



Layman's Report

Research for the conservation
of reefs and sea caves in Malta



BASIC PROJECT INFORMATION

Project Name:

LIFE BaHAR for N2K - Life+ Benthic Habitat Research for Marine Natura 2000 Site Designation
LIFE12 NAT/MT/000845

Duration:

October 2013 - June 2018

Coordinating Beneficiary:

Environment & Resources Authority, Malta

**Associated Beneficiaries:**

- Ministry for the Environment, Sustainable Development and Climate Change, Malta
- Department of Fisheries and Aquaculture within the Ministry for the Environment, Sustainable Development and Climate Change, Malta
- University of Malta - Department of Biology, Malta
- Fundación Oceana, Spain



Project Budget: €2,612,810

EU financial contribution: €1,306,405 (50%) co-financed by the EU LIFE+ Funding Programme

Partners' contribution: €1,306,405 (50%)



The LIFE programme is the EU's funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value.

All pictures used in this report are results of the LIFE BaHAR for N2K project
Underwater photos from SCUBA dives: OCEANA / Carlos Minguell © LIFE BaHAR for N2K
Above water pictures from pages 2, 14, 16, 17, 19, 37 and 39:
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Underwater footage from the Remotely Operated Vehicle (deep-sea images):
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BACKGROUND OF THE LIFE BAĦAR FOR N2K PROJECT

The Natura 2000 network of protected areas aims to ensure the long term survival of Europe's most valuable and threatened habitats and species, on land and at sea, through sustainable ecological and economical management. This is in view that marine habitats are vulnerable to human influences, and require protection in order to safeguard the biodiversity they sustain and to increase their resilience to the various pressures and threats.

At the start of the project in 2013 there were five marine protected areas (MPAs) in Malta, covering ca. 190 km². These MPAs, which are part of the Natura 2000 network, were mainly based on the presence of the sea grass *Posidonia oceanica* and the endemic Maltese top-shell, *Gibbula nivos*a.

There are of course other marine habitats and species present in Maltese waters that merit protection. However, scientific information on which areas are important for these other species and habitats was very limited, and insufficient for identifying and designating appropriate Natura 2000 sites. The LIFE BaĦAR for N2K project was developed to address this knowledge gap for three important marine habitats: reefs, sea caves and sandbanks.

In parallel, two other projects - LIFE+ Migrate and LIFE+ Malta Seabirds - were carried out to identify areas for the protection of important marine species.



WHAT IS NATURA 2000?

Natura 2000 is a network of protected areas across the European Union, aiming to protect animals, plants and habitats that are endangered, rare or found only in certain areas and which therefore are considered to be of "Community importance." A list of relevant habitats and species is incorporated in European nature law - namely the Habitats Directive and the Birds Directive.

What is a “habitat”?

The physical space we occupy, where we go about our daily lives, be it our home, place of work, the local food store or market, is our habitat. All species on earth need a habitat to survive, to call it their home, where they can find shelter, food, and mates to reproduce. Without a habitat, species would not be able to survive. Thus, in order to protect species from extinction, efforts need to be made so that the habitats that they live in are protected, and hence maintained or restored.

REEFS

There are two different types of reefs - biogenic and geogenic reefs. Biogenic reefs

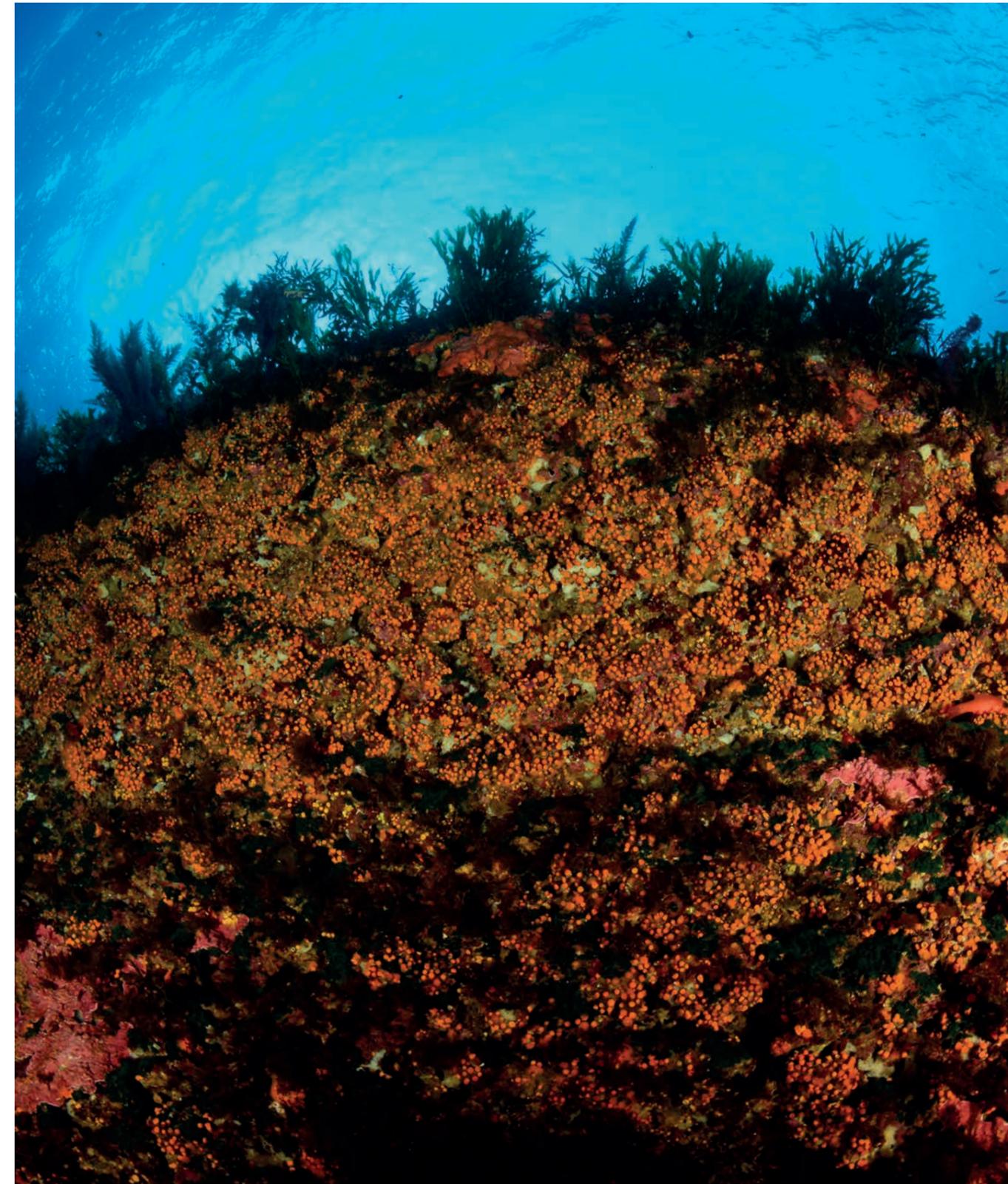
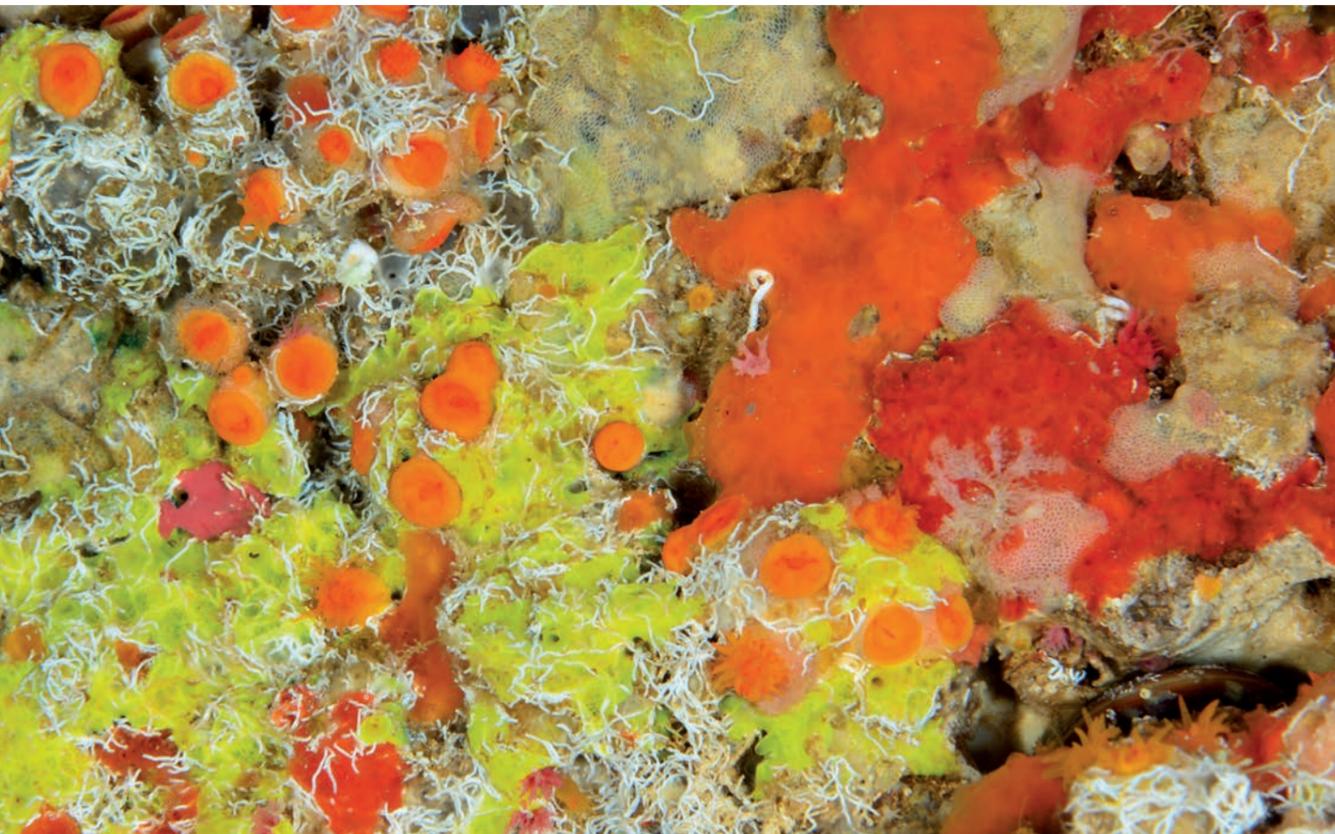
are concretions formed from dead or living organisms, which provide a surface where other species can live. Geogenic reefs are made of geological features, such as boulders or rocks that often create a three dimensional structure. Both types can co-occur and can be found in shallow and deep-sea areas.

Geogenic reefs

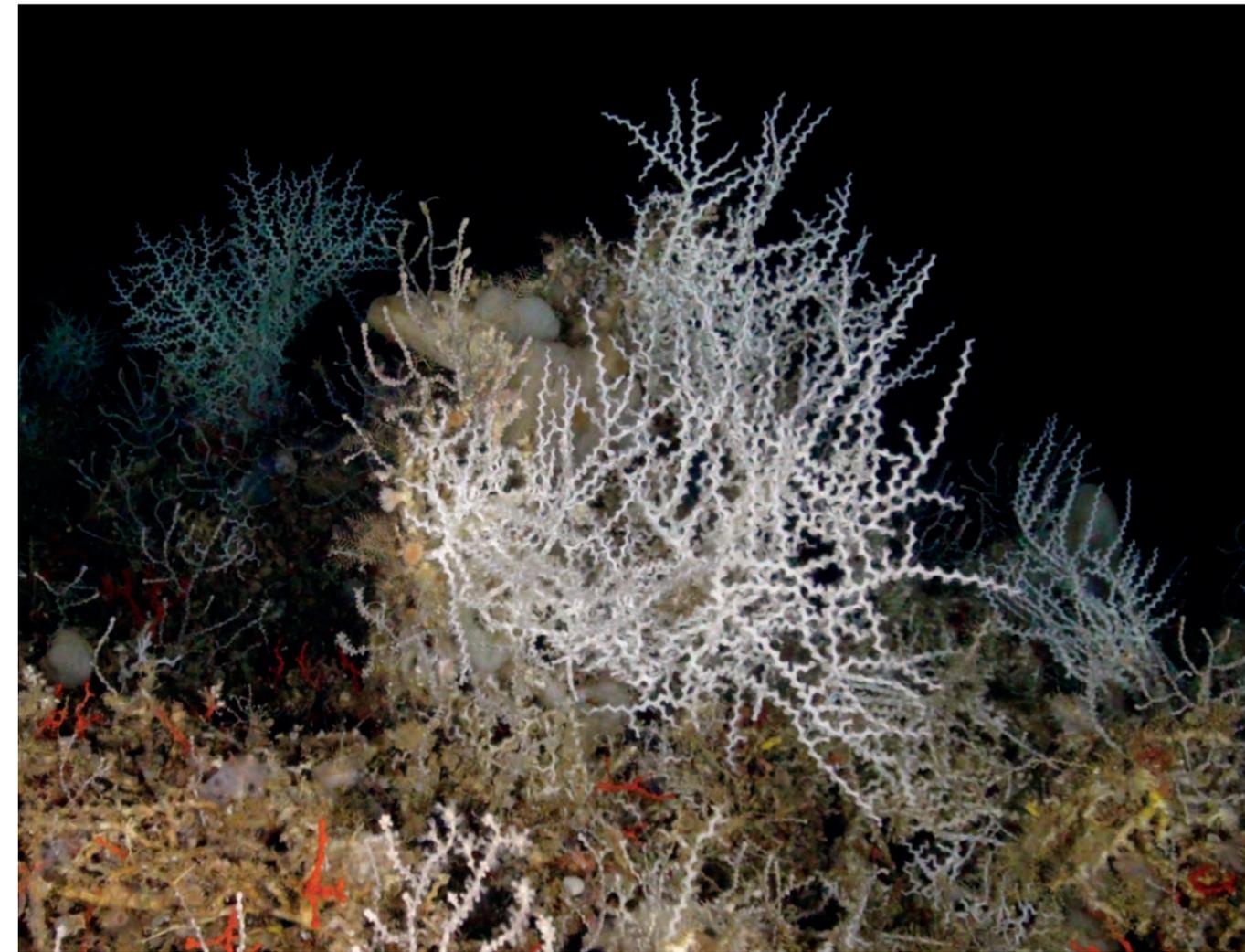
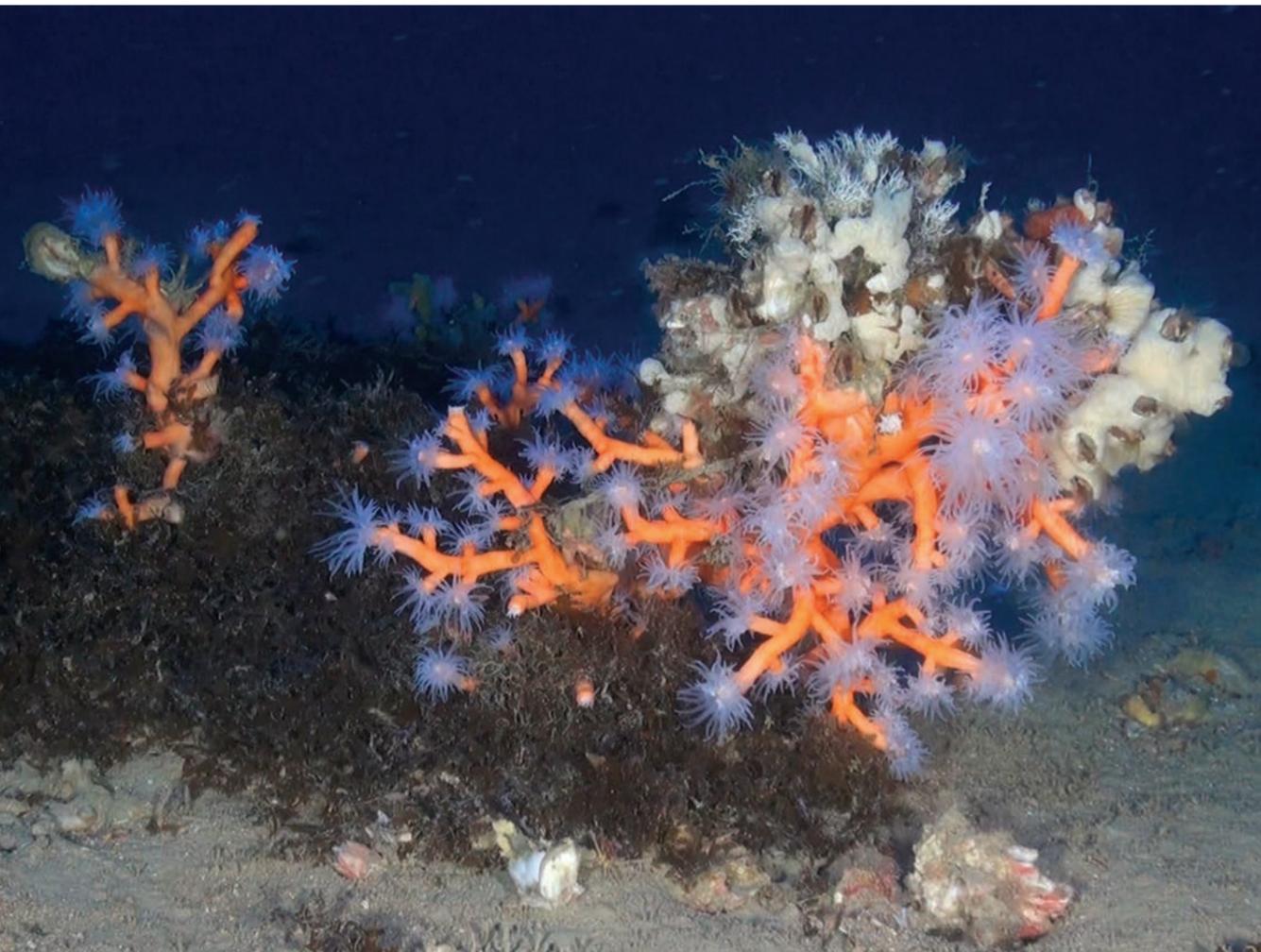
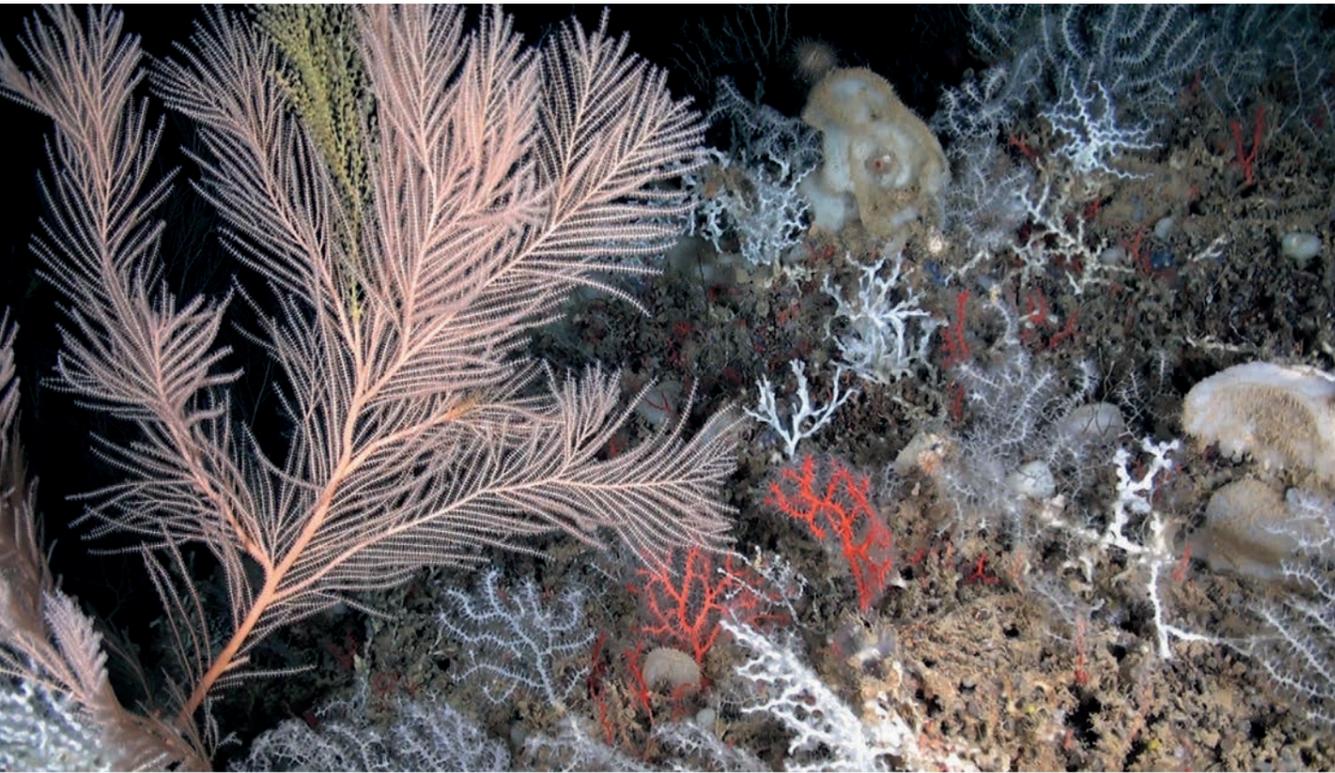
There are a variety of geogenic reefs, including the following:

- Vertical rock walls (the underwater part of coastal cliffs)
- Sheer or stepped drop-offs (underwater cliffs)
- Rocky shoals
- Boulder fields

In deeper waters, geogenic reefs may take the form of escarpments and seamounts.



Reefs are an important habitat that is protected under several legal instruments. Reefs host a variety of different species, including for example corals, sponges, molluscs, crustaceans and fish.

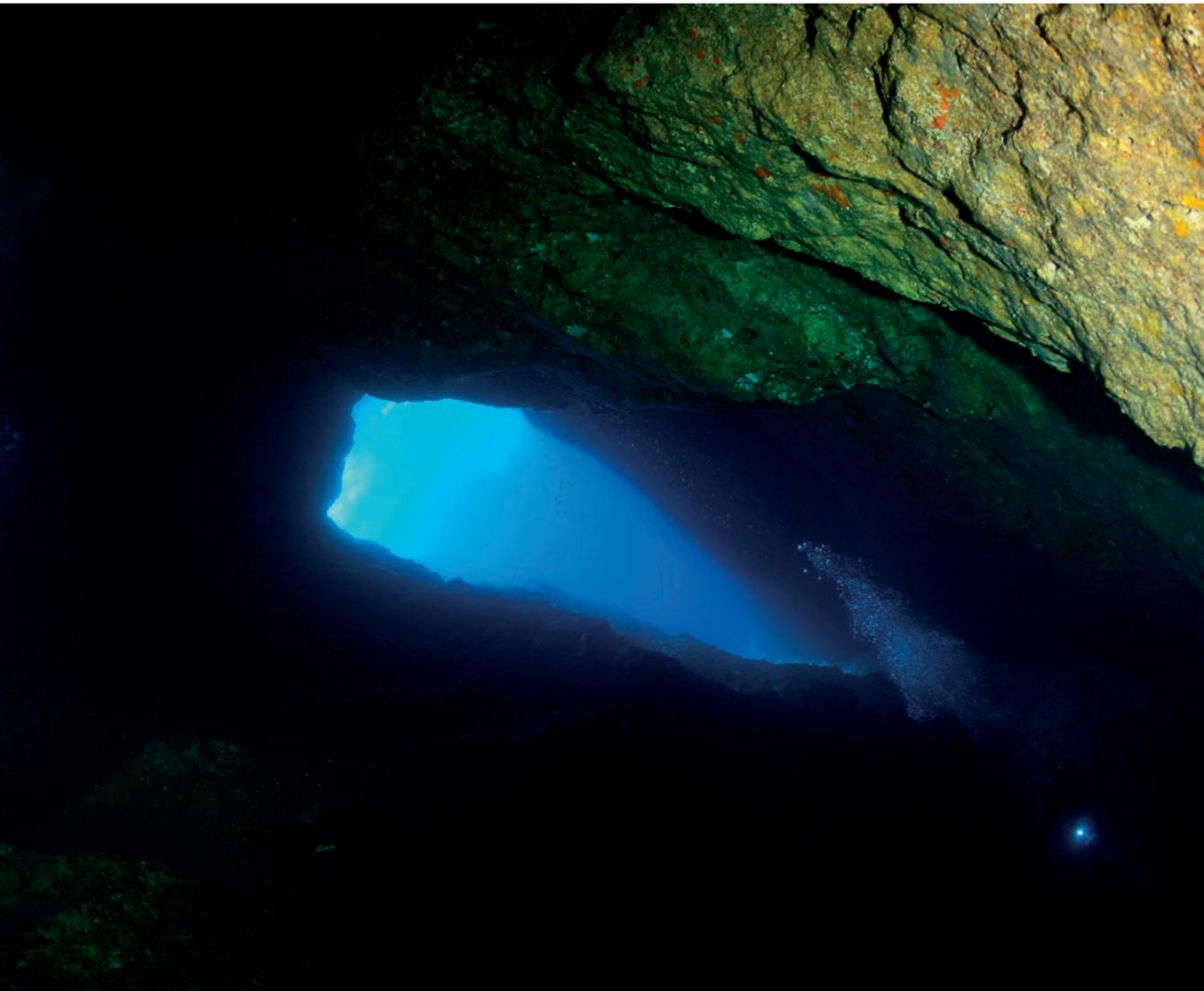


Biogenic reefs in the deep

There are several reef-forming species of cold-water corals that secrete calcium-carbonate, forming a hard skeleton. Cold-water corals are found at depths ranging from 50 m to 2000 m and grow very slowly. Although many cold-water coral frameworks are likely to be very old, the biodiversity present in such deep water habitats has only started to be investigated in the last few decades due to the development of advanced technology. The biodiversity of these reefs can easily compete in terms of their species richness with their well-known relatives – the shallow water tropical coral reefs.

MARINE CAVES

Underwater caves are home to a variety of species, some of which can only be found in caves. Interestingly, the composition of species assemblages can change within a single cave due to differences in light availability and water flow. Other factors that contribute to the type of species present relate to temperature changes, presence of salinity gradients (haloclines) in caves with freshwater seepage, presence of particular geomorphologic features, and the type of cave floor which may be sediment or rock.

**SANDBANKS**

Sandbanks are permanently submerged raised banks mainly composed of sandy sediments, but sometimes also of boulders, cobbles, mud and other sediments of varying grain sizes, surrounded by deeper water. Sandbanks form elevated, elongated, rounded or irregular topographic features which play an important part in beach dynamics, wherein sandbanks act as a sand storage mostly during the winter season.



AIM OF THE PROJECT

Reefs, sea caves and sandbanks are listed in Annex I of the Habitats Directive, which means their importance is recognised through European Union legislation and Member States are required to designate sites for their protection.

Information on the location and state of these habitats in Maltese waters was patchy for areas close to the coast, and generally scarce for areas far from shore. This was mainly due to the specialised skills, advanced technology and pertaining costs that are needed to explore marine habitats, especially in deep waters.

The main purpose of the project was therefore to fill existing data gaps and identify areas within Maltese waters supporting the three marine habitats previously described. The area of study was Malta's Fisheries Management Zone (FMZ) which extends up to 25 nautical miles from the Maltese Islands' coastline.

The project also aimed to increase public awareness and inform, as well as involve, stakeholders in the process leading to the identification of the new MPAs.

Overall, the project had the following aims:

- Identify and fill knowledge gaps on the presence of reefs, sea caves and sandbanks in Maltese waters
- Establish new areas for protection of these habitats and establish site conservation objectives
- Involve and inform stakeholders throughout the project
- Increase awareness on marine habitats and the Natura 2000 network

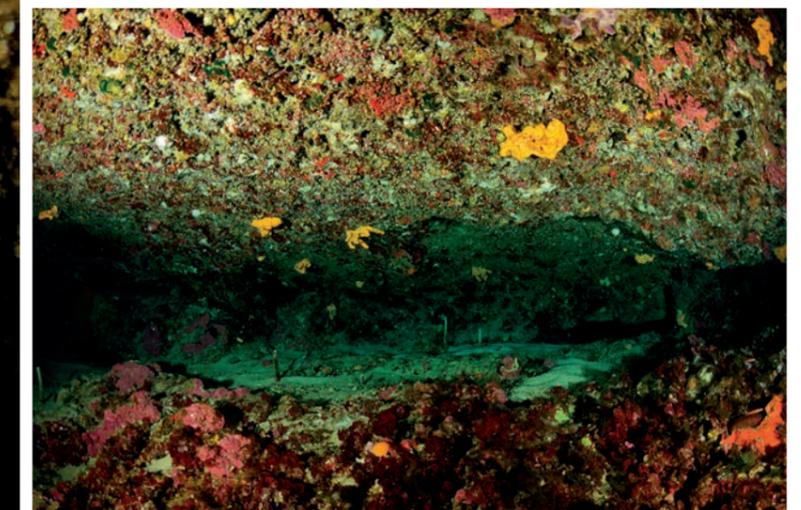
The project focussed on three different aspects:

- Collecting and analysing scientific data
- Promoting the project and raising awareness
- Day-to-day management and administration of project activities

COLLECTION AND ANALYSIS OF SCIENTIFIC DATA

The collection and analysis of scientific data included the following actions:

1. Collection and evaluation of existing data on reefs, caves and sandbanks.
2. Collection of data during marine surveys using SCUBA diving equipment as well as a remotely operated underwater vehicle (ROV) to depths of 1 km below the sea surface.
3. Collection of bathymetry (seabed profile) data and characterisation of the seafloor using a multibeam echo-sounder system and samples collected from the seafloor.
4. Proposing areas for protection based on the analysis of all the data collected.

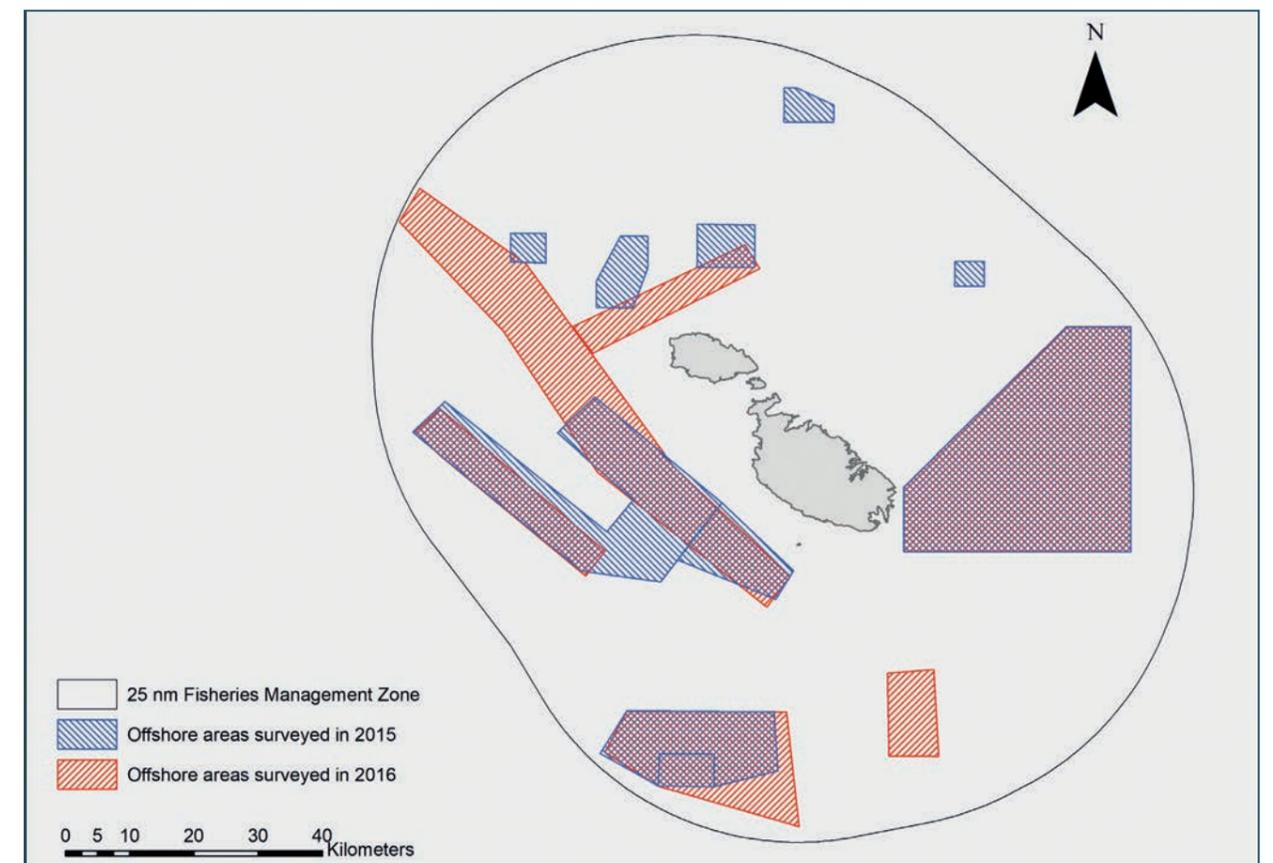
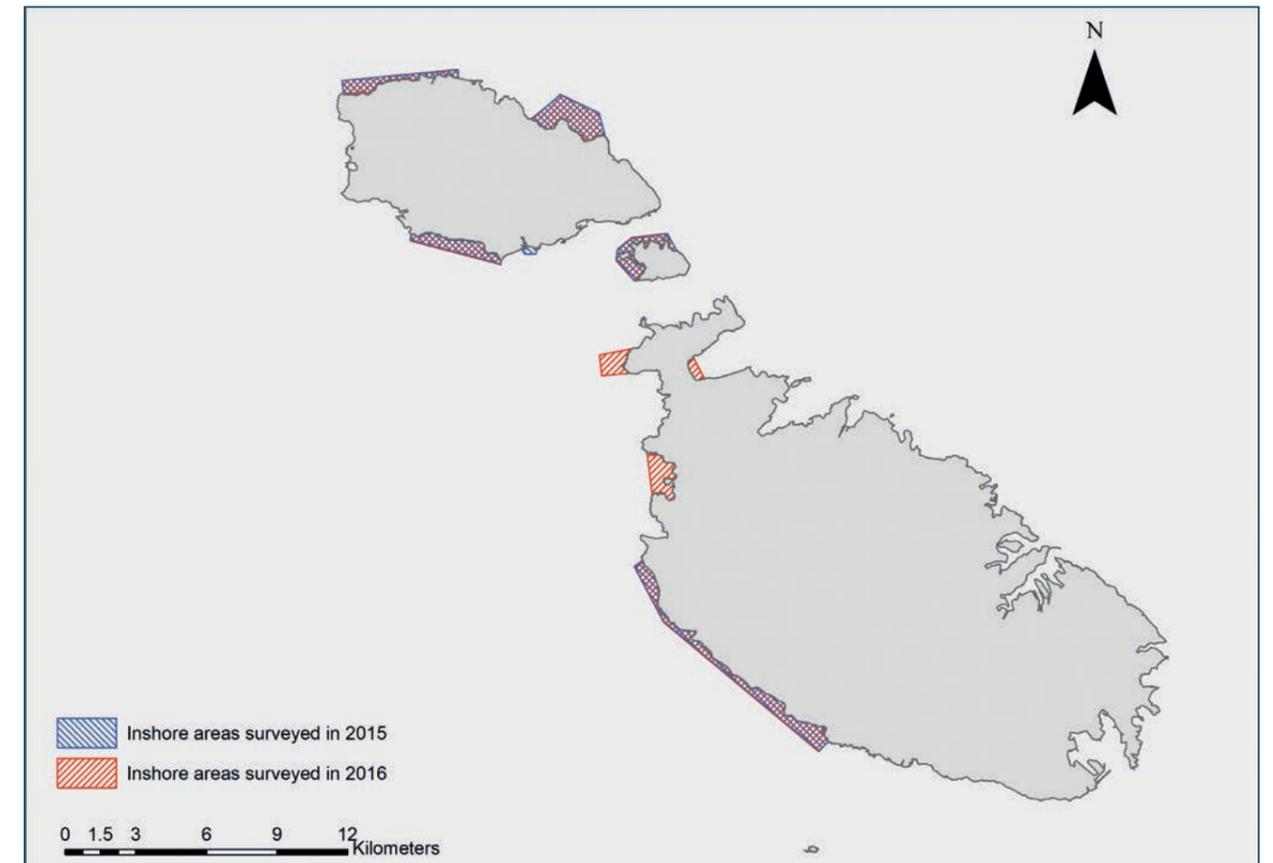


IDENTIFYING AREAS TO BE INVESTIGATED

Based on the initial evaluation of existing information on bathymetry and marine habitats in Maltese waters, the project team identified a number of “priority survey areas”, where the habitats of interest were most likely to be present.

Whilst some information was available for the coastal priority survey areas, the offshore sites within Malta’s FMZ were mostly unexplored.

For the first round of surveys conducted in 2015, 13 inshore and 13 offshore priority survey areas were identified; of these, 6 inshore and 10 offshore areas were surveyed, shown in blue shading. In 2016 the priority survey areas were adjusted to concentrate on 8 inshore and 6 offshore areas, shown in red shading.



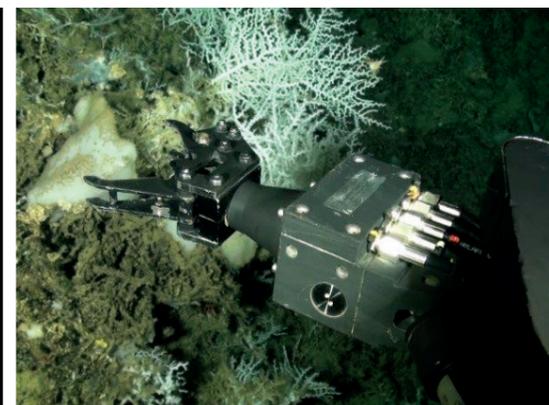


**EXPLORING THE MALTESE SEA -
LIFE BAHAR SURVEYS**

Habitat Surveys

During the summer months of June and July, in 2015 and 2016, two expeditions were carried out to gather information on shallow and deep-water bottom habitats found in the Malta's FMZ, involving more than 100 days at sea.

The at-sea campaigns were carried out on board the research vessel Oceana Ranger, a ketch catamaran with thirteen crew members. In the first campaign, underwater video footage of the seabed was recorded during 94 ROV transects, 9 within the preselected inshore areas, and 85 in the offshore zones. This campaign also included 12 SCUBA dives. During the second expedition, ROV footage of offshore deep-sea bottom habitats was recorded during 112 transects. Videos and pictures of shallow water reef and cave habitats were taken during 30 SCUBA dives in Malta's inshore waters. The footage was then analysed in order to identify and map species of interest, with a particular focus on protected species and/or species closely associated with the habitats under study.





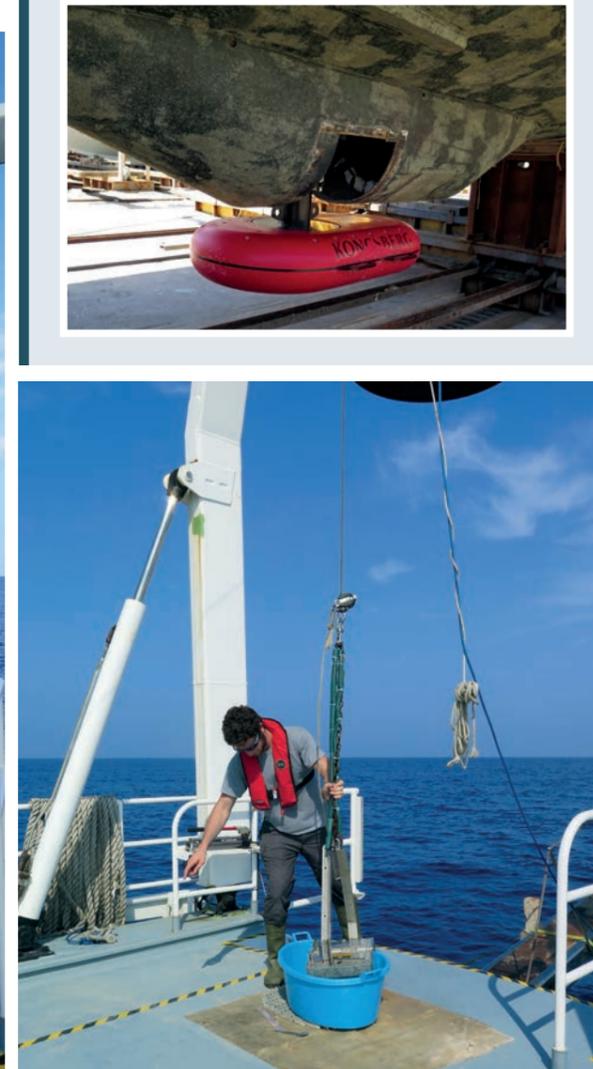
What is an “ROV”?

An ROV – short for ‘remotely operated underwater vehicle’ – is an unmanned underwater robot equipped with a camera and an extendible arm for collecting specimens; it is used to survey waters at depths that are not accessible by divers. The ROV is controlled from on-board a vessel via a cable system and transmits visuals from the camera in real time. The ROV enabled the research team to investigate reefs and locate caves at depths of down to 1000 m, and to collect biological samples.



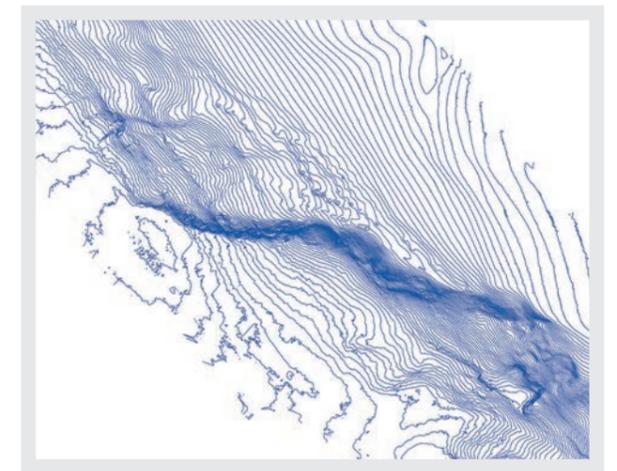
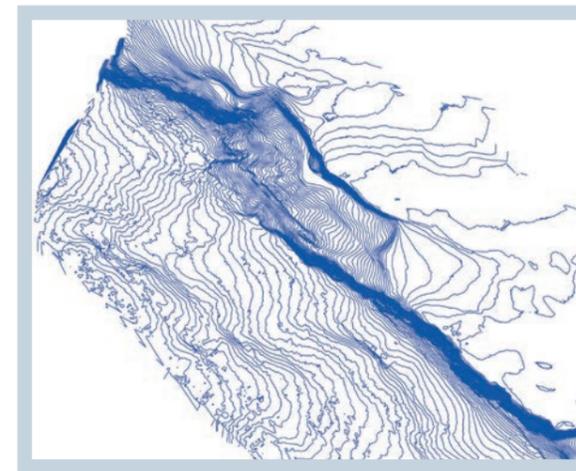
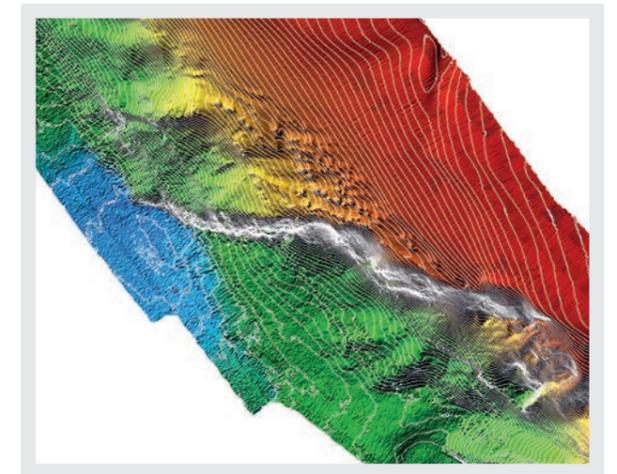
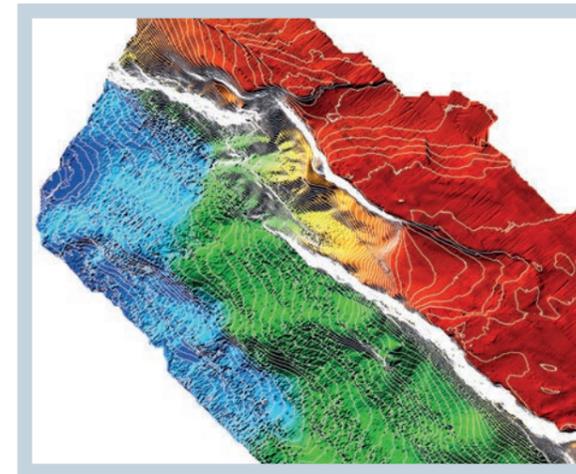
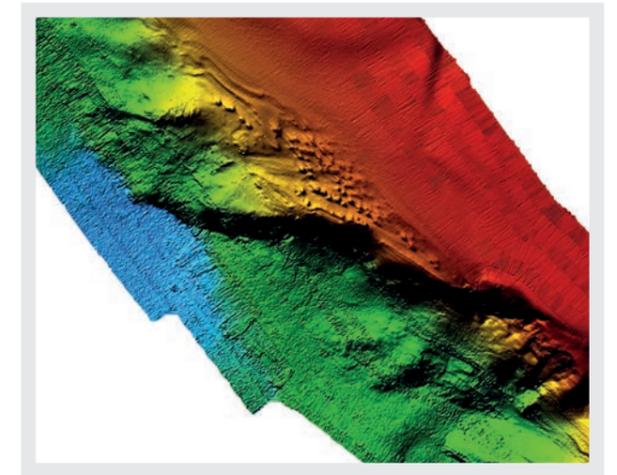
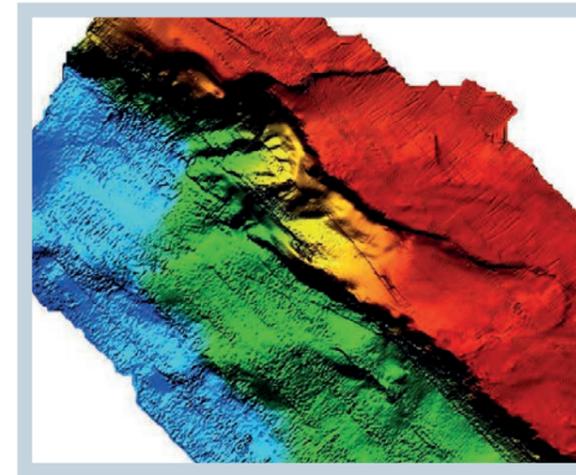
Seabed survey

In August 2016, a multibeam echosounder survey was carried out by a subcontractor following an international call for tenders. The first part of the work was a bathymetric survey, which acquired data on approximately 130,000 ha of seafloor at depths varying from 186 m to 1192 m. Once the bathymetric survey was completed, 50 sediment samples were collected from the surveyed areas. The samples were analysed in a laboratory for grain size distribution and organic carbon content, and the results were then used in combination with the multibeam data to create a map of the seabed type.



What is a “Multibeam Echosounder”?

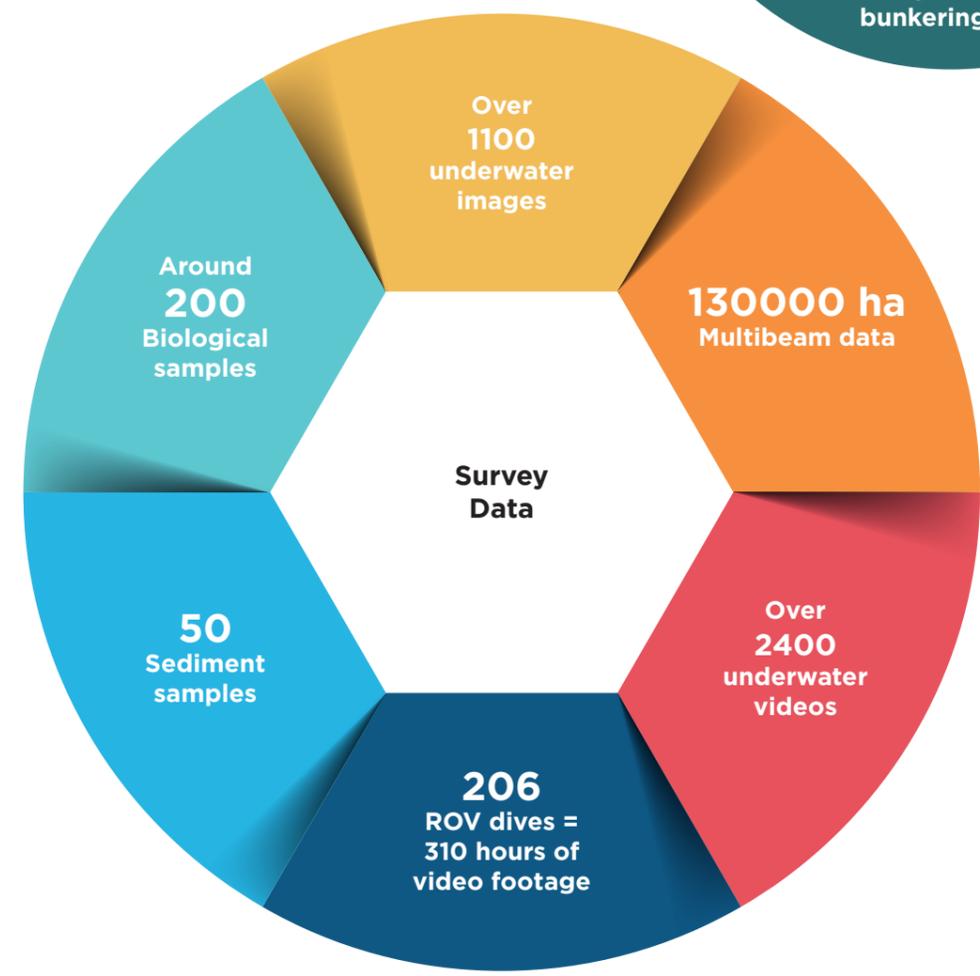
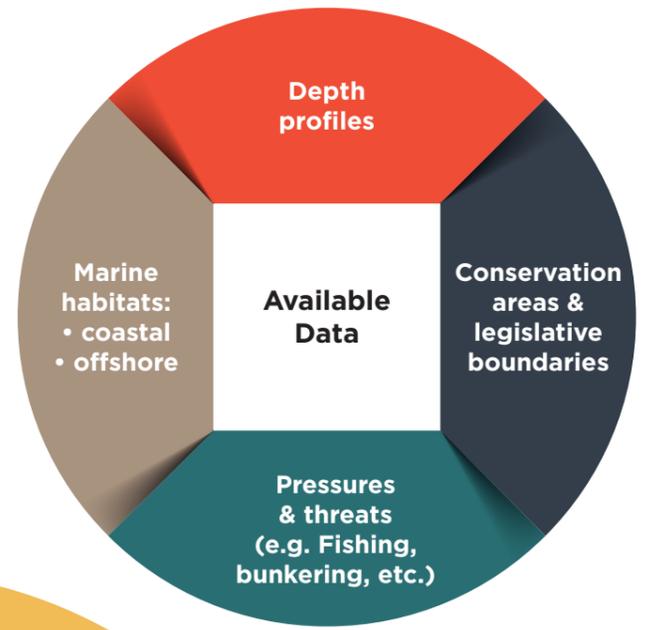
The Multibeam Echosounder is a type of underwater sonar, which uses soundwaves to map the profile of the seafloor. It is installed on the hull of a ship and maps the ocean bottom while the ship is slowly moving. The results are plotted as maps with different colours corresponding to different depths, thus revealing areas with flat bottoms as well as elevations, trenches and platforms as shown in the images opposite. This helped the project identify areas where reefs are present.





ANALYSIS OF COLLECTED DATA

All the data collected through the project were analysed in order to identify the most suitable areas to propose for protection of these important habitats, and to identify the pressures and threats to which they are exposed. The findings were mapped and made available online through a data viewer. This information was also used to develop conservation objectives for the sites. It will later also be used to develop management measures to achieve these objectives.





Reefs

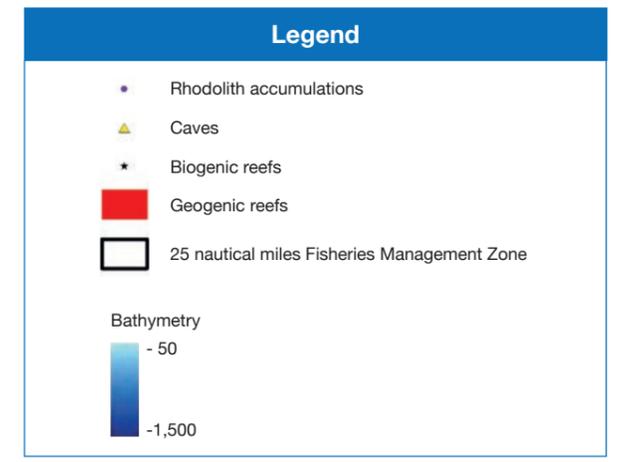
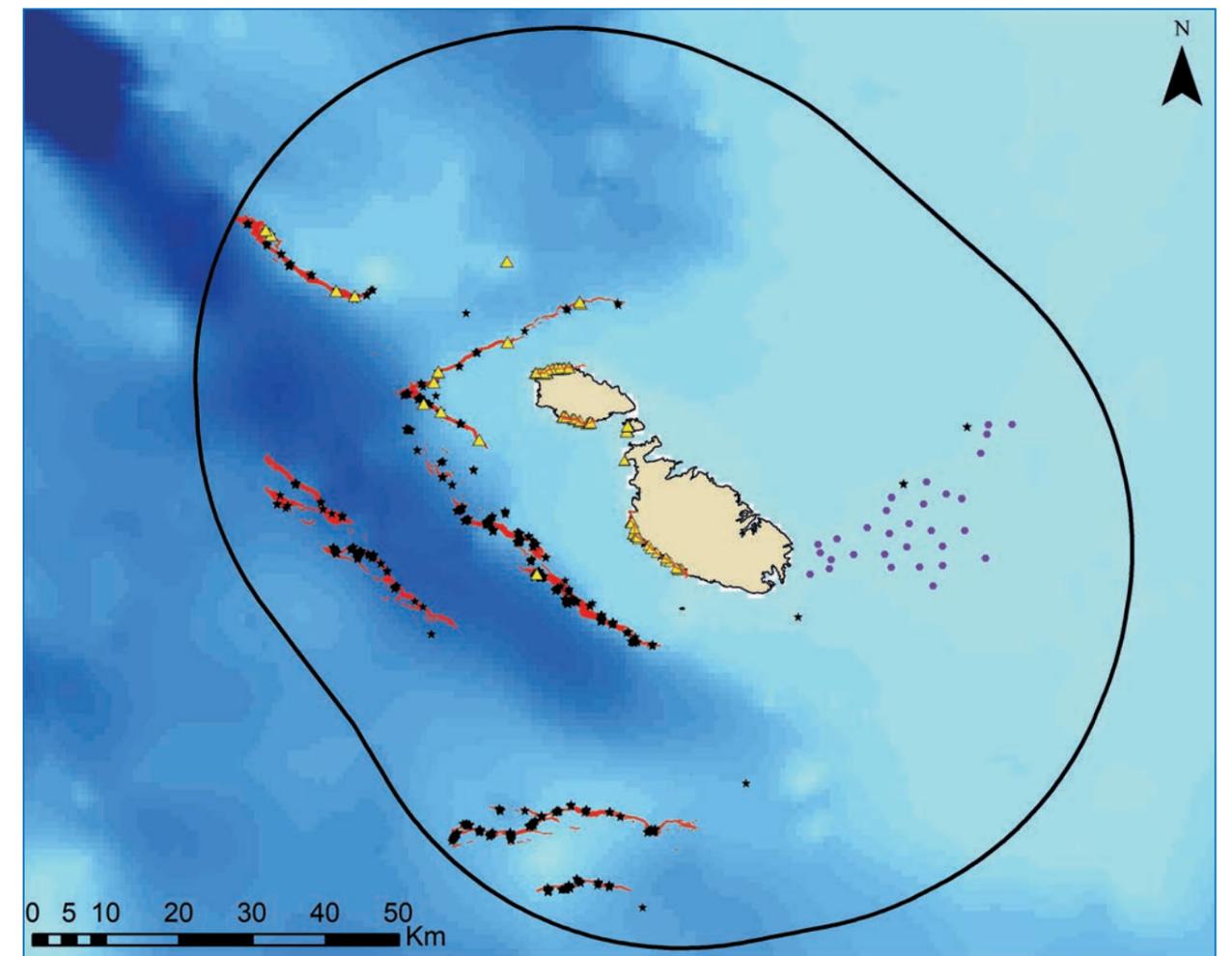
New deep-water reef areas identified, including coral frameworks and a fossilised sponge reef providing a habitat for a variety of species.

Sea Caves

In total 89 caves were surveyed of which 37 were 'emergent' caves; they all varied in shape and size.

Sandbanks

Three sandy elevations were documented and measured during the marine surveys – all located in existing MPAs. Detailed seasonal studies would be needed to confirm that these elevations are geomorphological 'sandbanks' and to demonstrate their ecological importance.





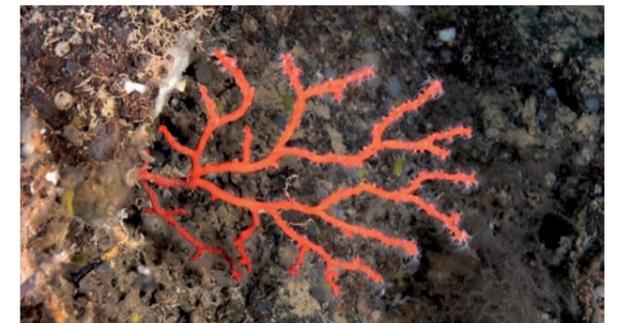
NEW DISCOVERIES

Deep-water caves

- During the ROV dives, deep-water caves were found located to the West and North-West of the Maltese Islands, with most caves located at depths of 250 m to 450 m.
- The largest deep-water cave was found at 438 m.
- The deepest cave record was 795 m.

Species

- A species of starfish, *Coronaster briareus*, with 10 - 11 arms was found, which had not been recorded in the Mediterranean before.
- A new depth record for the precious red coral *Corallium rubrum* was recorded at 1016 m.



OTHER HABITATS OF CONSERVATION INTEREST

Rhodolith accumulations

Rhodoliths are colourful, unattached nodules formed by calcareous red algae, which may take a number of different forms, ranging from compact spherical nodules to ones with twig-like branches.

Accumulations of rhodoliths, ranging from sparse nodules occurring individually to dense beds, were recorded in several sites off southeastern Malta at depths of 50 m to 100 m during the LIFE BaHAR surveys.

Bathyal muds with facies of *Funiculina quadrangularis*

All sea pens, *Funiculina quadrangularis*, were recorded on deep-sea muds in several areas, particularly on flat plains at the foot of plateaux and escarpments. The tall sea pens can grow higher than 2 m and are often found in association with other species, such as crustaceans.

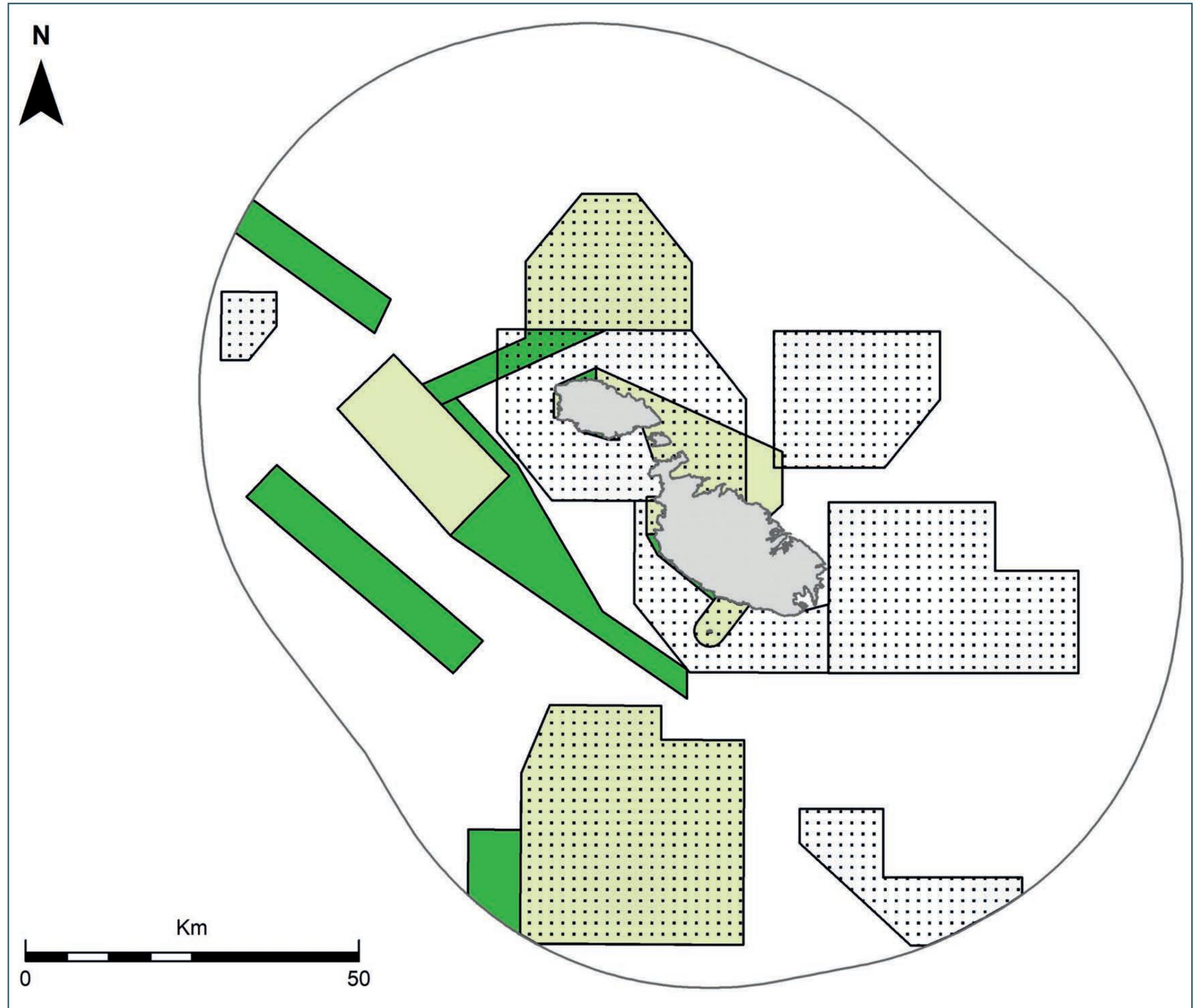


NEW MARINE PROTECTED AREAS FOR REEFS & CAVES

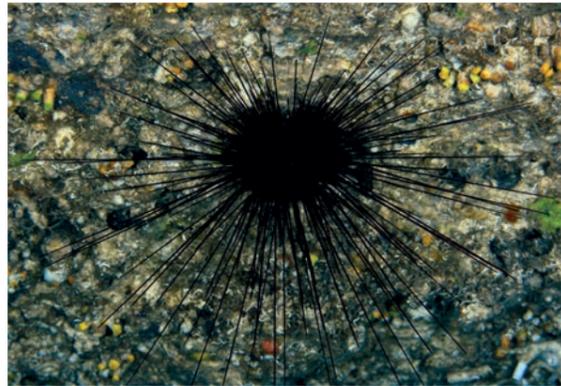
The project results led to three inshore and five offshore areas being proposed for the protection of reef and cave habitats and inclusion in the Natura 2000 network.

The three new inshore areas are extensions to the area covered by existing coastal MPAs. Two of the offshore areas are new sites, while the other three are extensions of the existing MPAs previously declared in 2016.

The new sites have led to an overall increase of protected marine area from 3487 km² (as from 2016) to 4138 km². The total protected marine area is now equivalent to more than 35% of the Maltese waters. The previous increase in 2016 was a result of nine new MPAs for the protection of seabirds, the loggerhead turtle and the bottlenose dolphin; these sites were designated as a result of LIFE Malta Seabirds and LIFE+ Migrate projects



SPECIES THAT CAN BE FOUND IN THESE AREAS



Long-spined sea urchin
Centrostephanus longispinus

Sea urchins are important grazers controlling algae growth on shallow water reefs.

The long-spined sea urchin is protected by law.



Zigzag coral
Madrepora oculata

The zigzag coral, *Madrepora oculata* is a cosmopolitan scleractinian coral species, which can be found in all oceans at depths of 50 m down to more than 1500 m.



Triton's trumpet
Charonia lampas

The Triton's trumpet is a protected marine predatory snail feeding on starfish. Its beautiful shell has been traded by humans for many years, contributing to a population decrease.



Black coral
Leiopathes glaberrima

Colonies of *Leiopathes glaberrima* can be either white or orange, depending on the colour of the polyps; like all black corals, it has a very dark skeleton.



Orange coral
Astroides calycularis

The orange coral is a species endemic to the Mediterranean, which means it can only be found in this sea. It grows in shallow, shady coastal waters, where it feeds on tiny organisms.



Bamboo coral
Isidella elongata

Bamboo coral is internationally recognised by the International Union for Conservation of Nature (IUCN) as critically endangered. This deep-sea species grows at depths of 115 m to 900 m.



Maltese skate
Leucoraja melitensis

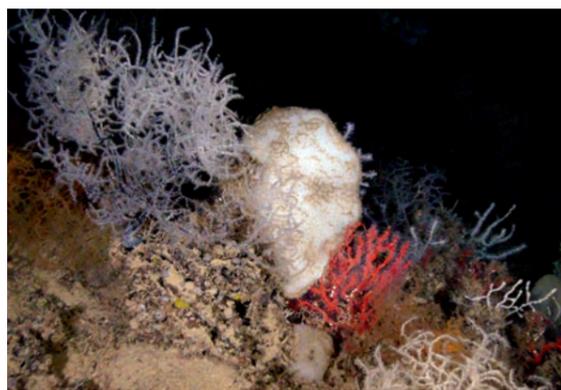
Another protected endemic (Mediterranean only) species – the Maltese skate, *Leucoraja melitensis*, filmed during one of the LIFE BaHAR deep-sea surveys. Despite its common name, it can also be found in the Sicilian channel, along the Tunisian coast and in Algerian waters. However, encounters are scarce and it is considered to be critically endangered by IUCN.



Mediterranean slipper lobster
Scyllarides latus

The slipper lobster has been heavily fished and is nowadays a rare sighting. They can be found at depths from 2 m down to 400 m, where they hide during the day and forage at night.

SPECIES THAT CAN BE FOUND IN THESE AREAS



Deep-water reef

Deep-water mixed reef assemblage including black coral, red coral, and sponges.

Crinoids *Leptometra phalangium*

Many marine animals, such as the corals and crinoids, feed on suspended particles or small free-swimming organisms called “plankton” which they capture using their arms or tentacles.

Sea pen *Pennatula phosphorea*

A single sea pen is not just one individual animal, but a colony of many individuals called “polyps” living together.



Deep-sea biodiversity

The deep sea around the Maltese Islands is a biodiversity hotspot, with at least 75 fish species, 55 cnidarians, 35 crustaceans, 32 molluscs, 21 echinoderms and 15 sponge species encountered during the LIFE BaHAR surveys.



Stony coral *Lophelia pertusa*

The stony coral *Lophelia pertusa* grows in deep, dark waters; it cannot survive in temperatures higher than around 14 °C.

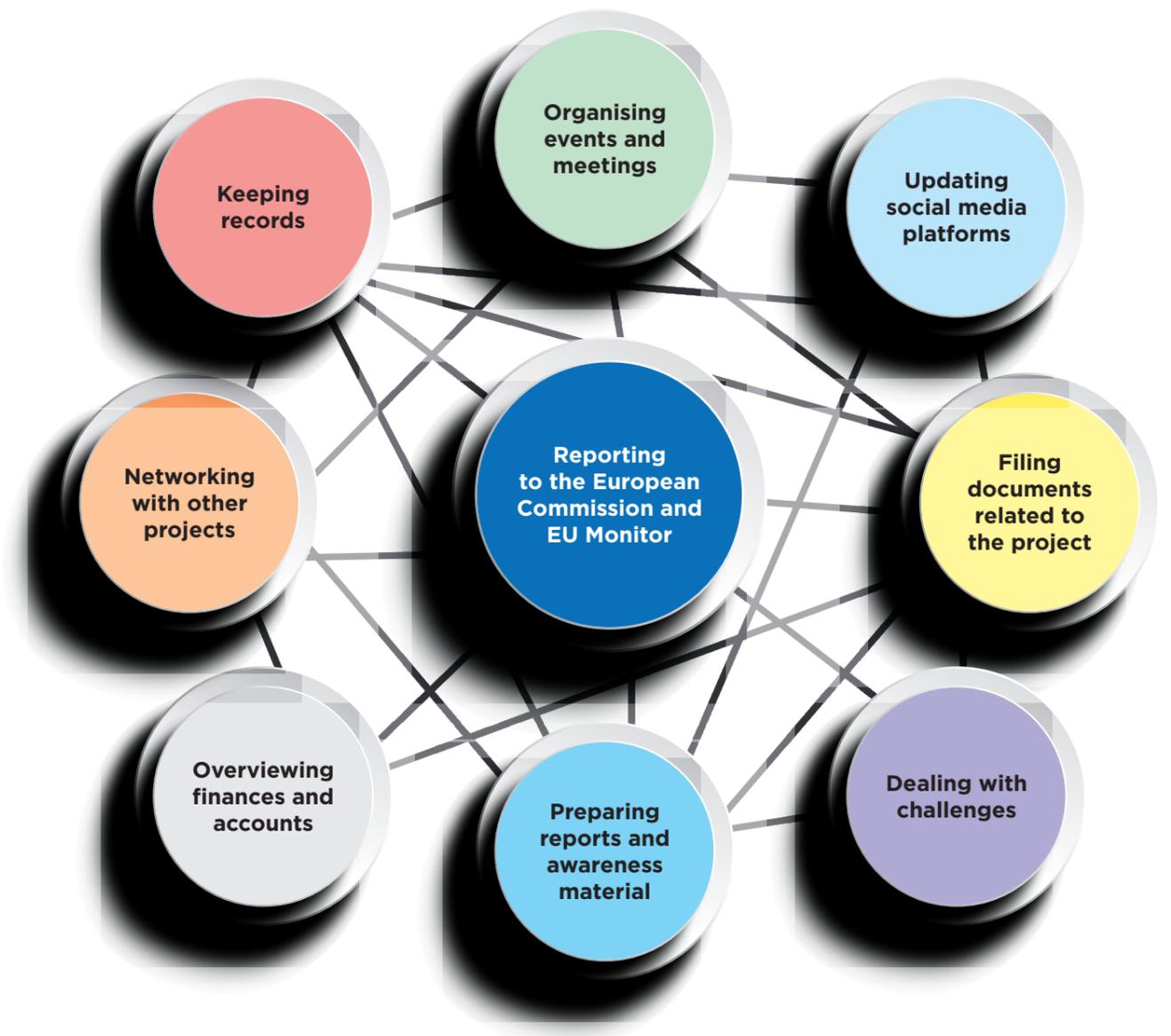
PROJECT MANAGEMENT & MONITORING

Project management and monitoring by the project team also took place on a daily basis to ensure that timelines were kept, milestones achieved and actions coordinated according to the plan set out for the project.

and Scientific Committee, composed of representatives from the project partners; regular meetings of these decision-making committees were held to discuss the state of play and agree on a way forward when issues arose from time to time.

At a strategic level, the project was monitored and guided by a Management Committee

This involved a number of tasks:



AWARENESS RAISING, PROJECT PROMOTION & OUTREACH



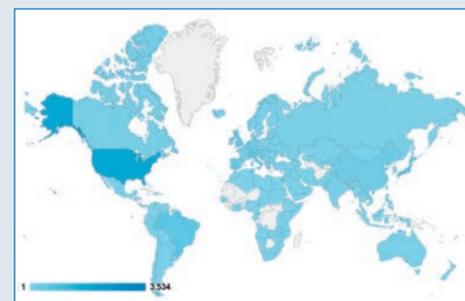
Besides filling data gaps and exploring the locations of reef and sea caves, one of the objectives of the LIFE BaHAR for N2K project was to raise public awareness on the marine environment, including pressures and threats affecting specific habitats and the Natura 2000 network. In the course of the project, a number of products were created to spread the word through various media outlets and social media, and during events with the public and stakeholders. These included:

- TV Information clips
- Information sheets
- Notepads
- Birs
- Calendars
- Website
- Facebook page
- YouTube account
- Twitter account
- Press releases
- Expedition videos
- Noticeboards
- Exhibition prints



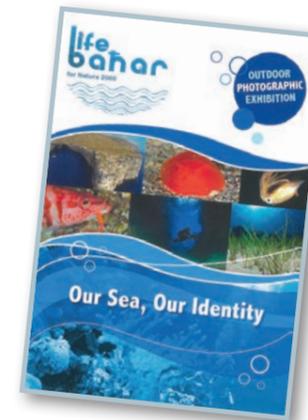
OUTREACH

- The LIFE BaHAR website was viewed over 240,000 times by people from all over the world (see map).
- LIFE BaHAR project stationery was handed out to over 3,500 individuals attending events organised by the beneficiaries and through the project.
- Information sheets describing the project, marine habitats, the marine Natura 2000 network and project results reached over 7,000 people.
- Facebook posts were viewed by an average of 180 people every month, and the page was liked by more than 2,500 people from different countries.



EVENTS

Outdoor photographic exhibitions were organised during the 2015 and 2016 summer months, which presented an interesting range of local marine photos taken by members of the general public. The purpose of the exhibition was to offer a better understanding of the marine biodiversity and its role in everyday life through the images portrayed; information on the project and the Natura 2000 network was distributed at these events.



A milestone event of the project was the international LIFE BaHAR for N2K conference on **“Marine Protected Areas in the Mediterranean – Sharing expertise for effective conservation”**.

The 3-day conference was held between the 11th and 13th of September 2017. International as well as national experts, the project partners and the European Commission presented different topics on Marine Protected Areas. The topics included the LIFE BaHAR for N2K project and its findings, the Natura 2000 network, management aspects from a local to a regional scale around the Mediterranean, and appropriate monitoring techniques for different habitats. Almost 100 people attended the conference; these included local stakeholders – ranging from NGOs to the private sector and government entities – as well as researchers, students and interested people from the general public.



STAKEHOLDER MEETINGS

The involvement of stakeholders was an important aspect of the project. Apart from the conference, stakeholders were invited to participate in four meetings that were held during the project lifetime at key steps of the project:

- 1. Data Collection:** The first seminar was held in May 2014, to introduce the project to stakeholders and discuss the collection of existing data. The project team and stakeholders discussed what data is available, and how stakeholders might be able to support the data collection process.
- 2. Marine Surveys:** The aim of the second seminar in November 2015 was to update stakeholders on the marine surveys carried out in June and July 2015, and to provide an opportunity for stakeholders to contribute their views and suggestions for the next set of surveys scheduled for 2016.
- 3. Identification of Protected Areas:** The third seminar was held in July 2017. The aim of the seminar was to inform stakeholders on

the outcomes of the 2016 project surveys, and to provide information on how the project results would be used in the next step – the identification of new potential Sites of Community Importance.

4. Project Outcomes & Conservation

Objectives: The fourth seminar conducted in November 2017 informed stakeholders on the project outcomes following the final data analysis, the next steps for designation of protected areas and management. The meeting provided an opportunity for an open discussion on potential future conservation measures.

“Stakeholder”: Stakeholders are groups, organisations or individuals that have an interest in the projects. They can be both affected by the project activities or have an influence on their implementation.



LIVELIHOOD ANALYSIS



In 2018, interviews were held with stakeholders in order to understand what potential conflicts there may be between their activities and the designation of new MPAs. The data collected from these interviews will inform the responsible authorities on how to better implement management and stakeholder involvement for the new MPAs following project completion.

Following these interviews, discussions were held with stakeholders whose livelihood may be affected by the new MPAs. The aim was to discuss the strategic conservation objectives and explore best practices and alternatives. The main target audience of this activity were stakeholders involved in the fishing industry, tourism, shipping activities and diving sector.

The outputs of this action through early stakeholder engagement in discussions will be considered in the development of management measures for these MPAs.



LONGTERM ENVIRONMENTAL BENEFITS

The areas identified for designation through the project include reef and cave habitats, as well as a number of species of conservation interest. The management of protected areas for these habitats will enable Malta to conserve both these important habitats and the species that they host.

The conservation objectives that are identified, together with the information collected on existing pressures, will enable the development of effective management measures. The objective is to ensure that the habitats achieve, or remain in, a good conservation status.

Further analysis of the data collected and dissemination of project results, as well as continued networking with stakeholders after the project conclusion, will enable streamlining of measures to address the different but

often overlapping requirements of various legislation, such as the Habitats Directive, Birds Directive, Water Framework Directive, and Marine Strategy Framework Directive, amongst others. In addition, this will ensure that socio-economic factors are taken into account during the management process.

The project has also addressed a number of data gaps on marine habitats that was limiting the coverage of the monitoring processes in the marine environment, in particular with regard to deep-sea bottom habitats. Use of the data collected during the LIFE BaHAR for N2K project will inform the further development of national marine monitoring regimes, and hence enable the assessment of environmental status for a larger number of marine habitats and species.



WHAT'S NEXT



The designation of Natura 2000 sites is the first step in the protection and management process, for which the Conservation Objectives and After-LIFE Conservation Plan, developed as part of the project and taking into consideration the feedback received from stakeholders, will set out targets and a strategy to be followed by

ERA and the relevant stakeholders following project completion.

The After-LIFE Conservation Plan will identify measures to be taken to preserve the habitats until site-specific conservation measures are established following project completion.

PROJECT PARTNERS



The Environment and Resources Authority, ERA, is the national environmental regulator. As the national regulator, ERA maintains consultation with stakeholders so as to promote and instil sound environmental management.

ERA's Mission is "To safeguard the environment for a sustainable quality of life". The Authority has various goals including:

- To mainstream environmental targets and objectives across Government and society;
- To take the leading role in advising Government on environmental policy-making at the national level, as well as in the context of international environmental negotiations;
- To develop evidence-based policy; backed by a robust data gathering structure;
- To draw up plans, provide a licensing regime and monitor activities having an environmental impact and to integrate environmental considerations within the development control process.

Established in 2016, ERA took on the environment regulatory functions previously carried out by the Environment Protection Directorate within the Malta Environment and Planning Authority.



The Ministry for the Environment, Sustainable Development and Climate Change (MESDC) is responsible to ensure the implementation of the EU environment acquis and for environmental protection in the Maltese Islands, as well as responsible for agriculture, fisheries and animal welfare policies. Specifically on environment, this includes nature and biodiversity, air quality and waste.



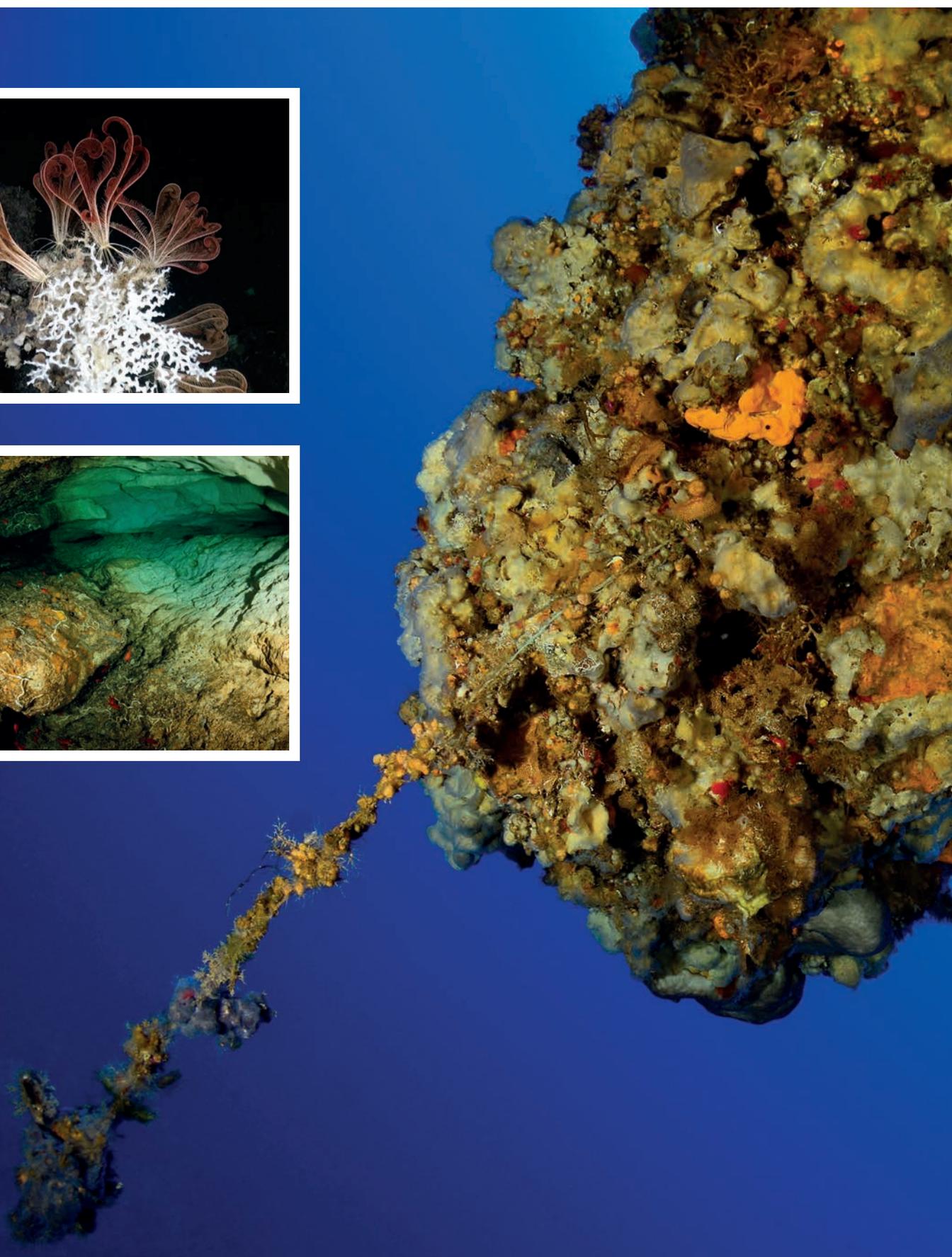
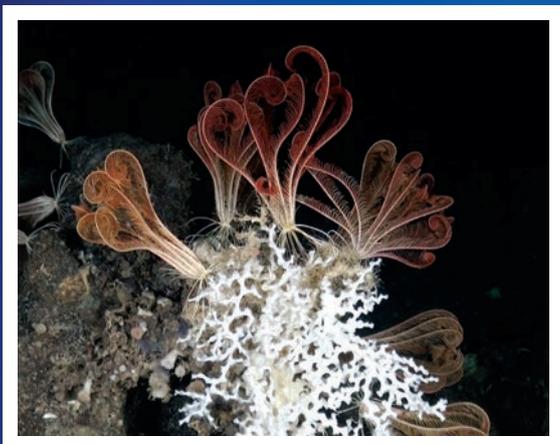
The Department of Fisheries and Aquaculture (MESDC-DFA) was represented by the Capture Fisheries Section, which is the national institution responsible for scientific monitoring and research related to capture fisheries, including the provision of scientific advice concerning fisheries based on EU obligations to the Maltese government.

OCEANA

Oceana is the largest international organisation solely dedicated to protecting the world's oceans, with a strong record of accomplishment on fisheries management and habitats protection over the last decade. It was created in 2001 by a group of foundations who were concerned about the lack of protection afforded to the world's oceans. As an organization, it brings a unique approach that combines the resources, scientific evidence and public outreach to catalyse action and change. Using science, law, advocacy, at-sea expeditions, and communications, Oceana brings policy changes that address the most urgent problems confronting the marine environment.



The University of Malta was represented by the Department of Biology. Although the research interests of the Department are wide-ranging, over the past decade it has developed into a centre of excellence particularly with respect to marine biology. Examples of the Department's research interests include: marine pollution and assessment of environmental quality, marine ecology, ecological assessment and monitoring, biodiversity and biogeography, fisheries biology and marine aquaculture, as well as marine conservation. Through its research programmes the Department of Biology is generating new information about marine life, and making a direct contribution to the sustainable management of biodiversity and natural resources in the Maltese Islands.



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