



# CoralFISH

*Ecosystem based management of corals, fish and fisheries  
in the deep waters of Europe and beyond*

## Welcome to the CoralFISH newsletter

Issue 6 March 2012

*This is the sixth issue of our newsletter intended to inform interested parties of the progress of the project in addressing some of the key policy issues related to the sustainable exploitation of deep-sea resources.*

CoralFISH is a unique collaboration between marine scientists, fisheries biologists and fishermen from eleven countries. It represents an important first step towards improving the science base for the implementation of an ecosystem approach to fisheries management in the deep-sea.

In October last year, CoralFISH returned to Crete for its third annual Science meeting, graciously hosted by Chris Smith and Nadia Papadopoulou from HCMR. Included in this issue are some of the highlights from the meeting including reports on CoralFISH activities in the previously unexplored deep waters off Cephalonia island, in the Greek Ionian Sea; data mining of species records from the Azores contained in old expedition monographs and the extensive imagery archives that are held in a number of European and North-American institutes; the use of CoralFISH habitat suitability maps as a support to the identification of Ecologically or Biologically Significant marine Areas (EBSAs), and interestingly, given its prominence in the Marine Strategy Framework Directive, the presence of litter in the stomachs and intestines of fish caught in the Greek Ionian Sea. In addition, the past few months has seen us busy building our links with relevant organizations and projects and we include here an update on activities in our sister project 'ODEMM' - Options for Delivering Ecosystem Based Marine Management".

As we approach the end of FP7 and look forward to Horizon 2020 it is important that marine research, because of its strategic importance, remains high on the European research agenda. I recently had the opportunity of attending an important European Parliament workshop "Knowledge for a better understanding and use of resources: the case of mapping the seafloor", hosted by the European Parliament Member Maria do Céu Patrão Neves. The accomplished panel included the DG MARE Commissioner Maria Damanaki who, during her presentation, referred to a number of initiatives carried out under the umbrella of 'Marine Knowledge 2020' that could be considered to be the first steps towards a complete mapping of the European seabed by 2020. Commissioner Damanaki said "*Data and information gathered through seabed mapping can help define marine protected areas and help business to take informed decisions on investments in marine and maritime activities. But these are just examples, showing how the mapping the seafloor is of great importance both for the EU Common Fisheries Policy and our maritime policy.*"

Ultimately, the implementation of comprehensive marine spatial planning as part of the Integrated Maritime Policy requires the detailed bathymetry, substrate, minerals, chemical pollution and habitat (marine species) maps as called for by Commissioner Damanaki. This information will feed into initiatives such as the European Marine Observation and Data Network (EMODnet) intended to make all the data publicly available. Coupled with the stimulus of the increased needs of industry, large-scale seafloor mapping can be a major growth area in Europe over the next few years. Europe should then strive to achieve a global lead position in this area manifesting itself in strong exports of technology and expertise.

As always, I wish all CoralFISH participants, our sister projects, and all those working to improve management of deep-sea resources and biodiversity, every success over the coming months.

Anthony Grehan, CoralFISH

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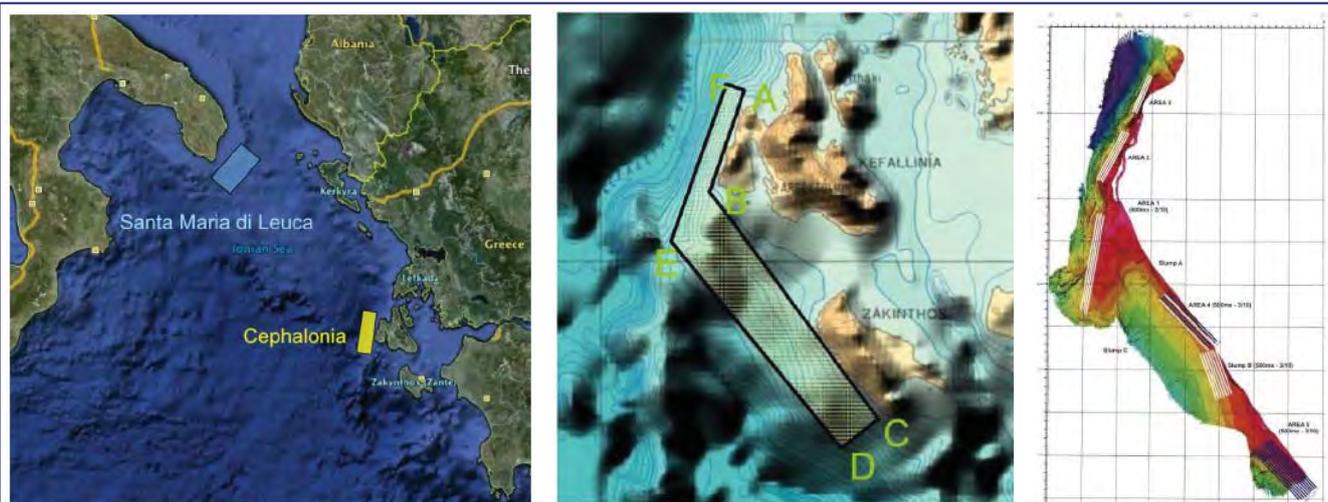
## CoralFISH SME Success Story

At the recent "Knowledge for a better understanding and use of resources: the case of mapping the seafloor" workshop in the European Parliament, Commissioner Damanaki proposed the challenge of a complete mapping of the European seabed by 2020. During the ensuing discussion, panellists suggested that in order to reach this ambitious target, creative solutions would be required, for example, converting fishing vessels into survey

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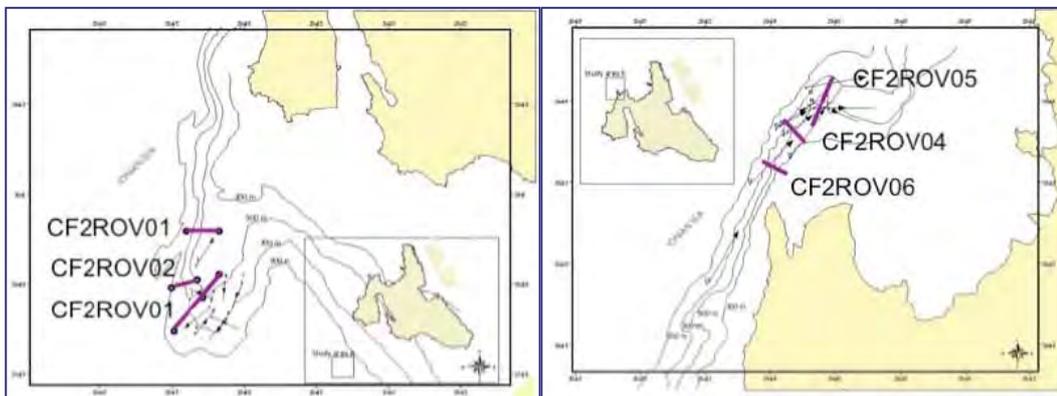
*CoralFISH has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 213144. Articles in this newsletter reflect the views of the authors and the EC is not liable for any use that may be made of the information contained herein.*

## HCMR surveys in Greek Ionian Sea



Regional location and multibeam mapping of Greek Ionian study areas off Cephalonia Island.

As part of their work in CoralFISH, HCMR have carried out the first exploratory work of the almost unexploited deep waters off Cephalonia island, in the Greek Ionian Sea. This area is on the eastern margin of the Ionian sea, with the Italian CoralFISH study area, Santa Maria di Leuca on the northwestern margin (above, left).



'Coral In' and 'Coral Out' sites off SW and W Cephalonia, showing different ROV dives.

Multibeam mapping and side scan sonar target acquisition (above, right), was followed by diving with HCMR's 2000m ROV Max ROVER. Two further ROV surveys were carried out in 2010, with fixed replicate video transect surveys of the seabed at depths of 400-800m in pre-defined 'coral' and 'non-coral' areas off the island of Cephalonia. Although no large reefs were found, the video material revealed the presence of small areas with scattered corals and a variety of underwater life along with some trawl marks, lost gears and various types of litter.

Two long-line surveys, on board a commercial vessel, were carried out in the same areas, to investigate the deep sea fish catch (species, sizes, numbers, diversity, age, maturity, feeding) and potential coral by-catch and associated gear impacts. For comparative purposes similar surveys have been carried out by the Italian, Norwegian and Icelandic CoralFISH teams. A huge amount of new fishery and biological data were collected during these long and physically demanding fishing days on board "Gerasimos" along with a lot of catch and by-catch photographs. A total of



Reviewing side-scan targets



MaxRover ROV diving on the targets



ROV consoles



Lost gillnets on the sea bottom

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## Litter in the stomachs of deep-water fish in the Eastern Ionian Sea

Members of HCMR's CoralFISH team describe below a problem that we can be all too familiar with on land, but maybe don't think of it affecting the deep sea: litter

Text & images: A. Anastasopoulou, Ch. Mytilineou, C.J. Smith, K. Papadopoulou

Anthropogenic litter is now unfortunately far too commonly found in marine environments and underlines the need for local initiatives to combat this problem. Litter from anthropogenic sources was found in the stomachs and intestines of four Elasmobranchs species and one bony fish caught in the Greek Ionian Sea.

The fish were caught during a CoralFISH long line fishing survey (see Page 2) conducted by the Hellenic Centre for Marine Research to investigate the fish communities in adjacent coral and non-coral areas at 400-800m depth. Materials of anthropogenic origin such as plastic (parts of bags and other items, fragments of lines and ropes), metal, wood, and chicken bones were identified in the guts of the pelagic stingray (*Dasyatis violacea*), blackmouth catshark (*Galeus melastomus*), longnose spurdog (*Squalus blainville*), velvet belly shark (*Etmopterus spinax*) and the bony fish blackspot red seabream (*Pagellus bogaraveo*).

Litter was found in the guts of the fish species pictured right. From top to bottom: Pelagic stingray (*Dasyatis violacea*); Blackmouth catshark (*Galeus melastomus*); Longnose spurdog (*Squalus blainville*); Blackspot red seabream (*Pagellus bogaraveo*)

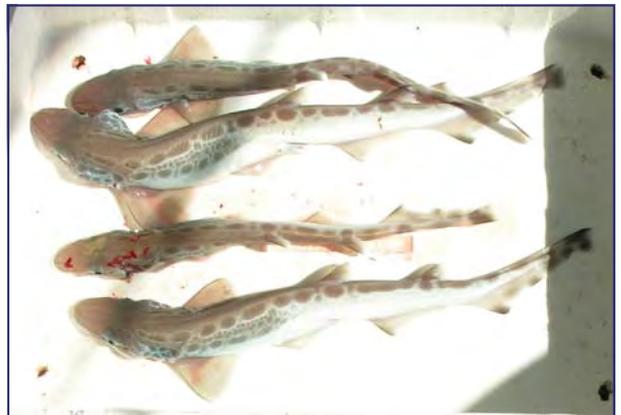
Most of the anthropogenic remains found were plastic, which could be explained by their modern day frequency of use, ease of dispersion and slow degradation in cool bottom waters. Since the occurrence of these materials was relatively infrequent for most species, it is likely that their consumption was accidental. Elasmobranchs seems to swallow more litter than bony fish with the pelagic stingray and velvet belly shark exhibiting the highest occurrence in their gut contents.



Elaboration of samples in the laboratory

It has been proposed that the higher consumption of litter by Elasmobranchs is related to their ability to consume virtually

anything of appropriate size during their feeding activity or even to satisfy their curiosity for those objects. In addition, they may confuse marine litter with food. Most fish with ingested litter were found in the defined coral area, indicating that this sensitive environment needs more protection. The HCMR research team are currently working on ROV video material from the same area to see if the coral area observations are confirmed.



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Antipatharian coral on unstable slope sediment/rock



*Plesionika* spp shrimps



*Helicolenus dactylopterus* (blackbelly rosefish)

18 long lines were deployed, (2 different configurations were used to record as many species as possible, with hook number 6 targeting hake and hook number 9 targeting blackspot red seabream,) 9 in the coral and 9 in the non-coral area and data were recorded by hook.



Long-lining fishing vessel *Gerasimos*

Five species of coral were caught, almost all of them in the coral area, with just a few specimens of more ubiquitous *Isidella elongata* caught in the non-coral area. Twenty nine fish and elasmobranch species and 4 more invertebrate species were also caught with no differences seen in the number of species between coral and non-coral areas. However, significantly higher values were seen in the coral area for the whole catch CPUE and for some species CPUE and population and biological parameters. Cold water coral habitat seemed to be important for the Eastern Ionian Sea fish assemblage or at least for some particular species.

A questionnaire survey of local fishermen provided additional information on commercial fisheries and coral potential interactions by gear type and target species as well as species, areas and frequency of coral by-catch with *Isidella elongata* and *Leiopathes glaberrima*, reported as the most

frequently caught in gill nets and longlines.

Different aspects of this work have been presented at the Biodiversity World Conference in 11/2011 in Aberdeen and the Annual CoralFISH meeting in 11/11 in Crete (where participants enjoyed good conference facilities, sunny warm weather and a social event featuring a live local music performance by the famous Xylouris family lute players and singers). More CoralFISH work will be shown at the 12th session of the Sub-Committee on Marine Environment and Ecosystems, FAO HQs Rome January 2012, 5th International Deep Sea Coral Symposium in April 2012 and the World Fisheries Conference in May 2012 in Edinburgh.



Deep sea fish and coral by-catch



Left to right: gut contents; weighing stomach contents; analysis of gut contents



## ODEMM: Options for Delivering Ecosystem Based Marine Management



The FP7 ODEMM project aims to develop a set of fully-costed ecosystem BASED management (EBM) options that would deliver the objectives of the Marine Strategy Framework Directive (MSFD), the Habitats Directive and others.

ODEMM aims to look at the barriers to successful implementation of key EU directives that support EBM and the sustainable use of Europe's seas and to develop scientifically-based operational procedures needed to both overcome the barriers and allow for a step by step transition from the current fragmented system to fully integrated marine management. HCMR's Nadia Papadopoulou, who is also a key researcher in CoralFISH, is a WP leader in ODEMM.

ODEMM's First 6 Deliverables and Tools are now available at [www.liv.ac.uk/odemm](http://www.liv.ac.uk/odemm) under Outputs (see: Project Deliverables, Guidance documents, Publications and Data and Supporting Information)

**Deliverable 1** "Sustainable Use of European Seas and the role of the MSFD" presents the outcomes of an extensive literature review on status, trends, pressures and impacts in the NE Atlantic, the Baltic, Black and Mediterranean Seas. The applicability of available information to Good Environmental Status assessments is shown in Deliverable 1 for each of the 11 MSFD descriptors.

The ODEMM Pressure Assessment is a new tool evaluating threat to ecological characteristics from human activities and its application in Deliverable 1 shows the sector/pressure combinations that currently pose the greatest threat to marine habitats in European Seas.

The legislative history of MSFD, new regulatory features, governance issues, sectoral and non-industry stakeholder dilemmas, implementation challenges and institutional ambiguity are the focus of 4 new papers (**Deliverables 2-4**).

The ODEMM Risk Assessment is a new tool assessing the current level of departure from GES and the likelihood of failure to achieve GES using status and trends information, regional experts



*(Continued from page 1; CoralFISH SME Success Story)*

vessels. This would have the effect of reducing over capacity in the European fishing fleet while providing the means for fishermen to still earn a living going to sea.

In fact, CoralFISH already provides a ready made 'success story' with regards this type of transition! Our fishing industry (SME) partner, Paddy O'Malley of O'Malley Fisheries, following exposure to the detailed mapping undertaken in the project by our scientific partners at our first Science Meeting in 2009, took the courageous decision to change business. O'Malley Fisheries has become M.S.V. Maritime International Ltd., and during the past 18 months has secured a number of contracts to provide supply or chase vessels during major seismic surveys in areas of the Mediterranean and off Africa where fishing activity takes place. Buoyed by this initial success, Mr. O'Malley is hoping to grow his fleet to meet the increasing demand for this type of service.

The synergies are obvious. Ex-fishermen have the requisite levels of seamanship, are habituated to long spells at sea, are practised at spotting deployed fishing gears, and also have a fundamental understanding of fisher behaviour and communications. They are thus ideally placed to help resolve any conflicts that may arise between seismic and fishing operations.

and an evaluation of impacts assessed against pre-defined definitions of GES and categorical risk criteria (**Deliverable 5**).

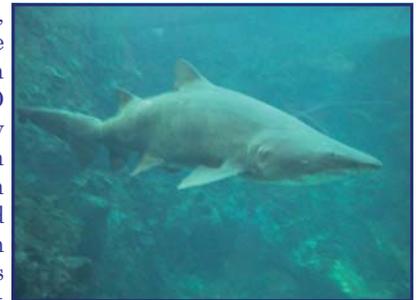
**Deliverable 6** reviews main policy frameworks and



ODEMM, CretAquarium, June 2010

regionally specific operational objectives relevant to high level objectives set out by MSFD, with emphasis on those assessed as being at high risk of failure for their region.

By DG ENV invitation, ODEMM work will be presented at the 6th meeting of the MSFD Marine Strategy Coordination Group on 22 February 2012 in Brussels. New and ongoing work on Management options and management strategy evaluation, Risk and Cost-Benefit analyses (WP4-6), are now at the top of the agenda and the focus of the most recent ODEMM meeting hosted by HCMR in Heraklion, Crete on 27 February 2012.



ODEMM returned to CretAquarium in February 2012.

# Mid-Atlantic deep-sea habitat mapping: mining for gems in dusty archives

In the article below, Fernando Tempera (IMAR/DOP-UAz), describes trawling through archival material, some of it dating back almost half a century, to extend our knowledge of the deep sea.

Portugal's marine jurisdiction around the Azores archipelago currently encompasses an EEZ of almost 1 million km<sup>2</sup> and a claimed continental shelf extension that extends Portuguese sovereignty to approximately twice this value.

This topographically-rich region of the ocean floor is thought to hold a mosaic of deep-sea environments inhabited by sensitive habitat-building species. However, scarce literature is currently available concerning the circalittoral, bathyal and abyssal epibenthic biological assemblages encountered outside the minute hydrothermal vent fields. The effort to catalogue, characterize and map these biotopes, particularly those representing vulnerable marine ecosystems (VMEs), has therefore become a priority for ongoing European-wide programmes focusing on habitat mapping (e.g., CoralFISH, HERMIONE, MeshAtlantic), and the European efforts to classify them hierarchically (EUNIS).

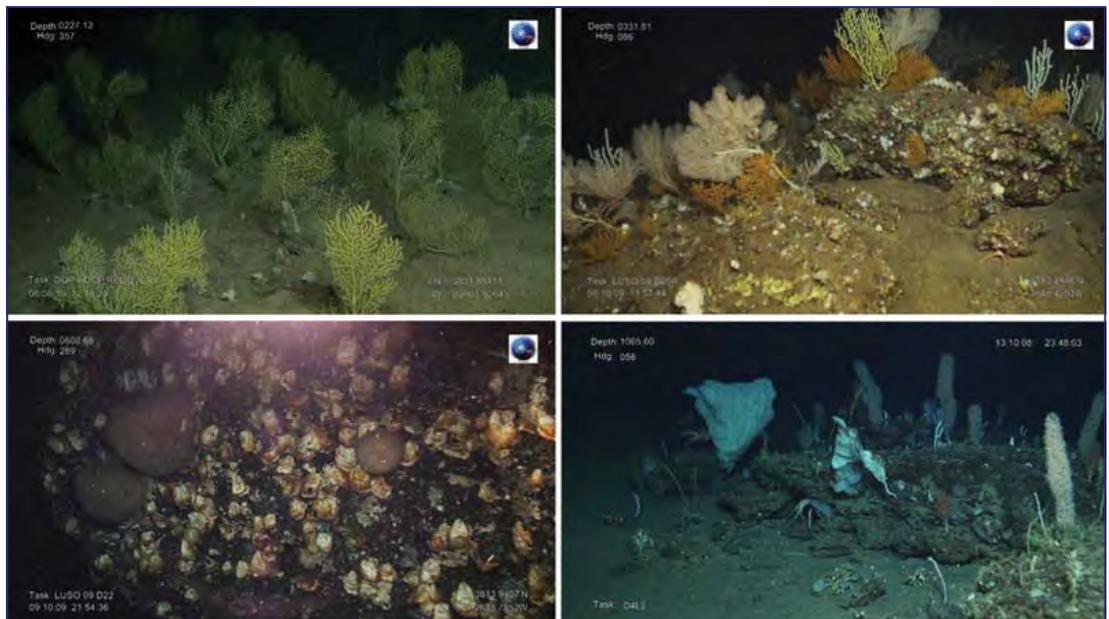
In view of this, a review of deep-water surveys conducted over the past 40 years in the Azores EEZ is ongoing. Archives held at the IMAR – Institute of Marine Research, University of the Azores (DOP-UAz) and the Portuguese Task-Force for the Extension of the Continental Shelf (EMEPC/EMAM) already revealed 37 distinct deep-sea

epibenthic facies dominated by a variety of organisms (corals, sponges, bivalves, ascidians, brachiopods, crinoids, sea-urchins, anemones and holothurians). Occurring from shelf breaks at 150m depth down to abyssal plains exceeding 3,000m depth, many of them typified biotopes of conservation importance such as coral gardens, scleractinian reefs, deep-sea sponge aggregations and hydrothermal vents fields. Seventy per cent of these biotopes were found to overlap with the present depth range of commercial bottom fisheries in the region (50 to 1000m) and likely receive some degree of direct physical impact by bottom-tending fishing gear.

Revisiting large biological datasets such as those produced by the Prince Albert I of Monaco campaigns or the extensive imagery archives held in a selection of European and North-

American institutes is considered a natural and cost-effective part of the work to understand deep-sea patterns in the Azores region. After all, nearly 120 years of benthic sampling and four decades of widespread optically-based research are available for re-examination with the benefit of novel perspectives and accumulated knowledge.

Old does not always mean useless. As a matter of fact, back in the dawn of manned submersibles and towed cameras, exploring





geomorphological contexts as diverse as possible was very much the order of the day. Locations spread over abyssal plains, island slopes, seamounts and a variety mid-Atlantic ridge segments were visited much more than in the last two decades, when optically-based deep-sea platforms in the Azores diverted predominantly to the hydrothermal vent fields.

**Acknowledgements:** The author was funded by an EGIDE scientific fellowship grant (ref. 736169F) for his work at IFREMER (Brest) and the Centre d'Océanologie de Marseille, where he received vital and kind support from a series of people too extensive to list in such a short note.

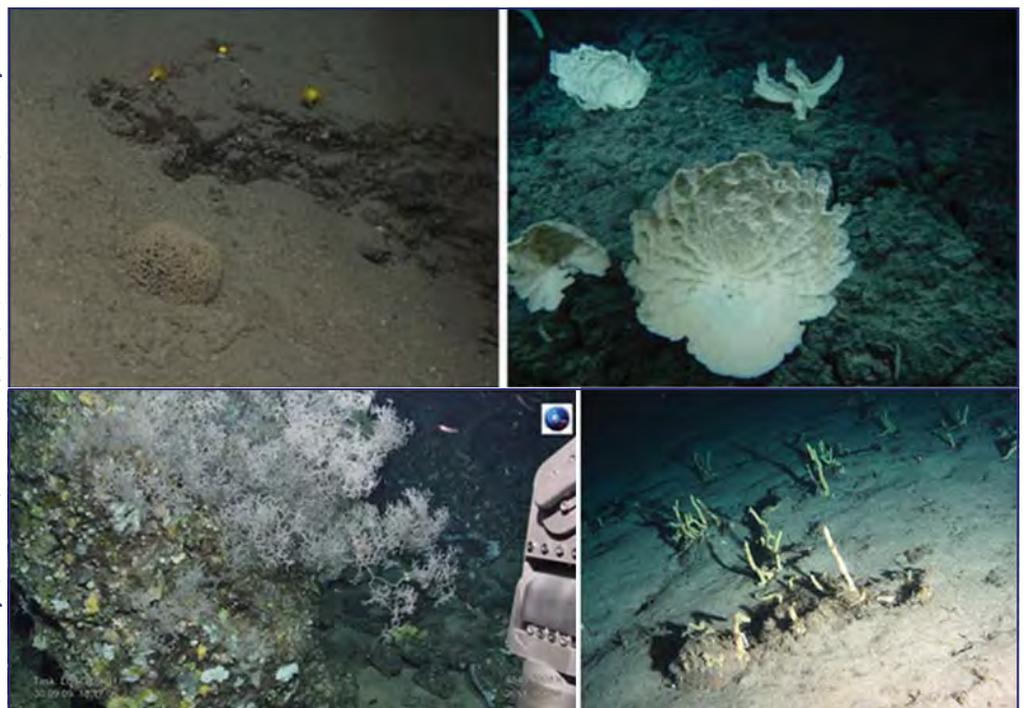


Even old discoloured slides from the late 1960's and fuzzy VHS footage from the early 1990's were found to encase authentic gems for deep-sea habitat inventorying and mapping. The recent review of a selection of archives at IFREMER and the Centre d'Océanologie de Marseille (COM), for instance, permitted adding 12 new facies to the catalogue of deep-sea epibenthic assemblages of the Azores as well as 190 new occurrences of biotopes of conservation importance.

**All images:** Examples of deep-sea facies found in the Azores

(Image credits: EMAM; IMAR/DOP-UAz; GreenPeace ©Gavin Newman; SEAHMA)

As interests grow to exploit fishery and seafloor resources in new areas and depth ranges, the investment made by projects like CoralFISH in a broader deep-sea exploration arises evermore necessary. But in times of financial scarcity, it is also true that revisiting historical archives may often provide cheap, though valuable, ground-truthing information. And, in a world where finding factual baseline conditions is getting harder and harder, this may actually represent the only means to obtain glimpses of pristine deep-sea grounds.



## Coral predictive habitat maps used in EBSA identification

In September 2011, members of CoralFISH were invited to participate in first workshop on the identification of Ecologically or Biologically Significant marine Areas (EBSA). The meeting was organised by the OSPAR Commission and the North-East Atlantic Fisheries Commission in conjunction with the Secretariat of the Convention on Biological Diversity. The purpose was to identify areas in the high seas of the North East Atlantic that represent important habitats and biological diversity based on scientific criteria.

The meeting was informed by the research of delegates. An important part of the meeting was the examination of distributions maps of the region to identify areas of importance for keystone species. CoralFISH partner Chris Yesson of Zoological Society of London provided detailed distribution estimates of cold water corals, based on his collaborative research for CoralFISH. Some of this work has just been published in the *Journal of Biogeography*<sup>1</sup> and demonstrates the global importance of the North East Atlantic for octocorals (Yesson et al, 2012). An important area in the NE Atlantic is that covered by the Hatton and Rockall Banks and the Hatton-Rockall Basin. This area was proposed as an EBSA because they represent unique bathyal habitats (200-3,000m), constituting a prominent feature of the NE Atlantic continental margin between Greenland and Scotland. It was agreed that these banks and slopes present high habit

at diversity, supporting an array of benthic and pelagic fauna, as well as being significant fishing areas.

This is one of many areas proposed as a Ecologically or Biologically Significant Area. Groups of delegates produced reports supporting the claims for EBSA status, and at present these reports are under consideration.

Update: On 17<sup>th</sup> February 2012, the Josephine Seamount was designated the first area to be added to the EBSA registry (<http://ebsa.cbd.int>).

<sup>1</sup>Yesson C, Taylor ML, Tittensor DP, Davies AJ, Guinotte J, Baco A, Black J, Hall-Spencer JM & Rogers AD (2012) Global habitat suitability of cold-water octocorals. *Journal of Biogeography*. (doi:10.1111/j.1365-2699.2011.02681.x)



Website used by delegates to view species distribution data, including CoralFISH partners' collaborative research estimating cold water coral locations.

## Enhancing coral identification skills for imagery ground-truthing



Examination of the morphological characters of a plexaurid gorgonian of the genus *Placogorgia*. From left to right: Brigitte Guillaumont, Inge van den Beld, Selmane Sakher, Andreia Braga Henriques and Jaime Davies.

A workshop on deep-sea octocoral taxonomy was organized by CoralFISH researchers Brigitte Guillaumont, Jaime Davies and Inge van den Beld at IFREMER, Centre of Brest, on the 6th-17th February 2012. Since the start of CoralFISH, this team have been dedicated to the characterisation of coral habitats in the Bay of Biscay using video analysis, together with the creation of a reference collection comprising corals collected both recently and from historical expeditions.

The material examined in this workshop was mainly collected last summer during the BobEco cruise to the Bay of Biscay and west coast of Ireland, onboard the research vessel Pourquoi Pas? using the ROV Victor 6000. Voucher specimens were identified to validate video annotation and elaborate a comprehensive list of the species recorded in the Bay of Biscay. Moreover, this information will contribute to the next workshop "Identification of deep-sea corals from imagery data" organised by Jaime Davies and Inge Van den Beld in Amsterdam and to an ongoing project coordinated by Jaime Davies and sponsored by IFREMER, in collaboration with NOAA and the University of Plymouth, which will create an annotated

catalogue of deep-sea species from the NE Atlantic.

The taxonomic sessions counted on the expertise of CoralFISH PhD student Andreia Braga Henriques (IMAR-DOP, University of the Azores), who provided an introduction to fundamental morphological differences at the family and genus levels, and also a demonstration of the techniques used in the preparation of sclerites for light and scanning electron microscopy, as well as slide reading. Although octocoral taxonomy is difficult and very time consuming, the six most representative families were covered: Acanthogorgiidae, Chrysogorgiidae, Isididae, Paragorgiidae, Plexauridae and Primnoidae. At least two new records for the Bay of Biscay were so far recorded, but it became clear throughout the workshop that there are many corals of uncertain taxonomic status that need to be addressed in the future taxonomic work.



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