EP

United Nations Environment Programme

UNEP(DEPI)/MED WG.382/10
17 June 2013

ENGLISH
ORIGINAL: FRENCH

MEDITERRANEAN ACTION PLAN

Eleventh Meeting of Focal Points for SPAs

Rabat, Morocco, 3-4 July 2013

DRAFT ACTION PLAN FOR THE CONSERVATION OF DARK ASSEMBLAGES OF THE MEDITERRANEAN SEA (Marine Caves, Canyons, etc…)

Delegates are kindly requested to bring their documents to the meeting

UNEP
RAC/SPA - Tunis, 2013

Note:
The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of RAC/SPA and UNEP concerning the legal status of any State, Territory, city or area, or of its authorities, or concerning the delimitation of their frontiers or boundaries.

Regional Activity Centre for Specially Protected Areas (RAC/SPA)
Boulevard du Leader Yasser Arafat
B.P. 337 - 1080 Tunis Cedex - Tunisia
E-mail: car-asp@rac-spa.org

The original version of this document was prepared for the Regional Activity Centre for Specially Protected Areas (RAC/SPA) by Pergent G With contribution from : Aguilar R., Ballesteros E., Bazairi H., Bianchi C.N., Bitar G., Borg J., Chevaldonné P., Daniel B., Gerovasileiou V. Harmelin J.G. Mastrototaro F., Ouerghi A, Perez T., C. Pergent-Martini, Sartoretto S., Schembri P., Tilot V., Tunesi L., Vacelet J.

Table of contents

1. PRESENTATION

A. State of knowledge

Dark habitats are environments where the luminosity is extremely weak, or even absent (aphotic area) leading to an absence of macroscopic autochthonous photosynthesis.

The bathymetric extension of this lightless area depends to a great extent on the turbidity of the water and corresponds to benthic and pelagic habitats starting from the deep circa-littoral. Caves which show environmental conditions that favour the installation of organisms characteristic of dark habitats, are also taken into account.

Dark habitats are dependent on very diverse geo-morphological structures (e.g. underwater caves, canyons, slopes, isolated rocks, seamounts, abyssal plains).

A.1 – Assemblages of underwater caves

Underwater caves are 'natural cavities big enough to permit direct exploration by man' [1]. Dark underwater caves are lightless enclaves of the marine environment, with lighting less than 0.01% [2] and a fairly confined space. Dark underwater caves are often reservoirs of unknown biodiversity and refuges for generally very non-resilient communities [2].

Semi-dark underwater caves are not included in this Action Plan as they are already integrated into the "Action plan for the conservation of the coralligenous and other calcareous bio-concretions in the Mediterranean Sea"

.

Underwater caves are particularly well represented in all the rocky karst or fractured coastlines and are probably very widespread at Mediterranean level. Although we do not have an exhaustive view of the situation, several actions, specific to these habitats, have recently been started:

- Since the 1950s, researchers from the Endoume Marine Station (Marseilles) have been more particularly studying the underwater caves of France's Mediterranean coast. A great number of caves have been identified, and sometimes described, and the main species have been paid particular and systematic attention and also studied from a functional and progressive angle. Most of these results have fed into the assessments made at national (ZNIEFF sea) and European (Natura 2000) level. Since 2011, the French Marine Protected Areas Agency has undertaken systematic research on these habitats in the sectors mapped within the CARTHAM programme (CARTography of heritage Marine Habitats) and the Corsican DREAL has sponsored an inventory of the island's whole coastline (97 dark caves)

- From 2003 on, Italian researchers with the support of the Ministry of the Environment have brought out an atlas with a CD on the distribution of underwater caves by geographic sector (1). Additionally, a national system of geo-location of the caves has been set up, accessible online (catastogrotte.speleo.it)

- Inventorying is now being done as part of the Greek-European NETMED programme and has recorded over 2,700 marine caves in the 13 Mediterranean countries inventoried.

In terms of conservation, as far as the Mediterranean European states are concerned, caves are natural habitats that come under Habitat Directive on the conservation of natural habitats and of wild fauna and flora and appear as such as priority habitats requiring protection (Directive 92/43). Lastly, a certain number of underwater caves enjoy protection status because they fall within the geographical boundaries of Marine Protected Areas (MPAs): (e.g. the Karaburun-Sazan National Marine Park (Albania[1]), the Telaŝćica Nature Park (Croatia), the Lastovo Archipelago National Park (Croatia), the Mèdes Islands Marine Reserve (Spain), the Port-Cros National Park (France), the Calanques National Park (France), the Alonissos and Northern Sporades National Marine Park (Greece), the Zakynthos Marine National Park (Greece), the Capo Caccia/Isola Piana Marine Protected Area (Italy), the Punta Campanella Marine Protected Area (Italy), the Tremiti Islands Marine Nature Reserve (Italy), the Ustica Islands Marine Nature Reserve (Italy), the Palm Islands Reserve (Lebanon), the Dwejra Marine Area (Malta), the Mgarr ix-Xini Marine Area (Malta), the Ghar Lapsi and Filfla Marine Area (Malta), the Marine Area between Rdum Majjiesa and Ras ir-Raheb (Malta), the North-east Malta Marine Area, the Al-Hoceima National Park (Morocco) and the Galite Archipelago (Tunisia)).

A.2 – Assemblages of underwater canyons

Canyons are valleys with sometimes steep walls and V-shaped sections that are like land canyons but bigger; they often present tributaries and rocky outcrops that can be sizeable [3].

These are elements that play an important part in the way the Mediterranean ecosystem functions, insofar as they constitute the main route for transferring matter between the coast and the deep sea [4]. Thus they can represent biodiversity hotspots and recruiting areas (Sardà *et al*., 2004 in [4]). Lastly, in the light of the Convention on Biological Diversity (2008), underwater canyons present characteristics that class them as priority conservation areas (Chalabi, 2012 in [3]).

These structures are extremely frequent and concern all the Mediterranean countries. Thus, even though over 518 important canyons have been identified [3], less than 270 are sited in detailed fashion (Figure 1), and they are probably more numerous in the light of the geo-morphological maps of the Mediterranean seabed.

[1] Personnel communication, Prof. Sajmir Beqiraj

At present, underwater canyons are not much taken into account in terms of conservation insofar as only a few of them are protected by inclusion in existing MPAs (the Golfe du Lion Marine Nature Park and Calanques National Park canyons, France; the Pelagos Specially Protected Area of Mediterranean Importance (SPAMI) canyons, France, Monaco and Italy; the Mar Menor SPAMI canyon and coasts of the Murcia region, Spain).

Also, since 2009 the Montpellier, petit-Rhône and grand-Rhône canyons have been integrated within the Golfe du Lion restricted fishing area adopted by the General Fisheries Commission for the Mediterranean (GFCM) [5].

Figure 1: Distribution of main canyons identified in the Mediterranean (after authors of Document & [3], [6]). Map: Google earth©

A.3 – Engineering benthic invertebrate assemblages

Assemblages of engineering benthic invertebrates are found on several kinds of substratum and, in the Mediterranean, give rise to unique formations of conservation interest such as:

- black coral forests (Antipatharians) and Gorgonia on hard substrata
- beds with *Isidella elongata* and beds with Pennatula on crumbly substrata
- associations of big sponges and 'deep water corals' present on both kinds of substratum.

These various formations can be more or less overlapping and they shelter ecosystem-building species that provide a hard biogenic habitat as well as a network of interstices for many other organisms. Among these, the 'deep sea corals' shelter a very high specific richness with over 220 species [7], constitute the base of complex food chains and represent, the FAO says (2008), one of the best known examples of vulnerable marine ecosystems (Marin & Aguilar in [3]).

Although there is still not much information on where they are to be found, living 'deep water corals' do not seem to be frequent in the Mediterranean (Figure 2; [8]). They are particularly found on rocky escarpments, walls of canyons, seamounts, and also on rocky surfaces that stand permanently clear of bathyal silts.

Figure 2: Location of some populations of structuring invertebrates in the Mediterranean. These are mostly 'deep water corals' (after authors of Document & [8], [9], [10]). Map: Google earth©

Their presence can thus be a necessary precondition for setting up specific measures. Although at present they are still not much taken into account in terms of conservation, since only the Santa Maria de Leuca reef with *Lophelia* and *Madrepora* has since 2006 been included as a restricted fishing area by GFCM [11], they are at the origin of the creation of MPAs (e.g. the Cassidaigne and Lacaze-Duthiers canyons, France). Similarly, two sites have been chosen to this effect by Italy (Continental slopes of the Tuscan Archipelago and Santa Maria de Leuca sector) for setting up the Natura 2000 at-sea network, and many are included in the proposal to set up a representative MPA in the Sea of Alboran [6].

A.4 – Deep-sea chemo-synthetic assemblages (mud volcanoes, cold seeps, 'pockmarks', brine anoxic lakes, hydrothermal springs)

It was in the 1990s that the first descriptions on deep-sea populations based on chemo-synthesis started (Corselli & Basso, 1996 in [12]). They are often associated with underwater mud volcanoes, but more generally any emission ('cold seeps') on the surface of the sediment of reduced gas or fluids (methane, sulphurs, etc.) permits the developing of chemo-autotrophic microbial communities, themselves at the base of a particular food chain, quasi-disconnected to surface photosynthesis.

In the Mediterranean we are therefore familiar with mud volcanoes and also 'pockmark' areas, shallow craters that form after gas has been released. Hyper-saline anoxic lakes have also been discovered between 3,200 and 3,600 metres down in the eastern basin (Lampadariou *et al*., 2003 in [12]). They also give rise to chemo-autotrophic primary

production. Lastly, areas with hot hydrothermal springs are found at the level of underwater volcanoes in the Tyrrhenian Sea (Marsili Seamount). These Mediterranean chemo-synthetic communities are deemed to be relatively isolated vis-a-vis the Atlantic Ocean (Fiala-Médioni, 2003 in [12]). Hyper-saline anoxic lakes, because of the combination of almost saturated salt concentrations, high hydrostatic pressures, absence of light, anoxia and the high stratification of the water layers certainly constitute habitats that are among the planet's most extreme. They mainly contain bacterial communities and metabolically active Archaeans, specific to these environments [4].

'Cold seeps' seem to be well represented along the Mediterranean fold (eastern basin; Figure 3). 'Mud volcanoes' are frequent in the eastern basin especially at the level of the Mediterranean fold and in the south-east of the basin, but the discovery of 'pockmarks' around the Balearic Islands allows us to envisage their existence in the western basin (Acosta *et al*., 2001, in [12]; Figure 3). Lastly, six hyper-saline anoxic lakes have been localised at the level of the Mediterranean fold [4] (Figure 3).

Figure 3: Locating chemo-synthetic populations that have been studied in the Mediterranean (after authors of Document & [6], [12], [13], [14], [15]). Map: Google earth©

Among these deep-sea chemo-synthetic populations only the 'cold seeps' of the Nile Delta are currently taken into account in terms of conservation, since it has since 2006 been included as a restricted fishing area by GFCM [4].

A.5 – Assemblages associated with seamounts

In the Mediterranean, seamounts are raised parts of the seabed, ending in a peak, and of limited extent, which never reach the surface [16].

Although seamounts have so far been little studied from the biological angle in the Mediterranean, they seem to contain a unique biodiversity characterised by high rates of endemic species and could act as refuges for relic populations or constitute speciation areas (Galil & Zibrowius, 1998 in [12]).

The Mediterranean in its wider sense (including the Black Sea) probably contains about 200-300 seamounts, most of them in the western basin (Figure 4), with over 127 of them at the level of the Tyrrhenian Sea and the Sicily-Tunisian Strait[2].

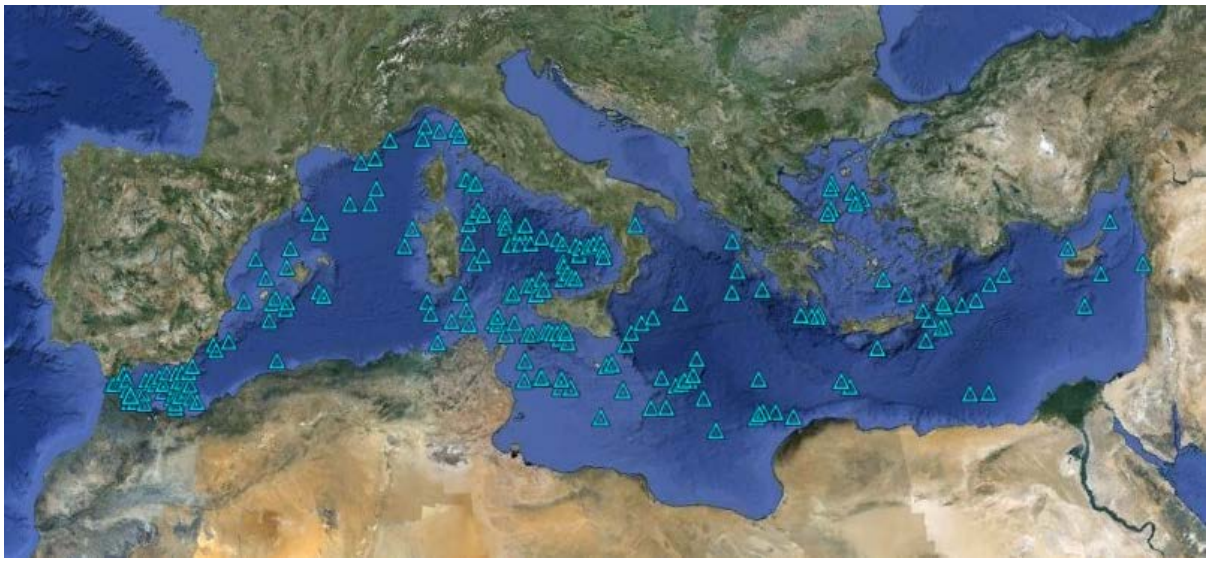

Figure 4: Distribution of the main Mediterranean seamounts (Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo & the GIS User Community; map: Google earth©

At present, these seamounts are little taken into account in terms of conservation since only that of Eratosthenes (eastern basin) has since 2006 been included as a restricted fishing area by GFCM [3].

B. Main threats

Apart from a limited number of sectors, the small size of the Mediterranean continental shelf leads to a strong interaction between the land and sea domains; thus the impact of earth-origin pressures is felt down to sizeable depths. Such impacts may be of natural origin (mouths of coastal rivers, underwater cascades) or of human origin (discharge from urban and industrial pipes, coastal development, exploiting of living and subsoil resources, prospecting). Similarly, this proximity leads to strong interaction between the euphotic and aphotic domains, particularly via the supply of nutritive elements at the base of many trophic chains, and the transfer and fixing of larvae both for the pelagic and benthic fields.

The main threats hanging over dark habitats therefore depend greatly on their location (distance from coast, presence of rivers, proximity of big population centres and industrial complexes), their depth, their morphology (slope, substratum, structure) and the uses to which they are put (exploiting of resources).

[2] (Personal communication, Prof. Maurizio Wurtz)

In this respect underwater caves are specific entities, being, because of their often shallow depth and their nearness to the coast, easy of access. Also, the caves, at least in their 'semi-dark' parts, constitute landscapes of high aesthetic or archaeological value and are therefore often visited, leading to mechanical harm particularly from divers. Using destructive methods (e.g. dynamite) in coastal development work is likely to significantly affect these habitats.

Changes in the quality of the environment (accumulation of nutriments, contamination by run-off water, rise in water temperature) can impact these environments. Although the dark caves are less frequented, they are especially fragile and constitute veritable reservoirs of knowledge and biodiversity that must at all costs be protected [17]. Indeed, the slightest disturbance can cause considerable damage and impacted communities will take a long time to recover their state of equilibrium (extremely lengthy adjustment of stability).

Other dark populations undergo different pressures, at least in part, to those hanging over the underwater caves. There, too, although changes in the quality of the environment can play a non-negligible part (acidification of the water) specific threats are identified.

These mainly concern impacts linked to the exploiting of living resources (gathering red coral, trawling, fishing with *palangres*, or mesh nets, lost or abandoned fishing gear), the accumulation of waste (land-origin arrivals, direct discharge at sea, submersion of rubble from dredging), research activities (seismic, sampling), and undersea prospecting (drilling, exploiting hydrocarbons; military activities [12]).

Thus, recent studies have shown that as well as displacing sediments, trawling affects the morphology of the seabed, as is shown by high-resolution relief maps of the seabed, and can cause damage equal to that caused by ploughing farmland [18].

Similarly, the fragility of cold-water corals makes them very vulnerable to fishing activities, especially trawling, and also to mesh nets and *palangres*, whether directly or because of the changes in the environment caused by some of the fishing gear. Moreover, recolonisation can prove very difficult or even impossible in the light of the reduced growth of the main builders [19].

Similarly the burying at great depths of waste from the exploiting of mines is often seen as one of the options available for eliminating that waste [20].

2. OBJECTIVES OF THE ACTION PLAN

The objectives of the Action Plan are to:

- conserve the habitats' integrity, functionality (favourable state of conservation) by maintaining the main ecosystem services (e.g. carbon sink, halieutic recruitment and production, biogeochemical cycles) and their interest in terms of biodiversity (e.g. specific diversity, genetics)
- encourage the natural restoration of degraded habitats (reduction of human origin impacts)
- improve knowledge about dark populations (e.g. location, specific richness, functioning, typology).

3. ACTIONS REQUIRED TO ATTAIN THE OBJECTIVES OF THE ACTION PLAN

Actions needed to achieve the aims can be put into four categories:

A. Improvement and acquisition of knowledge

Scientific data on the biology, ecology and functioning of the various dark populations is still rare and hard of access. Thus, we should improve this knowledge in order to possess the information that is vital for implementing an optimal management strategy for each of these populations, in particular by:

- assessing available knowledge, taking into account not only national and regional data (e.g. RAC/SPA, GFCM, IUCN, OCEANA, WCMC) but also scientific works. The information will be integrated within a geographical information system (GIS) and could be shared via online consultation
- setting up a database of people-resources in identified fields (i.e. caves, deep-sea populations), of institutes and bodies working in this field and of the available means of investigation
- quantifying the proven or potential pressures (e.g. commercial and recreational fishing, leisure activities and diving, undersea prospecting).

New knowledge must be acquired in areas of regional interest to promote a multidisciplinary approach and enhance international cooperation over these sites. Such joint action will permit the exchange of experience and the setting up of shared management strategies (crafting guidelines).

Regularly holding theme-based workshops that bring together experts on these dark populations will enable an assessment to be made of how far knowledge has progressed.

B. Management measures

Management procedures involve enacting laws aimed at regulating human activities likely to affect dark populations and permit their long-term conservation.

B.1 – Legislation

Thus, we must identify endangered or threatened dark populations and grant them the status of protected species as defined in Article 11 of the Protocol on Specially Protected Areas and Biological Diversity (SPA/BD Protocol, [21]).

The regulations on impact studies must be strengthened to make assessing the impacts on dark populations compulsory. The regulations should pay particular attention in the event of coastal development, the prospecting and exploiting of natural resources and the discharge at sea of materials.

Insofar as regulatory procedures already exist at international level to restrict or ban certain human activities, we should work to have them applied and developed. This is particularly so for the ban on trawling at depths of over 1,000 metres down in the Mediterranean or the setting up of Restricted Fishing Areas (RFA) as adopted in the context of the mandate of the General Commission on Mediterranean Fisheries [11]. The Mediterranean states are invited to use, and enhance, all the means already available to ensure better conservation of dark populations.

B.2 – Setting up MPAs

Designation of Marine Protected Areas intended to permit more efficacious conservation of these dark assemblages must be based on the identification of emblem sites on the basis of the criteria (uniqueness or rarity, particular importance for species biological stages, importance for threatened, endangered or declining habitats or species, vulnerability and reduced recuperative capacity after disturbance, biological productivity, biological diversity and naturality) that were adopted in 2009 by the Contracting Parties [22].

As part of the work done by RAC/SPA in 2010, many sites that met, these criteria have already been identified for the creation of MPAs beyond national jurisdiction [23]. It is necessary to pursue and build upon this approach via the procedures in Article 9 of the SPA/BD Protocol [21].

Similarly, it would be helpful to identify from among the already existing MPAs those that exist near sites of interest for the conservation of dark assemblages and to study the feasibility of extending them so that these sites are included within the boundaries of the MPA.

B.3 – Other management measures

Measures should be identified to reduce the pressures that hang over these dark assemblages and to implement them (e.g. guidelines).

In the light of the precautionary principle, particular attention will be paid to the impacts that could arise as a result of the acidification and/or fertilization of the oceans and the setting up of new emergent fisheries (border areas).

MPAs which host dark assemblages (e.g. dark caves) should update their management plans to include measures adapted to the conservation of these caves.

Procedures aimed at assessing the efficacity of these measures as a whole will be defined in consultation with the organisations concerned by the management of these dark assemblages (e.g. international conventions, GFCM, IUCN, NGOs) to promote sustainable, adaptable and concerted management.

Similarly, possession of a state of reference is a necessary precondition for setting up a system to monitor over time the maintenance in good condition of these dark assemblages. It

is also helpful in the sites for which data already exists to start monitoring procedures (return to the site) and in sites which have not yet been studied to establish a 'zero' state. Defining ecological indicators and biodiversity and vulnerability indices should permit the crafting of predictive scenarios for managing these habitats and their dependent populations. Making this approach general should in time permit the building up of a network of sites for monitoring.

C. Public awareness and information

Information and awareness programmes to make dark populations, their vulnerability and the interest for conservation better known should be crafted for decision-makers, users (e.g. divers, fishermen, mine operators) and the wider public (environment education). The participation of NGOs in these programmes will be encouraged.

D. Enhancing national capacities

In the light of the geographical distribution of many of these dark populations (outside waters that lie within national jurisdiction) and the difficulties of reaching them (bathymetric bracket, scientific means required, lack of knowledge, cost of study), it is important to:

- encourage the introduction of international cooperation to create synergies between the various actors (decision-makers, scientists, socio-professionals) and set up shared management
- organise training courses and encourage the exchange of cross-border experience so as to enhance national capacities in the field

E. National plans

To give greater efficacity to the measures envisaged for setting up the present Action Plan, the Mediterranean countries are invited to craft national plans for the protection of dark assemblages. Each national plan must bear in mind the specific features of the country and even the areas concerned. It must suggest appropriate legislative measures, particularly as regards impact studies for coastal development and to check the activities that can affect these assemblages. The national plan will be drawn up on the basis of the scientific data available and will include programmes for: (i) gathering and continuous updating of data, (ii) training and retraining for specialists, (iii) education and awareness for the public, actors and decision-makers, and (iv) the conservation of dark populations that are significant for the marine environment in the Mediterranean. These national plans must be brought to the attention of all the concerned actors and as far as is possible coordinated with other pertinent national plans (e.g. emergency plan against accidental pollution).

4. REGIONAL COORDINATION AND IMPLEMENTATION

Regional coordination of the implementation of the present Action Plan will be handled by the Secretariat of the Mediterranean Action Plan (MAP) via the Regional Activity Centre for Specially Protected Areas. The coordinating structure's main functions are:

- gathering, summarizing and circulating knowledge at Mediterranean level and permitting this to be integrated within the available instruments (e.g. FSD)
- setting up and updating databases on people/resources, laboratories involved and investigation means available
- helping states identify and assess the pressures on the various dark populations at national and regional level
- promoting studies on dark populations and making inventories of species in order to better grasp the way they function and better assess the ecosystem services they provide
- promote cross-border cooperation
- back the setting up of dark population monitoring networks
- organise meetings of experts and training courses on dark populations
- prepare reports on how implementation of the Action Plan is progressing, for submission to the Meeting of National Focal Points for SPAs and meetings of the Contracting Parties
- establish a work programme for implementing the Action Plan over a five-year period, which will be submitted to the Contracting Parties for adoption. At the end of this period, if necessary, after assessment and updating, it can be repeated.

Implementing the present Action Plan is the responsibility of the national authorities of the Contracting Parties. At each of their meetings, the National Focal Points for SPAs shall assess how far the Action Plan is being implemented on the basis of national reports on the subject and a report made by RAC/SPA on implementation at regional level. In the light of this assessment, the Meeting of National Focal Points for SPAs will suggest recommendations to be submitted to the Contracting Parties. If necessary, the Meeting of Focal Points will also suggest adjustments to the schedule that appears in the Appendix to the Action Plan.

Supplementary work done by other international and/or non-governmental organisations, aiming at the same objectives, should be encouraged, encouraging their coordination and avoiding duplication of effort.

At their ordinary meetings, the Contracting Parties could, at the suggestion of the Meeting of National Focal Points for SPAs, in order to encourage and reward implementation of the Action Plan, grant the title of 'Action Plan Partner' to any structure that may so request. This label will be granted on the evidence of proven involvement in the implementing of the present Action Plan attested by concrete actions (e.g. conservation, management, research, awareness etc.). The label can be extended at the same time as the multi-annual work programme on the grounds of an assessment of actions carried out during that period.

5. IMPLEMENTATION SCHEDULE

Actions	Time	Who
Making a summary of knowledge of dark populations and their distribution around the Mediterranean in the form of a geo-referenced information system	As soon as possible, and continuously	RAC/ SPA and Contracting Parties
Setting up a database of people/resources and means of investigation available	As soon as possible, and continuously	RAC/SPA
Identify and assess proven pressures on each of the various types of habitat	Year 1	RAC/ SPA and Contracting Parties
Revise the reference list of types of marine habitat for the selection of sites for inclusion in the national inventories of natural sites of conservation interest, in order to take account of dark assemblages	Years 1 and 2	RAC/ SPA and Contracting Parties
Promote the identifying of areas of interest for the conservation of dark assemblages in the Mediterranean and Carry out concerted actions in national and/or cross-border sites	Years 1 and 2	Contracting Parties RAC/ SPA and Contracting Parties
Finalise the implementing of MPAs in already identified sites at national level and outside waters that lie within national jurisdiction Propose the creation of new MPAs	Starting from Year 2	RAC/ SPA and Contracting Parties
Encourage the extension of existing MPAs to integrate nearby sites that host dark assemblages	Starting from Year 2	Contracting Parties
Introduce national legislation to reduce negative impacts Integrate taking dark assemblages into account within impact studies procedures	On adoption	Contracting Parties
Regularly hold theme-based workshops (in coordination with those of the 'Coralligenous' AP	Every three years	RAC/.SPA
Propose guidelines suited to the inventorying and monitoring of dark assemblages	Starting from Year 2	RAC/SPA and Partnaires
Implement monitoring systems	Starting from Year 3	RAC/SPA
Enhance cooperation actions with concerned organisations	On adoption	RAC/SPA
Step up awareness and information about dark assemblages with the various actors	Continuously	RAC/SPA, partners and Contracting Parties
Enhance national capacities and improve skills in taxonomy and monitoring methods	As needed	RAC/SPA

6. BIBLIOGRAPHY

1 Cicogna, F.*, et al.* (2003) *Grotte marine: cinquant'anni di ricerca in Italia*. Ministero dell'ambiente e della tutela del territorio

2 Harmelin, J.G.*, et al.* (1985) Dark submarine caves - An extreme environment and a refuge-biotope. *Téthys* 11, 214-229

3 Wurtz, M. (2012) *Mediterranean submarine canyons: Ecology and governance.* UICN

4 Danovaro, R.*, et al.* (2010) Deep-Sea Biodiversity in the Mediterranean Sea: The Known, the Unknown, and the Unknowable. *PLoS ONE* 5, 1-25

5 CGPM (2009) *Rapport de la trente-troisième session. Tunis, 23-27 mars 2009.* Fishery and Agriculture Organization

6 UICN (2012) *Propuesta de una red representativa de áreas marinas protegidas en el mar de Alborán / Vers un réseau représentatif d'aires marines protégées dans la mer d'Alboran.* UICN

7 Mastrototaro, F.*, et al.* (2010) Biodiversity of the white coral bank off Cape Santa Maria di Leuca (Mediterranean Sea): An update. *Deep Sea Research Part II: Topical Studies in Oceanography* 57, 412-430

8 Freiwald, A.*, et al.* (2009) The WHITE CORAL COMMUNITY in the Central Mediterranean sea revealed by ROV surveys. *Oceanography* 22, 59-74

9 Pardo, E.*, et al.* (2011) Documentacion de arrecifes de corales de agua fria en el Mediterraneo occidental (Mar de Alboan). *Chronica naturae*, 20-34

10 Taviani, M.*, et al.* (2010) Pleistocene to Recent scleractinian deep-water corals and coral facies in the Eastern Mediterranean. *Facies* 57, 579-603

11 GFCM (2006) Report of the Thirtieth Session. Istanbul, Turkey, 24-27 January 2006. In *GFCM Report* (Mediterranean, G.F.C.f.t., ed), pp. 56, Food and Agriculture Organization

12 WWF and IUCN (2004) *Mediterranean deep-sea ecosystems an overview of their diversity, structure, functioning and anthropogenic impacts, with a proposal for their conservation*. IUCN Centre for Mediterranean Cooperation & WWF Mediterranean Programme

13 Dupré, S.*, et al.* (2010) Widespread active seepage activity on the Nile Deep Sea Fan (offshore Egypt) revealed by high-definition geophysical imagery. *Marine Geology* 275, 1-19

14 Lastras, G.*, et al.* (2004) Shallow slides and pockmark swarms in the Eivissa Channel, western Mediterranean Sea. *Sedimentology* 51, 837-850

15 Taviani, M.*, et al.* (2013) The Gela Basin pockmark field in the strait of Sicily (Mediterranean Sea): chemosymbiotic faunal and carbonate signatures of postglacial to modern cold seepage. *Biogeosciences Discussions* 10, 967-1009

16 Ballesteros, E.*, et al.* (2013) Els monts submarins. In *Atles dels ecosistemes* (Bueno, D., ed), pp. 320, Enciclopèdia Catalana

17 Gerovasileiou, V. and Voultsiadou, E. (2012) Marine caves of the Mediterranean sea: A sponge biodiversity reservoir within a biodiversity hotspot. *PLoS ONE* 7

18 Puig, P.*, et al.* (2012) Ploughing the deep sea floor. *Nature* 489, 286-289

19 Clark, M.R.*, et al.* (2006) *Seamounts, Deep-sea corals and Fisheries: vulnerability of deep-sea corals to fishing on seamounts beyond areas of national jurisdiction.* UNEP-WCMC

20 CIESM (2003) *Mare Incognitum ? Exploring Mediterranean deep-sea biology.* CIESM

21 PNUE-PAM-CAR/ASP (1995) *Protocole relatif aux Aires Spécialement Protéges et à la Diversité Biologique en Méditerranée (Barcelone, 1995).* CAR/ASP,

22 PNUE-PAM-CAR/ASP (2009) Proposition concernant un programme de travail régional pour les Aires Protégées Marines et Côtières de la Méditerranée. In *Document de travail pour la neuvième réunion des Points Focaux nationaux pour les ASP, 3-6 Juin 2009, Floriana - Malte* (Notarbartolo di Sciara, G. and Rais, C., eds), pp. 1-37

23 UNEP-MAP-RAC/SPA (2010) *Overview of scientific findings and criteria relevant to identifying SPAMIs in the Mediterranean open seas, including the deep sea*. RAC/SPA