Sea, its occurrence has been documented across the entire Basin (Zibrowius 1980). The localities in which it has been recorded are Santa Maria di Leuca (northern Ionian Sea, Taviani *et al.* 2005), Malta (Strait of Sicily, Schembri *et al.* 2007), SE Cephalonian Island (Eastern Ionian Sea, Mytilineou *et al.* 2014), Crete and South of Rodes (Aegean Sea) (Taviani *et al.* 2011), Lacaze- Duthiers and Cap de Creus canyons (Gulf of Lion, Fiala *et al.* 2012; Madurell *et al.* 2012; Fabri et al., 2014), Tricase and Otranto Strait (South-western Adriatic Sea) (Angeletti *et al.* 2014), Erastothenes Seamount (South of Cyprus) (Galil and Zibrowius 1998), Eastern Sardinian canyons, Ventotene Island (Bo pers comm. 2014) and Montenegro (Addamo , pers. comm. 2014). The occurrence of white coral communities including *D. dianthus* has been reported also in Liguria, Tuscan Archipelago and Northern Sardinian seamounts (Relini & Tursi, 2009).

Depth limits: 200-1200 meter
Countries of occurrence: Algeria, Cyprus, France, Greece, Italy, Malta, Montenegro, Spain, Turkey.

Population estimate and trends: Even if *Desmophyllum dianthus* is widely distributed across the whole Mediterranean, quantitative data of densities and population structure does not exist. This is mainly because *D. dianthus* is a solitary species and not large in size, hence it is very difficult to record by ROVs or underwater cameras. In the localities of Santa Maria di Leuca (northern Ionian Sea), Maltese deep sea bottoms (Strait of Sicily), SE Cephalonia Island (Eastern Ionian Sea), Cap de Creus and Lacaze- Duthiers canyons (Gulf of Lion), and recently in the Corsica canyons, *D. dianthus* has been regarded as abundant mainly on hard substrates of vertical walls, slopes and mounds and commonly associated with colonies of the white reef forming corals *Lophelia pertusa* and *Madrepora oculata* (Schembri *et al.* 2007, Vertino *et al.* 2010, Pardo *et al.* 2011, Fiala *et al.* 2012, UNEP/MAP – RAC/SPA, 2014). It has been also observed growing in artificial substrata such as nylon fishing lines and other anthropogenic debris mainly coming from fisheries (Schembri *et al.* 2007). It is a common component of deep iron wrecks (300-800m) (and entangled ropes) in the Ligurian Sea and Tuscan archipelago together with *M. oculata* and *L. pertusa* (Bo & Cattaneo, pers. obs).
As *D. dianthus* is a species that seems to be closely associated with white cold water coral communities, it could be expected that its populations would be affected by similar threats as the "white coral" communities. However, the degree of association of this species to *L. pertusa* and *M. oculata* needs to be deeply studied as well as their resilience against different kind of perturbations.

Habitat (s): *Desmophyllum dianthus* occurs from the continental shelf (200m) down to the bathyal zone (2000 m) colonizing hard substrates and, as mentioned before, it is commonly associated with frame building species (e.g. *Lophelia pertusa* and *Madrepora oculata*) (Rosso *et al.* 2010). It has also been found attached to "artificial substrates" such as abandon fishing nets, buoys, underwater cables and pipelines (Schembri *et al.* 2007), and occasionally on dead or partially dead black corals (Bo pers. comm. 2014).
In the last few years, several studies have been developed in order to better understand the biology, physiology and ecology of this species and also to look for potential similarities with cold water corals (CWC) or, on the contrary, for inter-specific differences. Indeed the results obtained until now show clear differences in several of the investigated aspects as growth rates (Orejas *et al.* 2011), trophic ecology (Tsounis et al. 2010, Naumann *et al.* 2011), physiological response under temperature changes (Naumann *et al.* 2014, Gori et al. 2016), or ocean acidification (OA) (Movilla *et al.* 2014b, Gori et al. 2016). Populations' genetic studies would serve as an inference of the population structure and reproductive traits. So far there are some published studies (Miller *et al.* 2011, Addamo *et al.* 2012), that hypothesized that *D. dianthus* reproductive traits might be similar to other CWC corals (Waller *et al.* 2005), it transmit spawning agent with lecitotrophic larvae, suitable for long distance dispersal. Furthermore, a recent study by Addamo et al. (2016) analysed the genetic similarities between *D. dianthus* and the colonial cold-water coral *L. pertusa*.
D. dianthus seems to be a species with moderate thermal tolerance; hence even if the current temperatures in the Mediterranean locations where this coral develop are around 12ºC, the survival and growth of the specimens has been documented under temperatures up to 17ºC (Naumann *et al.* 2013). Furthermore, through aquariums experiments, it has been demonstrated the paramount

role in which zooplankton plays as prey for this coral, sustaining key physiological processes, such as respiration and calcification (Naumann *et al.* 2011). Some studies have been conducted to get some insight in the biology, physiology and ecology of this species. After these first studies, it has been documented that *D. dianthus* displays average growth rate of 14 % per year (Orejas *et al.* 2011)and has a long lifespan of up to 200 years (Risk *et al.* 2002).

Given the difficulties of long to medium term experiments when studying Ocean Acidification and its impacts in the field, aquariums experiments are regarded as the ones that better establish the resilience of this species when facing environmental changes. These experiments may serve as approach for studies on the potential impacts of climate change on this species. As recently assessed in a one year-long term aquariums experiment (Movilla *et al.* 2014a, Movilla *et al.* 2014b), *D. dianthus* displays significantly lower growth rate when maintained under acidified conditions, therefore showing a lower tolerance to OA than other CWC species investigated up to date (Movilla et al. 2014b). Experiments recently conducted also with Mediterranean specimens for an 8 month period, showed no influence of acidified conditions (750 ppm) in calcification rate, but a decrease in calcification under temperatures higher than 15°C. In general this work by Gori et al. (2016) shows a lower tolerance of the species under thermal stress than OA conditions. However, the synergy of both factors can have dramatic consequences for the species.

Threats

Existing and potential threats: As *Desmophyllum dianthus* individuals are commonly associated with the white corals *Lophelia pertusa* and *Madrepora oculata* and inhabit the same habitats, the species is likely to be subjected to the same physical disturbances as *L. pertusa* and *M. oculata* especially due to deep-sea bottom trawling impacts, benthic long line fisheries, as well as to other perturbations factors such as; the anchorage of offshore structures on the seabed and drilling activities previous to oil extraction or mining.

Deep-sea trawling has become important in the Mediterranean since 1950's. Their main targets are the red shrimps (*Aristeus antennatus* and *Aristeomorpha foliacea)*, and the Norway lobster (*Nephrops norvegicus*) between 400 and 800 m, and eventually deeper (reaching 1000 m). The negative effects of bottom trawling on cold water coral communities has been documented for several years, arguing that this method would break up the structure of the reef resulting in complete disintegration of the coral matrix as well as associated fauna and thus modifying the sea floor (Rogers, 1999, Fosså *et al*., 2002). The effect of bottom trawling is currently being studied and assessed, several studies have been published in the last decade for several regions as is the case in the North Atlantic Ocean (e.g. Hall-Spencer *et al*. 2001, Althaus *et al*. 2009), and recently also in the Mediterranean Sea (Durrieu de Madron *et al*. 2005, Maynou and Cartes 2012, Cartes *et al*. 2013, Fabri et al. 2014; Savini *et al*. 2014). The extensive use of these fishing methods in the Mediterranean Sea, are threatening these communities. In the case of the submarine canyons, where bottom trawling is not carried out, benthic long line fishing gears are also a threat (Orejas et al. 2009). Moreover, the potential impact of long line fishing on deep structuring anthozoans living on deep rocky shoals and muddy bottoms has been recently demonstrated (D'Onghia et al. 2012; Mytilineou et al. 2014). These gears have been previously considered as "threat for cold water coral communities" in other areas around the world (Lumsden *et al*. 2007).

Considering the destructive effect of bottom trawling in these areas and the slow growth rates of *D. dianthus (*Orejas et al. 2011), as is the case for CWCs in general (Roberts et al. 2009 and references therein), there is a need to consider that this damage could have dramatic consequences on *D. dianthus* populations. The impact of bottom trawling in these CWC populations could bring them to an irreversible situation, this is the reason why these communities should be considered, as is the case for the maërl beds, a "non renewable resource" (Barberá et al. 2003). An indirect effect from bottom trawling is the resuspension of sediment, which can cover large areas, and negatively affect filter feeding sessile organisms (Norse et al. 2012). This effect has also been documented during drilling events as well (Larsson and Purser 2011).

Cold-water corals are also potentially high vulnerable to other direct (e.g. mining, waste dumping) and indirect (e.g. ocean acidification, OA) impacts (Fosså *et al*. 2002, Hall-Spencer *et al*. 2002, Freiwald *et al*. 2004). Energy exploitation and development; deployment of submarine cables and pipelines (WWF Adena), might also be a risk for this species, as their deployment will damage the CWC populations due to direct impact of the drilling activities, as well as to the resuspension of sediment (Larsson and Purser 2011), reducing the original complexity of the deep-sea floor and negatively affect filter feeding sessile organisms (Norse *et al*. 2012).

The current imprint of CO_2 has already affected the Mediterranean Sea by a pH decrease of 0.05- 0.14 since preindustrial times (Touratier and Goyet 2011). These processes would affect the depths of the Aragonite Saturation Horizon (ASH), and thus the decrease on pH and $CaCO_3$ availability for deep water corals. Because deep water corals grow slowly, as already mentioned, and develop in aragonite-limited waters, they are considered potentially vulnerable to OA. However, up to date there is no clear evidence on how these organisms will cope with future pH decrease or how their populations will adapt to the changing environment. Studies on the potential effects of OA in CWC are being currently developed and some studies on *Lophelia pertusa* and *Madrepora oculata* have already been published presenting different results. these differences seem to be species specific, and also due to differences in experimental times methodologies, age and size of the colonies (e.g. Maier et al. 2009, 2012, Movilla et al. 2014a). A first study developed with *Desmophyllum dianthus*, showed significantly lower growth rates under acidified conditions, which means that this coral species seems especially sensitive to pH decrease (Movilla et al. 2014b), a recent study on the same species cultivated under different thermal and pH systems (Gori et al. 2016) revealed a higher tolerance for pH decrease than for temperature increase. However the interaction of the two factors (higher temperature and lower pH) clearly influence the metabolism and growth rate of the species. This could have serious consequences for the future of the population.

Exploitation: This coral is not used for commercial purposes.

Proposed protection or regulation measures: Important conservation actions for this and other CWC species in the Mediterranean Sea, are to include them in conservation lists, especially in Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/ BD) under the Barcelona Convention; as well as in regional and country specific catalogs of threatened species.
Currently *D. dianthus* has been listed in CITES Appendix II. *L. pertusa*, one of the species to which it has been associated with, is catalogued under "*Lophelia pertusa* reefs" annex from OSPAR Commission which is also included in the Annex II of the Barcelona Convention.

Although *D. dianthus* is a solitary coral, this species contributes to the construction of the reef framework due to its association with the reef builder corals *M. oculata* and *L. pertusa* (Fiala *et al.* 2012). Hence, the protection of *L. pertusa* and *M. oculata* will consequently protect *D. dianthus* in many of the regions where it occurs. Areas where these reef builders occurred start to be included in Marine Protected Areas, as is the case of Santa Maria di Leuca, where the General Fisheries Commission for the Mediterranean (GFCM), which monitors and regulates the actions of Mediterranean states and their fishing industries in the region, has banned bottom trawling. This decision was taken based on the efforts of the World Wildlife Fund (WWF), IUCN, and a number of scientists that have long been pushing for the banning of destructive fishing methods. Also the Canyon of Cap de Creus and its CWC communities are already part of the NATURA 2000 network. The protection category of each area, as well as the size and extension, must depend on the communities and ecosystems present within Also, it has to take into consideration the ecological studies of these communities and it associated species in order to correctly preserve this ecosystems.
Among the most important aspect to improve is our knowledge on the population dynamics of the species and reproduction traits as well as ecology of the species in the Mediterranean Sea. Currently no information is available in any of these aspects, but first data on growth rates are already available, as mentioned before (Orejas *et al.* 2011).

These previous points would serve as a basis for the development of a management and a conservation plan for this species. Improving our knowledge of the species is feasible to reach, considering the current advances of deep water technologies in acoustic techniques (Multibeam, Side Scan Sonar). These techniques would lead to a much precise knowledge on the topography of the sea floor and characteristics of the substrate, as well as advances in underwater video and photography and remotely operated vehicles (ROV) and manned submersibles, which have increased the opportunities to study the characteristics of deep water organisms and habitats. There are some available studies on aspects of the biology of *D. dianthus* in the Atlantic waters (e.g. Risk *et al.* 2002), which are a reference for the Mediterranean populations; however, due to the important differences between these geographical areas, there is a clear need to develop studies on the biology and ecology of *D. dianthus* in the Mediterranean basin.
Up to date, it has not been possible to conduct studies on density and distribution of *D. dianthus* due to its relative small sizes (at least in the Mediterranean specimens collected up to date) which make it very difficult to document the species in video images. -

Fisheries is one of the main threats on *D. dianthus* populations, and the rest of CWCs . A wide survey on coral captures from the different gears is needed. Such surveys are poorly implemented in the Mediterranean Sea, however, it could be feasible considering the large experience of the fishermen and the potential collaboration of scientist and other stakeholders (local authorities, govern, NGOs...).

An important measure which needs to be considered and implemented as soon as possible is to develop a specific legislation for all Mediterranean countries. This legislation should prohibit bottom trawling in CWCs hotspot areas were *D. dianthus* and the white corals (*L. pertusa* and *M. oculata*) occur. Even if the number of described and known areas where these communities develop is still scarce, predictive habitat mapping can be used to map the areas where CWC are potentially present on the basis of the characteristics of previously studied CWC ecosystems.

There is also a need, as already mentioned, for more experimental studies to assess the resilience of those organisms againstthe predicted changes in seawater parameters due to global climate change. Up to date, several studies have been conducted to better understand the ecophysiology of these organisms (e.g. Naumann *et al.* 2011, 2014). These two studies conducted to investigate the potential effects of OA on the growth rate of *D. dianthus*. On one hand, they showed a significantly lower growth rate under acidified conditions (the species is particularly sensitive to of pH changes) (Movilla *et al.* 2014b), and on the other hand, also a high sensitivity (even higher than to acidified conditions) to thermal stress (Gori et al. 2016), while the synergy of both factors (e.g. high temperatures, low pH) specially detrimental for the metabolism of the species. The difficulties to develop studies *in situ*, even if some have been already conducted in Atlantic waters (Brooke *et al.* 2009) and in the Mediterranean Sea (Lartaud *et al.* 2013), against the feasibility to maintain this CWC in aquariums, makes experimental studies in tanks of paramount importance to better understand the reaction of the species in front of environmental changes, including the ones which are a consequence of the climate change.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean

Proposed by :	Species concerned: ***Dendrophyllia ramea***
(Indicate here the Party(s) introducing the amendment proposal) *Spain*	Amendment proposed : ■ Inclusion in Annex II ☐ Inclusion in Annex III ☐ Removal from Annex II ☐ Removal from Annex III

Taxonomy Class : Anthozoa Order : Scleractinia Family: Dendrophylliidae Genus and Species : *Dendrophyllia ramea* Known Synonym(s): *Madrepora ramea* Linnaeus, 1758 Common name (English and French): Coral candelabro (Spanish; Castilian)	Inclusion in other Conventions : *(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention .)* All stony corals are included in the Annex II of CITES This species is included in the IUCN Red List and categorized as "VULNERABLE" in the Mediterranean http://www.iucnredlist.org/search

Justification for the proposal:

No population information is known for this species. However, there are evidences and information concerning its threats, including damaging by recreational diving and fisheries, as well as collection of specimens for decorative purposes. Moreover, it is a species that appear as discards in bottom trawling (Sánchez *et al.*, 2004); this commercial activity is carried out at depth were *D. ramea* populations are typically present. On the other hand, there are no studies about the ecological requirements of this species, being important to take into account that the shifts on the marine environment as a consequence of increasing anthropogenic impacts (e.g. fisheries, pollution, global change, ocean acidification) could affect the distribution and abundances of *D. ramea* populations. Finally, a new threat has been detected: abandoned fishing gear (which originated the so called "ghost fishing"), which highly affect this and other benthic and demersal species.

Therefore this species can be considered as "Vulnerable". More research on the occurrence of the species and its conservation status and trends is highly recommended.

Biological data

Brief description of the species: *Dendrophyllia ramea* is an azooxanthellate scleractinian coral that may reach more than 50 centimeters height, being the biggest among the species belonging to the family Dendrophylliidae present in the Mediterranean Sea (López-González, 1993). This species tends to form long branches with a larger terminal corallite, the smaller lateral corallites are arranged in two opposite lines along the main branches. In this species the polyps seated in the corallites are typically interconnected, the coenosarc tend to cover the entire branches (Zibrowius, 1980). This species has a typical orange-yellowish color with white polyps (e.g. Ocaña *et al*., 2000).

Distribution (current and historical): *Dendrophyllia ramea* is an Atlanto-Mediterranean species. Its presence has been recorded in the Southeastern Atlantic, there are records from the Azores, Canary Islands, Cabo Verde, Nigeria, Gulf of Guinea, Ghana (Zibrowius 1980). In the Mediteranean Sea, its distribution has been mainly described across the Western Mediterranean Basin. The presence of the species is also confirmed in the SW Mediterranean Basin, Alboran Sea (Zibrowius 1980; Ocaña et al. 2000; Ocaña et al. 2009; García-Gómez &Magariño-Rubio 2010), North African coasts, Sicily Channel, Sicily up to the Gulf of Naples (Zibrowius 1980). Colonies have also been observed in the Catalan Coasts (NE Iberian Pensinsula), Balearic Sea (López-González, 1993; Sánchez et al. 2004), and the Gulf of Lions (Zibrowius 1980).

In the Eastern Mediterranean Basin, isolated colonies have been described in the Adriatic; Mjlet National Park (Croatia) (Kruzic et al. 2002), in the Ionian Sea (Korinthiakos Gulf) (Salomidi et al. 2010) and recently a dense population has been described in Eastern Cyprus (Orejas et al. 2016; Rivera et al. 2016; Orejas et al. submitted).

Depth limits: 20-172 meter

Countries of occurrence: Algeria, Greece, Corsica, Cyprus, Lebannon, Italy, Morocco, Lybia, Spain, Malta, Tunisia.

Population estimate and trends: There is no population estimate available for *Dendrophyllia ramea*. The species can be locally abundant (50-100 colonies on a 2 km scuba diving transect) at 25-40 m depth in the locality of Punta de la Mona, Almuñecar, Granada (Spain) (Ocaña et al. 2000; Cebrián& Ballesteros 2004) and in Algeciras Bay (1 colonies/ m^2) at 15- 20 m depth (Casado- Amezúa & Terrón- Sigler pers. obs). A dense population has been recently discovered and characterized in Cyprus, this population displays a maximum density of 4 col m^{-2} and average density of 1.6±1.4 col m^{-2} (Orejas et al. 2016). Patchy populations have been reported along the northern coats of Sicily (Bo, pers. obs.).

Habitat (s): *Dendrophyllia ramea* inhabits the continental shelf circalitoral communities, attached to characteristic rocky substrates or substrates covered by calcareous algae and shells in areas with moderated currents and turbidity (Zibrowius 1980; Oceana 2006; Templado 2009). In this region, it is also common to find *D. ramea* associated with the red coral, *Corallium rubrum*. In the localities of Punta de la Mona (Almuñecar, Granada, Spain), Calaburras (Málaga, Spain) and La Línea (Cádiz, Spain), *D. ramea* has been also found in the slopes and at the ends of rocky cliffs (Ocaña et al. 2000; Templado et al. 2009). In Korinthiakos Gulf (Ionian Sea, Greece) a large colony was detected on a sedimentary slope, probably attached to an underlying hard substratum (Salomidi et al. 2010). However in some localities such as the Algeciras bay and Chafarinas Island (Southern Alboran Sea, Morocco coasts), *D. ramea* has been found in shallower waters (15-20m depth), in rocky substrates and/or associated with the orange coral, *Astroides calycularis (*Casado-Amezúa & Terrón-Sigler. pers. obs., Sánchez-Tocino et al. 2009*)*. The recently discovered population in Cyprus completely developed in a soft substrate at depths between 125-155m (Orejas et al. 2016, Rivera et al. 2016; Orejas et al. submitted.). The deepest record for the species has been documented in the Lebanese waters at 172 meters depth (OCEANA, IUCN, SPA/RAC).

Threats

Existing and potential threats: Bottom trawling and other fishing practices

In the Mediterranean the minimum trawling depth is 50 m, hence trawling is a current threat for this species, as it has been confirmed due to its presence as a discard species in trawlers. However, the highest risk is the illegal trawling which takes place at shallower depths and has been denounced yearly by different organizations. The negative effects of bottom trawling on sea floors where cold water coral species occur has been mentioned previously, hence these gears break up the structure of the colonies, resulting in complete disintegration of the coral matrix as well as associated fauna. The result of that is an unnatural modification of the sea floor (Fosså et al. 2002). Considering the destructive effect of bottom trawling, it is clear that damage to these communities would have dramatic consequences for them. It is therefore suspected, that the recovery after impacts of trawling will take long time for these deep water communities or maybe never happen. Another known effect from trawling is the resuspension of sediment, which can cover large areas, caused by the trawling action,. These sediments will negatively affect the filter feeding sessile organisms and it has also been documented during drilling events in the North East Atlantic (Larsson and Purser 2011).

Furthermore, the presence of large *D. ramea* branches entangled in gillnets has been documented in the Gulf of Cadiz .

Purse seine fisheries are also a potential threat to *D. ramea*, as it is being operated at shallow depths and the chain attached to the net drag the seafloor detaching the species. This case has also been documented in the Gulf of Cadiz.

In Cyprus, colonies of the species have been also captured as by catch, and found entangled in fishermen' nets.

Recently, it has been observed that Ghost Fishing, a term used to describe the capture of marine organisms by lost or abandoned fishing gear, also has an effect on this species. The lost gears are continuously drifting due to the effect of the currents until it settles on the bottom (if this happens but it does not always occur), this movement of the nets break branches and detach whole colonies of *D. ramea*.

Furthermore, some populations can be affected by recreational fisheries. In Granada coast (Spain) it has been observed that more than 65% of *D. ramea* colonies are injured with polyps and/or branches loss or broken by fishing net, (Terrón- Singler et al. 2015).

There is some evidence of the collection of *D. ramea* by SCUBA divers in the Andalusian coast for aquariums and decoration purposes, which in most cases affects the populations in shallower waters (less than 40m depth) (Terrón-Sigler. et al. 2015).

Exploitation: This coral is not officialy used for commercial purposes, nevertheless as mentioned above, there is evidence of the collection of *D. ramea* by SCUBA divers as well as by individuals dealing with animal trade for aquariums and decoration purposes.

Proposed protection or regulation measures:

To improve knowledge on *Dendrophyllia ramea* biology and ecology

Among the most important aspects to improve is our knowledge on the distribution patterns, population dynamics of the species, reproduction traits and other aspects of the species ecology (as trophic ecology or ecophysiology) of the species in the Mediterranean. At the moment, no information is available in any of these aspects. This information would be an asset for the development of management and conservation plans for this species.

To include the species in conservation lists

Important conservation actions for this species in the Mediterranean, is to register them in conservation lists, which includes its protection under the Annex II (List of Endangered and Threatened Species) of the Protocol concerning Specially Protected Areas and Biological Diversity (SPA/ BD) under the Barcelona Convention; as well as its inclusion in regional and country specific catalogs of threatened species. On the other hand, *D. ramea* communities are one of the species that frequently occurs in Habitat 1170 "Reefs" (Annex I, Habitats Directive 92/43/CEE).
This coral has been also listed in CITES Appendix II.

It is also important to designate adequate Marine Protected Areas (MPAs) in deeper areas in order to cover the protection of this species. Currently, there are several MPAs that include some *Dendrophyllia ramea* populations, in Spain (Maro- Cerro Gordo, Punta de la Mona, Alboran Island, Tarifa and Chafarinas Islands), Sicily (Isole Egadi, Isoledelle Femmine), Malta (IsolePelagie) and Tunisia. The area of Cape Milazzo (North Sicily) also hosts a population at 80m depth and itis currently in progress of becoming an MPA. However, the first step in establishing conservation measures is to characterize the populations of this coral and its associated communities in the aforementioned localities.

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Form for proposing amendments to Annex II and Annex III to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean

Proposed by : *(Indicate here the Party(s) introducing the amendment proposal)* *Spain*	Species concerned: ***Isidella elongate*** Amendment proposed : ■ Inclusion in Annex II ☐ Inclusion in Annex III ☐ Removal from Annex II ☐ Removal from Annex III
Taxonomy Class : Anthozoa Order : Alcyonacea Family: Isididae Genus and Species : *Isidella elongata* Known Synonym(s): *Isis elongata* Esper, 1788 Common name (English and French): No common names	Inclusion in other Conventions : *(Specify here if the species is included on the species list of other relevant conventions, in particular: CITES, CMS, ACCOBAMS, Bern Convention.)* *Isidella elongata* facies have been considers as "Sensitive Habitat" by the Scientific, Technical, and Economic Committee for Fisheries (STECF). This species is included in the IUCN Red List and categorized as "CRITICALLY ENDANGERED" in the Mediterranean, which is the maximum protection category http://www.iucnredlist.org/search

Justification for the proposal

Isidella elongata is a species which is designated by IUCN as Critically Endangered. This is supported by the declining trend of the population which is estimated to be around 80% in the last 100 years (probably less than 3 generations due to very slow growth rates). This speculation is based in the decrease of the quality of habitat as well as on the available past and present by catch data. The latter suggest a dramatic effect of trawling activities on the majority of the known *Isidella* grounds in the Mediterranean Sea. This impact is mainly in the period between the beginning of the intensive, industrial fishing activities (around 1960s) to present time. Specific surveys conducted in the Catalan area suggest that the decline may locally show very rapid trends, with approximately 15 years as a critical period of time for the population to totally disappear (Cartes *et al.* 2013). The causes of the reduction at present time have not ceased, and even if the species is geographically widespread (as the seafloors suitable for the species are all muddy bathyal seafloors), it seems that surviving patches thrive only in certain areas which seems to be less suitable for fishing activities (shallow areas protected by hard bottoms or below 1000 m where trawling is forbidden) (Bo *et al.* 2015). The recovery ability of this species is very low, due to extremely slow growth rates, low dispersal ability, and a very long life span.

The destruction of these so called "coral gardens" is described as a dramatic loss in ecosystem functionality and biodiversity, as many pelagic or demersal species are associated towith the three dimensional habitat performed by *I. elongata* (Cartes et al. 2013; Bo et al. 2015; Rodríguez-Romeu et al. 2016).

The Mediterranean population is likely to represents the majority of the global population, with very few Atlantic records, for this reason the species is considered semi-endemic. Therefore, the regional sub-populations are not likely to be dependent on Atlantic larvae immigration for long-term survival. Since the Atlantic populations are not as common as the Mediterranean ones, a rescue effect is less feasible. Moreover, as for most deep tree-like anthozoans, it is important to consider the low dispersal ability of the larvae.
The threats impacting these populations at a regional level are significant, given the highly urbanized Mediterranean coastline, the high fishing activity carried out in this basin, as well as a substantial lack of specific management plans (with few exceptions). However, a major management plan for specifically high biodiversity hotspots and the inclusion of this species in International Conventions may greatly reduce the population reduction.

Biological data

Brief description of the species: *Isidella elongata* represents the only member of the Family Isididae (bamboo corals) in the Mediterranean Sea and it is easily recognized thanks to the typical alternation of white carbonate internodes and brown organic nodes along the ramifications (Carpine *and* Grasshoff 1975). It is a large-sized alcyonacean that may reach 70 cm high giving rise to a candelabrum-shaped colony with a 45° inclination among the branches (Carpine and Grasshoff 1975, Cartes *et al.* 2013, Bo et al. 2015). Polyps, arranged on two rows, are 3 mm tall and are surrounded by a crown of long sclerites. Shape of the colony, arrangement and shape of the sclerites are the taxonomic features that separate this species from the Atlantic cogeneric *Isidella lofotensis* and *Acanella arbuscula* (Carpine and Grasshoff 1975). Recent genetic and morphological analyses have suggested that some Mediterranean specimens identified as *I. elongata* may actually be *A. arbuscula*. on that point, more studies are needed to clarify this (Saucier et al. 2016)

Distribution (current and historical): *Isidella elongata* is a semi-endemic species in the Mediterranean Sea, reaching the adjacent Atlantic Ocean by transport of larvae in the westward outflow to the adjacent Gulf of Cadiz and Northern Morocco (Grasshoff 1988, 1989). The bathymetric range of this species ranges from 115 m in Sardinia (Bo *et al.* 2015) to 1500 m in the Atlantic Ocean. Even at greater depth the species is also found down to about 4000m (Grasshoff 1989). In the Mediterranean Sea, this species was known to inhabit the bathyal muds from 200 to 1200 m depth with vast meadows of closely located colonies especially deeper than 500 m depth (Pérès and Picard 1964, Carpine and Grasshoff 1975).

This species has been mainly reported as accidental by catch during experimental or professional fishing surveys; however, more recently, some populations have been investigated by means of Remotely Operated Vehicles (ROV). *I. elongata* has been found in several localities of the Alboran Sea (Ocaña et al. 2000, Pardo *et al.* 2011), the Baleric islands, Catalan coasts (Sardà *et al.* 1994, Cartes *et al.* 2009, 2013, Maynou *and* Cartes 2012), Gulf of Lions (Dieuzeide 1960, Bas 1963, Maurin 1962, 1968, Vaissiere and Carpine 1964, Vaissiere and Fredj 1964, Carpine 1970, Fabri et al. 2014), Ligurian Sea (Relini-Orsi and Relini 1972, Relini-Orsi *and* Wurtz, 1977, Relini, 1981, 1986; Mori and Manconi, 1990), Corse, Tuscan Archipelago, south-western coasts of Sardinia (Bo *et al.* 2015), Gulf of Naples (Von Koch 1887), Messina Strait and Sicily (including Aceste Seamount) (Aguilar et al. 2013), Sicily Channel (Greenpeace 2009), Apulia and Otranto Strait, Adriatic Sea (Broch 1953, Pax and Muller 1962), Tunisia, Algeria and Morocco (Carpine and Grasshoff 1975), at 150 m depth in the Aegean Sea (Vafidis et al. 1994) and in the Eastern Ionian Sea up to Crete (Bory de Saint Vincent 1834, Steindachner 1891, Vafidis et al. 2006, Smith et al. 2009, Mytilineou et al. 2013). It seems absent in the extreme Levantine basin (Pérès and Picard 1958).

Depth limits: 115-4000 meter

Countries of occurrence: Algeria, Croatia, France, Gibraltar, Greece, Italy, Malta, Morocco, Portugal, Spain, Tunisia.

Population estimate and trends: *Isidella elongata* is known to form wide meadows (ca. 255 colonies ha^{-1}, with a distance of 4-5 m between individuals) on flat or sloping muddy bottoms (Cartes et al. 2013). As the majority of deep sea corals, this species also shows slow growth rate (Andrews et al. 2009) and a long life span (400 years) (Sherwood et al. 2009). Carbon dating (C14) suggest that longevity of 75-126 years for Alaskan isidids (Roark et al. 2005) and radial growths of 110 mm yr^{-1} for a Tasmanian *Isidella* sp. (Sherwood et al. 2009).

Little is known about life history aspects of Isididae, such as reproduction, dispersal and colonization patterns (Cartes et al. 2013).

The recent work by Bo et al. (2015) contributed new data to get insight into the population structure of the species. The results are based on measurements taken from 109 specimens (video material), the study revealed a distinct peak for the size- class of 40 cm height with a good representation of the juvenile size classes. On average the colonies are 36 ± 1.2 cm tall (maximum 66 cm) and are 22 ± 1.0 cm wide (maximum 55 cm) with a regular isometric growth.

A continuous declining in mature individuals can be inferred, as the effect of trawling on muddy bottom eradicates all individuals, especially the larger colonies, which are possibly the mature ones as well.

Also a continuous declining in the number of subpopulations can be estimated since continuous trawling activities on the same fishing grounds are likely to eradicate all individuals.

Habitat (s): *Isidella elongata* is one of the few alcyonaceans able to develop on flat or slightly sloping (5%) soft bottoms (Pérès 1967, Laubier and Emig 1993, Oceana 2011), in fact, similarly to *Spinimuricea klavareni*, Isidella uses a large, basal root of anchorage penetrating the mud or soft substrate.

The *I. elongata* bathyal facies (Maurin 1962, Peres and Picard 1964, Carpine 1970, Bellan- Santini et al. 1985) are often associated with populations of deep shrimps such as *Aristeus antennatus*, *Aristemorpha foliacea*, *Nephros norvegicus* and *Plesionika* spp. These species have also been considered in the past as triggers for the occurrence of corals due to the mud stirring they produce (Vaissiere and Fredj 1964, Carpine and Grasshoff 1975, Maynou and Cartes 2012). The biocoenosis is also well identified from the hydrological point of view being located at the limit of the zone of intermediate waters (Carpine and Grasshoff 1975) which is also rich in near-bottom zooplankton (Cartes *et al.* 2009). High densities of bamboo corals have been observed in the oxygen minimum zone in the Northeast Pacific Ocean (Baco 2007).

The fields of *I. elongata* are associated with rich commercial invertebrates and fish (Carpine 1970, Carpine and Grasshoff 1975). A study conducted in the Ionian Sea revealed that some species of the fish assemblage (*Galeus melastomus, Helicolenus dactylopterus*) seem to be closely associated with *I. elongata* (Mytilineou et al. 2013). Also some juvenile specimens of *Phycis blennoides* have been associated with *Isidella* facies, but the majority of the observed fish are adult specimens (Cartes *et al.* 2013). A recent study also support the direct relationship between the deep-sea fish *Notacanthus boanapartei* and the *Isidella* populations, as the polyps of this bamboo coral are an important part of the diet of this fish (Rodríguez-Romeu et al. 2016). In the Alboran Sea, Pardo *et al.* (2011) documents the role of *I. elongata* as nursery for *Merlucius merlucius* and *Plesionika* spp. *I. elongata* frequently occur together with species such as *Kophobelemnon stelliferum* and *Funiculina quadrangularis* (Pardo *et al.* 2011), *it* also form small patches in sandy areas among rocky elevations or dead coral mounds (Pardo *et al.* 2011, Bo *et al.* 2015).

The epibiontic fauna associated with this species include numerous sessile invertebrates such as hydroids, actinians, barnacles and mobile fauna, such as polychaetes and crabs (Arena and LiGreci 1973, Carpine and Grasshoff 1975, Guerao and Abello 1996, Cartes et al. 2013). Cephalopods and sharks also use the coral branches to lay their eggs (Carpine and Grasshoff 1975, Cuccu et al. 2007).

Many studies support the biological important of *Isidella* facies and stress the high biodiversity associated with it as well as their role as a fish aggregation spot (Maynou *and* Cartes 2012), another study pointed out that a severe impact on some Balearic *Isidella* facies hardly altered fish and invertebrate composition, suggesting a low capacity of this species to form a proper structured habitat for megafauna, which may only share common bathymetric ranges and ecological conditions with the coral (Cartes *et al.* 2009). *I. elongata* occasionally form tanatocoenosis, as those found in the Santa Maria di Leuca deep-water coral province or along the Balearic slope (Rosso et al. 2010, Maynou and Cartes 2012). This tanatocoenosis may be used as an indicator of past occurrence of a coral facies (Hawkes and Scott 2005), and to estimate the densities of former populations which can help to better understand the current situation and extension of the living populations.

Threats

Existing and potential threats:

Three main categories of threat can be recognised for *Isidella elongata*: <u>Trawling activities</u>

Bathyal meadows of *I. elongata* are now considered very rare (D'Onghia *et al.* 2003, Sardà *et al.* 1994). Already in the 70-80s there were some indications of a high population decline based on the dramatic decrease of coral bycatch; this was the case for the Ligurian or Sicilian trawling grounds (Pérès and Picard 1964, Arena and LiGreci 1973, Relini 1986, Bellan-Santini et al. 2002). Similarly, in the French canyons of the Gulf of Lions, *I. elongata* was very abundant in the past but, at present, this species occur at very low abundances and probably swept away by repeated trawling (Fabri *et al.* 2014). In the Catalan area, the colonies were usually found where no trawling scars were detected on the bottom. However, in general, this species is considered highly disturbed along the Balearic slope (Maynou and Cartes 2012, Cartes et al. 2013). In the Sardinian area, small patches have been found in areas protected by hard grounds which were avoided by trawlers (Bo *et al.* 2015).

The destructive potential of trawling is very high, as demonstrated by the removal rate of colonies from a pristine gorgonian forest found in 1994 off Catalonian coasts, which almost disappeared after around 15 years of fishing effort (the coral field was reduced to isolated colonies with a density of 0.9 colonies ha^{-1}) (Cartes et al. 2013).

Conversely, the populations off the Algerian waters seems to be in better conditions, as the fishing pressure on *A. antennatus* off Algeria is not that high as in other areas in the Mediterranean (Mouffok *et al.* 2008).

Trawling indirect impacts can include changes in trophic webs, and would reduce benthos production on a long time and spatial scale (Maynou and Cartes 2012).

Also, Isidella elongata constitutes an essential habitat for several commercial species, a reason why this facie have almost completely disappeared due to trawl fishing in many Mediterranean areas (Ardizzone et al. 2006).

<u>Bottom line fishing</u>

Long lining is a very impacting fishing practice to Cold Water Corals communities in the Mediterranean Sea, since it is generally practiced in deeper waters than trawling or in rocky areas (where trawlers normally do not fish). These mentioned areas are good habitats for cold water corals which increases the probability of coral by catch (Edinger *et al.* 2007).

Experimental long-line seabream fishing carried out between 500-600m depth in the eastern Ionian Sea demonstrated that corals were entangled in 72% of the long lines, most colonies were complete and alive, while others showed already signs of damages as fractures (Mytilineou et al. 2013). *I. elongata* was highly abundant in the coral bycatch accompanied by black corals with an estimation of 130 live colonies of *I. elongata* caught per fisherman per year . They also demonstrated that fish species richness and coral by catch were dependent on the hook size, in other words, coral bycatch was higher with smaller hooks.

Long line coral catches are related to the abundance of the coral species in the area, and also to the catchability of the gear as well as to the morphological structure of the coral (Mytilineou *et al.* 2013).

Sampaio *et al.* (2012) mentioned that Alcyonacea was the principal group caught by long lines in the Azores, followed by Scleractinia and Stylasteridae.

At present this species may be considered almost disappeared in the Mediterranean Sea (Cartes et al. 2013) and its occurrence is limited to the shallowest or deepest ranges of its distribution, respectively in shallow water refuges of muddy bottoms protected from trawling activities (Bo *et al.* 2015) or to grounds where trawling is forbidden, for example on slope grounds or below 1000m depth (Sacchi 2008, Cartes et al. 2013).

<u>**Pollution and mineral extraction**</u>

In addition to fishing impacts, pollution and litter dumping on *I. elongata* facies are another important threats (Relini-Orsi 1974) as well as other human activities, such as mineral extraction (Thiel 2003) that favors, together with trawling activities and alteration of rivers run off, high silting areas. Sedimentation clogs the non-retractile polyps of *I. elongata* and alters their filtering activity (Cartes *et al*. 2013).

Exploitation: No uses are known for this species. Local traditional jewellery is reported in Italy with occasional bycatch.

Proposed protection or regulation measures:

The United Nations and FAO (2009) formulated fisheries management protocols to protect Vulnerable Ecosystems (VMEs) from destructive fishing activities in international waters, recognizing the importance and value of deep-sea ecosystems and the biodiversity they contain.

VMEs include uniqueness and rarities of species and habitats, their functional significance, fragility, structural complexity, and life histories limit the probability of their recovery (GFCM 2009).

Ecosystem-Based Management would greatly benefit from distribution maps of communities overlapped with human activities and by the creation of Fishery Restricted Areas (FRAs) (de Juan *et al.* 2013). Compact muddy facies with *Isidella elongata* are recognized among the VMEs (together with other soft bottom species such as the Sea Pen, *Funiculina quadrangularis*), and are included in the OSPAR list as well as in the European Commission Habitats Directive (Council Directive 92/43/EEC).
Isidella facies are considered as a Sensitive Habitat by the STECF and as reefs (habitat 1170) in the European Directive of Habitats.

To date, *Isidella elongata* facies and their associated habitats are not directly protected by legislation. However the species has been catalogued as "CRITICALLY ENDANGERED" in the Mediterranean by the IUCN Red List. Further, it is worthy to take into account that *I. elongata* develops in soft bottoms which are part of the identified Ecologically or Biologically significant Marine Areas (EBSAs) in the western Mediterranean (Fig. 1). Moreover *I. elongata* communities are considered as Vulnerable Marine Ecosystems (VME) and are Essential Fish Habitats (EFH). The Mediterranean Action Plan also included the bamboo coral habitats as part of the so called "Dark Habitats" (UNEP 2013) (which included caves and deep-sea habitats) that deserve protection. The results of the evaluation of the Environmental Status of the Spanish Marine waters throughout the "European Marine Strategy Framework Directive", pointed out the need of protection for these vulnerable ecosystems which have experienced a dramatic decrease mostly due to the intense fishing activity.

In Spanish waters there are some areas where populations of *Isidella elongata* are still in good conservation status. With this in mind we would like to suggest a specific area in order to implement - as a pilot project- (1) conservation measures, (2) a regulation of commercial activities and (3) a research program focused in gaining knowledge on the reproductive feature of the species, dispersal strategies, growth patterns and population dynamics. All these aspects are key to understand the ability of the populations to recover and colonise new areas. The area we suggest is located in the Ausiàs March – Ses Olives Seamounts (Fig. 2). This location harbours a population in good conservation stage (Fig. 3) as well as damaged populations (which are currently impacted by trawling), which will allow for a development of a comparative study between both situations for the same species. The area has been surveyed by OCEANA, and its precise location is known, which make the area a suitable place to implement the study we suggest.

The results of the study will help to develop adequate conservation measures as well as to regulate the commercial activities in the area in a sustainable way.

The Ausiàs March Seamount was protected in 2014 by the Spanish Ministry of Environment as "fishing restricted area" (Orden AAA/1504/2014). This protection figure currently covers areas located until 200 meters depth. The protection figure will make the area ideal for the proposed study to be develop here if the protected area would be enlarged to cover deeper areas, as the *Isidella* populations are located at 500-600 meters depth.

The species is also included in the Marine Protected Areas network of the Gulf of Lion (Parc Marin du Golfe du Lion, decree 2011–1269) (Fabri *et al*. 2014).

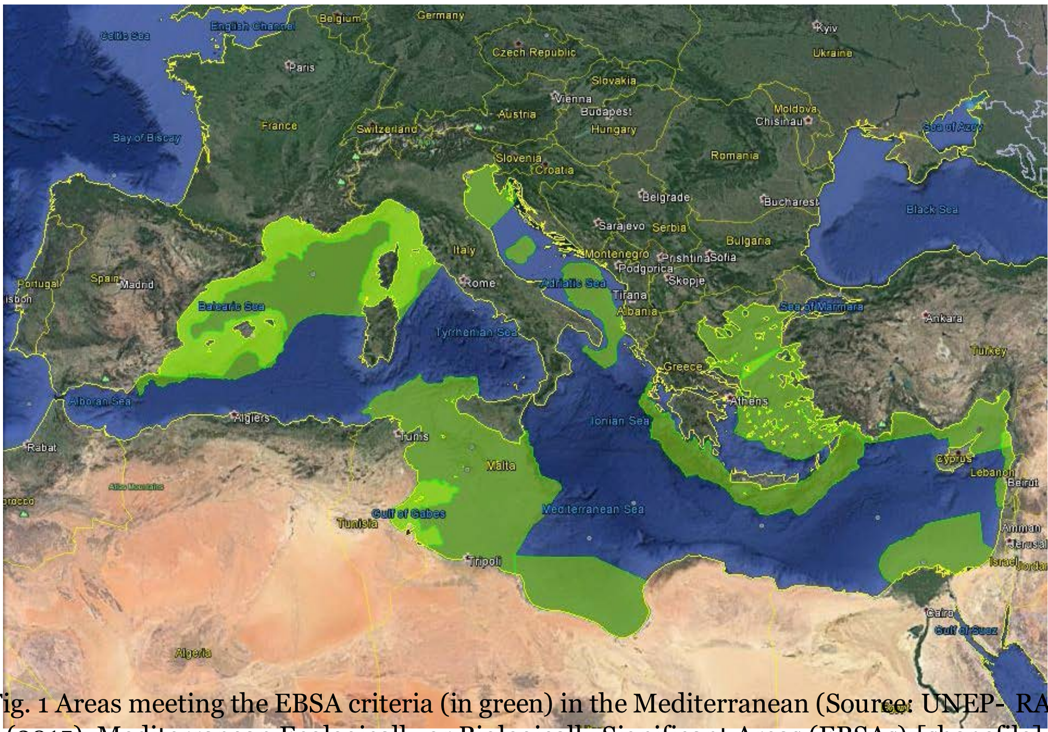

Fig. 1 Areas meeting the EBSA criteria (in green) in the Mediterranean (Source: UNEP- RAC/SPA. (2015). Mediterranean Ecologically or Biologically Significant Areas (EBSAs) [shapefile]. Requena, S. Vers. September 2016)

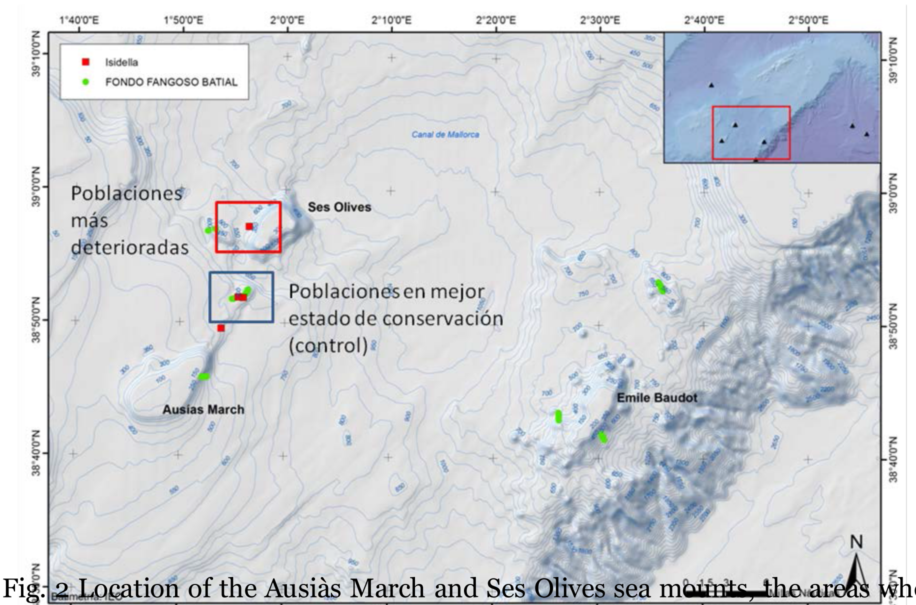

Fig. 2 Location of the Ausiàs March and Ses Olives sea mounts, the areas where the pilot project, including conservation measures, commercial activities regulation and research project, could be implemented (Source: OCEANA).

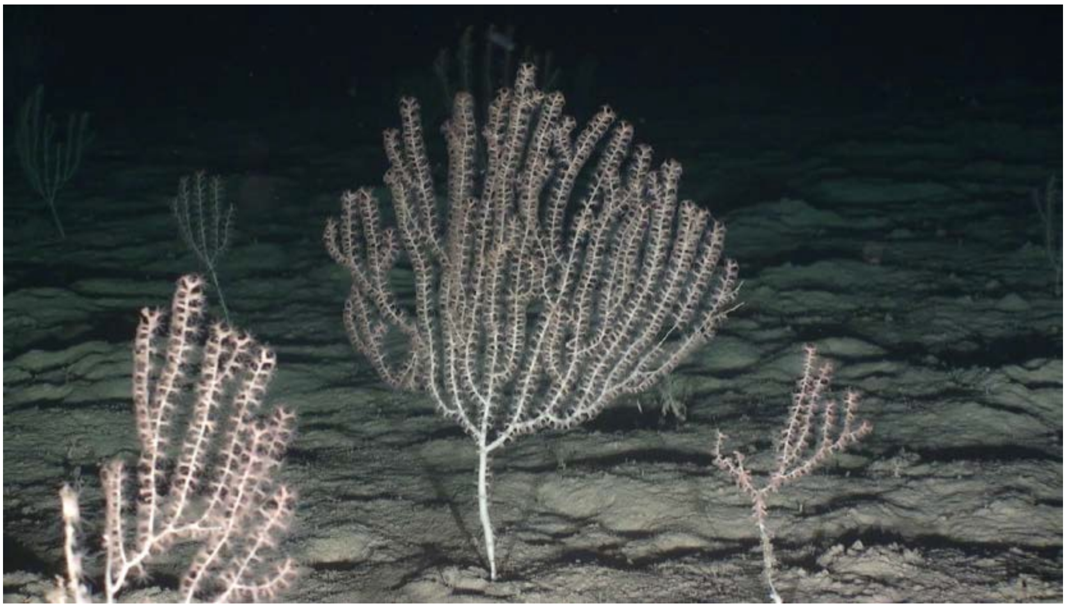

Fig. 3 *Isidella elongata* population in the Ausiàs March Seamount (Balearic Islands) at around 500 m depth. A large specimen is visible in the centre of the image (Source: OCEANA).

Potential proposed regulation measures:

1- Enforce the bottom trawling ban on VMEs, EFH and SH.
2- Enforce better fishing practices in the areas where these soft bottom ecosystem engineers dwell (e.g. implementation of pelagic doors in benthic fishing gears, switch from bottom trawling to long line fishing gears / Gillnets / traps).
3- Set up Special Protection Areas for sea pens populations across its main areas of distribution.
4- Set up research pilot projects considering “control areas” where populations are still in reasonable healthy conditions and areas where damaged populations are still present, closing the areas and implementing monitoring programs to increase our knowledge in demographic patterns, recovery capability of the populations and reproductive traits. This will provide a better knowledge aout what kind of protection the species needs and hence to implement suitable conservation measures.
5- Presence of the species in National/Natural Parks or in MPAs could be a useful tool to target healthy populations and monitor population dynamics, using it as a control populations.

Occurrence of the species is documented in the Telašćica Nature Park (Adriatic Sea, Croatia), as well as in the recently declared Natura 2000 areas Cañones del Golfo de León and Seco de los Olivos, among others.

As mentioned before, in order to be able to better apply conservation measures, more research is needed on:

- its distribution at regional and subregional-local scales to provide more accurate information on the population networks especially in deep habitats;
- Demographic characteristics, health status and population trends over broader spatial and bathymetric scales;
- Study of populations in other areas of the Mediterranean;
- Factors promoting the resilience of populations such as recovery mechanisms of adult colonies, biotic and abiotic factors influencing recruitment success and juvenile survivorship.

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