FINAL REPORT

2021

REGIONE PUGLIA

DIPARTIMENTO MOBILITÀ, QUALITÀ URBANA, OPERE PUBBLICHE, ECOLOGIA E PAESAGGIO

Progetto BEST - *Addressing joint Agro- and Aqua-Biodiversity pressures Enhancing SuSTainable Rural Development*

Programma Interreg V-A Grecia-Italia 2014/2020

FINAL REPORT

September 2021

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1. PREMISE

The objective of the monitoring is to expand the collection of data on biodiversity in marine and transitional ecosystems, already collected with the Interreg BIG Project and with the research program "BIOMAP - Marine Bioconstructions in Puglia", already funded by the Puglia Region in scope of the 2007-2013 ERDF OP - Axis IV - Line of intervention 4.4, in the area considered by the BEST Project, identified more precisely by the municipalities of Polignano a Mare, Monopoli, Fasano and Ostuni and by the territory included in the proposed perimeter for the institution within the administrative boundaries of the Mar Piccolo Regional Natural Park as identified by the LR n.30 of 21 September 2020.

In particular, we studied the geographical distribution of the bioconstructions of the circalittoral (coral and mesophotic reefs) and of the biocoenoses of the semi-dark and dark caves located in correspondence with the stretch of coast on the Adriatic coast included among the aforementioned municipalities, as well as the characterization of the various types of bioconstructions in terms of structural, functional and associated biodiversity.

Regarding the analyzes carried out in the Piccolo Sea, they referred to the updating of the faunal composition of the benthos and its distribution on the seabed of Taranto.

2. RESEARCH AREAS

The survey areas are identified more precisely by the municipalities of Polignano a Mare, Monopoli, Fasano and Ostuni and by the territory included in the proposed perimeter for the establishment within the administrative boundaries of the Regional Natural Park of the Piccolo Sea as identified by the Regional Law n.30 of 21 September 2020.

3. WORKING METHOD AND ORGANIZATION OF THE SERVICE

The instruments used are owned by GE.CO. srl, periodically maintained and checked according to the calibration needs of the single instrument.

Some tools have been used for various surveys. The plano-altimetric positioning of the surface in fact concerns the ROV and Multibeam surveys. The hydroacoustic positioning of the immersed sensors or instruments, on the other hand, concerns the ROV surveys, as the MBE proposed by us is integral to the nautical vessel. The sound velocity probe concerns the MBE and ROV surveys, as well as the use of Octans is foreseen for both systems so that the navigation of the boat can be better managed during the surveys and improve the accuracy of the acquired data. Teledyne's PDS 2000 navigation, control and data logging software was used for all planned monitoring.

Below we see in detail the working methodology that has been applied to the different areas.

A. In the stretches of sea overlooking the areas considered within the pilot area and up to a depth of -60 m.

Morpho-bathymetric cartographic restitution and benthic and transitional priority habitats (Directive 92/43 / ec)

Instrumental morpho-bathymetric surveys were carried out using high-resolution MultiBeam technology of the Adriatic coast between Ripagnola coast and Pozzelle tower and the Piccolo Sea which were not investigated by previous mappings, up to the bathymetric depth of –60 meters.

Instruments and protocols normally used during Marine Strategy investigations were used, and in particular the acquisition of detailed bathymetric and morphological data was performed through the use of the high definition R2 Sonic 2024 Multibeam system. operate at working frequencies between 170 Khz and 700 Khz thus providing a high definition of the geometric and morphological characteristics of the investigated seabed. The main characteristics of the proposed Multibeam system are expressed below while further technical details are shown in the attached technical sheet.

It should also be noted that the proposed Multibeam system was interfaced via a high-speed Ethernet connection with the navigation and control software and recording of the detected data installed on a workstation equipped with N.2 control videos, which also provided to the acquisition of data from sensors in real time:

- IMU model Ixea Octans III for the acquisition of data of: Heading, Pitch, Roll, Heave and relative compensation of the dynamic effects induced with an update frequency of 80 Hz;
- SVP On line Mini SVS Valeport for determining the speed of sound in real time;
- DGPS Trimble NetR9S for determination:
    - of the absolute position (NMEA CGA string)
    - of the synchronization parameters (NMEA ZDA string and PPS Output pulse)
    - of the real-time course of the tide

All sensors are pre-installed on the boat to reduce installation and calibration times. Anyway, the surveys of each area were carried out and the system was calibrated using the "Patch Test" procedure, as provided for in the Technical Regulations for Standardization of the Hydrographic Surveys drawn up by the Hydrographic Institute of the Navy.

Bathymetric data acquisition: By activating the UHD option (number of beams 1024) on the proposed Multibeam R2 Sonic system, a real-time (unprocessed) acquisition of a digital model of the mesh backdrop was performed up to a depth of 50 meters. regular no more than 0.25 meters x 0.25 meters per side, in order to be able to return both a model with a resolution of 1 meter x 1 meter and a high resolution model up to 0.25 x 0.25 meters.

Backscatter data acquisition: The acquisition of the backscatter data presents a series of critical issues which, if not approached methodically, generate values of the reflected signal that do not provide adequate and correct information on the morphological nature of the seabed.

The experience acquired by Ge.Co srl during previous monitoring has allowed us to code the following acquisition procedure and subsequent processing of the amount of energy of the backscattered wave that returns to the MB receiver called Backscatter Strength (BS).

Acquisition Phase:

1. Sound speed detection and insertion of profiles in the acquisition SW;
2. Activation of the “Snippets” option on the Multibeam system with real-time control of the detected data
3. Reduction to a minimum of the variations introduced in the Multibeam system regarding the parameters of radiated power and pulse length

On-site control phase to be carried out at the end of the investigations with the Multibeam system:

1. Identification through the analysis of the data collected, through Shadded representation, of areas with different compositions (for example: fine sediment, rock, Posidonia meadows)
2. Punctual verification (truth at sea) by means of video and photographic recordings carried out by means of a geo-referenced high-definition camera of the nature of the areas with different composition identified in point 1;
3. Calibration of the backscatter data through the "Backscatter Processing" module and the "Botton Classification" module included in the Teledyne PDS 2000 software;
4. Extrapolation of the calibrated analytical data of the backscatter signal with generation of files in ASCII format with regular mesh 0.50 x 0.50 meters per side.

The return of the data was carried out with 1: 10,000 scale cartography and the shape files and the return project were provided, including the print layout models.

Caratteristiche sistema Multibeam R2 Sonic	
Produttore	**R2Sonic**
Modello	**2024**
Omologazione	IHO Special Order
Beam widths 450 kHz	0.45 x 0.9
Beam widths 700 kHz	0.3 x0.5
Frequenze operative	**170 - 45o Khz - 700 Khz**
Swath coverage sections	10 - 160 gradi
Limite operativo minimo di profondita' a 400 kHz	0.70 metri
Limite operativo massimo di profondita' a 400 khz	100 metri
Numero di Beams	**256 - 1024**
Risoluzione a tutte le frequenze	1.25 centimetri
Configurazione operativa	
Frequenza di lavoro	450 - 700 Khz
Installazione Ricevitore e Trasmettitore	A scafo (linea chiglia)
Swath coverage sections	80 - 130 gradi
Ping rate	10 - 60 Hz
Velocita' massima di acquisizione	5 nodi /ora
Opzione Backscatter Snippets Output	**Attivata**

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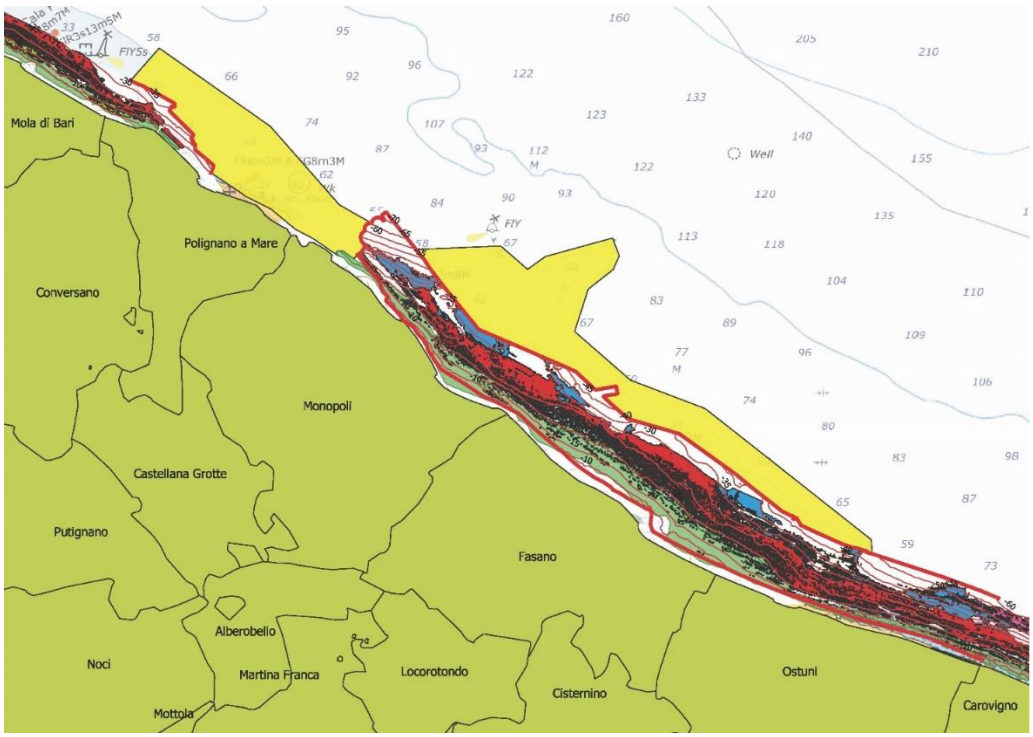
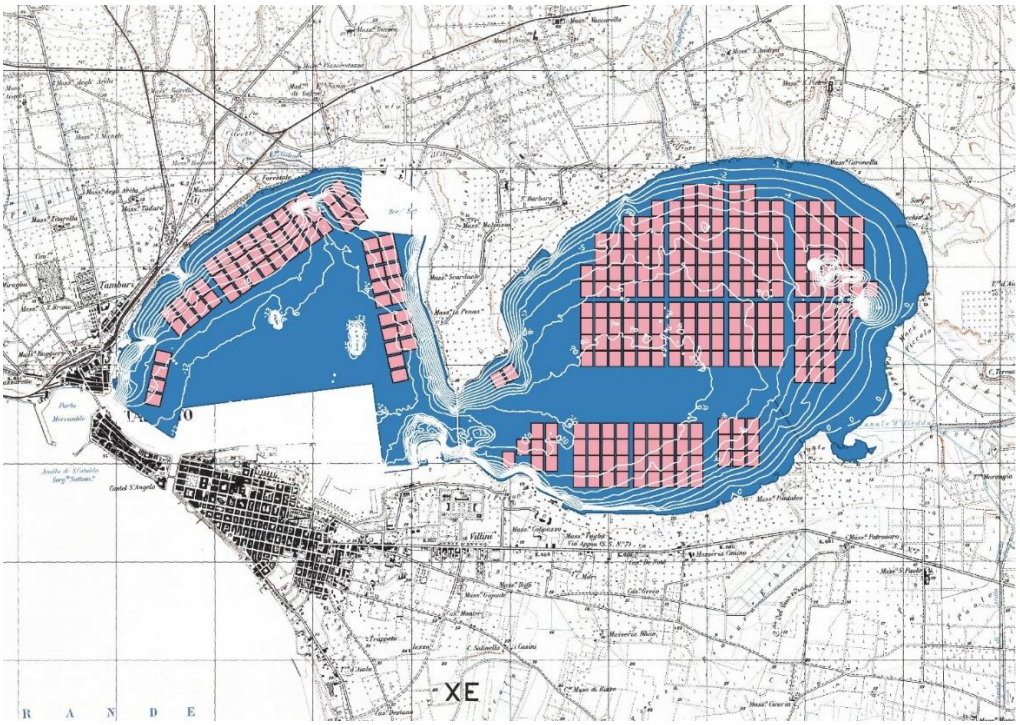
Areas subject to MBE survey as part of the BEST project

The following are the areas that have been the subject of the MBE survey for the characterization of the seabed. The areas have been identified in order to complete the previous investigations of the Biomap Project and the mapping of the Posidonia oceanica prairie, up to the bathymetric depth of -60 meters. In particular, it was based on the cartography produced by the Biomap project which indicates the areas under investigation with SSS and MBE (identified as in the diagram below) and reviewed in red for a clearer view.



Areas of investigation of the BEST project highlighted in yellow.



BEST project survey area highlighted in blue. An attempt was made to map the entire area compatibly with the presence of aquaculture rows which in reality are not positioned in the order indicated by the cartography sent to us by the Regione Puglia but are scattered throughout the survey area.

B. Areas of particular interest, identified in correspondence with the stretches of sea facing Ripagnola Coast (Polignano a mare), Park of the Coastal Dunes from Canne Tower to San Leonardo (Fasano and Ostuni), Pozzelle Tower (Ostuni) and Piccolo Sea (Taranto) - Further information of the habitats 1170 (cliffs), 8330 (sea caves) and 1150 (coastal lagoons)

Habitat of reefs (Natura 2000 code: 1170):

A bionomic characterization of the zoobenthic communities of coralligenous and mesophotic bioconstructions was carried out within four transepts made, in each area, in correspondence with the areas facing Ripagnola Coast, Parco delle Dune Costiere, Pozzelle Tower and Piccolo Sea, through non destructive by acquiring at least 10 images on a standard surface in 2 replicas (total 20 images) in spring and late summer and video with the use of ROVs and / or punctual surveys in scuba diving where possible, up to the bathymetry of - 60 meters. From each of the acquired images, morphometric and biometric data were extracted in compliance with the provisions of the Marine Strategy Monitoring Program (MSFD) protocol - Module 7 (coral habitats), for each of the layers (basal layer, intermediate and erect). The survey and sampling methodology performed is in accordance with the same guidelines mentioned above.

Non-destructive techniques were used with the study of images only and without the aid of destructive manual sampling.

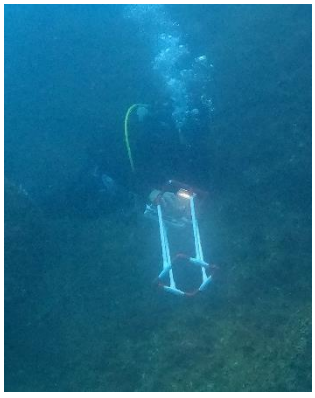
The parameters analyzed through the qualitative-quantitative analyzes of the images and of the diving field records consist of:

- bioconstructions type (bioconstructors: algae, scleractinie, polychaete, bivalves, etc.);
- bioconstructions morphology;
- structuring species (identification and measurements);
- conservation interest species (identification and measurements);
- associated fauna (identification and measurements);
- allochthonous species (identification and measurements);
- obvious disturbances (abandoned fishing gear, abandoned anchors and marine litter);
- health state (necrosis and / or epibiosis, integrity of colonies and structuring species).

The diversity and abundance of fauna and flora has been documented with lists of fish, invertebrate and algae species recorded along the length of each transept line. The inclusion of mobile marine species such as fish, invertebrates allows a more accurate representation of the state of marine ecology. The number of species serves as indicators of environmental stress or as significant predators of sensitive marine habitats such as coral communities.

INSTRUMENTATION FOR CORALLIGENIC SURVEY IN IMMERSION

NIKON D60 digital camera, equipped with flash and illuminators, with a resolution of 10.2 megapixels and Go Pro, with a resolution of 12 mega pixels. The cameras are equipped with a pvc frame that allows you to photograph a surface of 50cm × 40cm. The frame mounted on the camera allows you to standardize the photographic images captured by the diver while fixing the minimum sampling surface (0.2 m2) and the distance from the wall. The structure is then fixed and calibrated on the basis of the settings of the camera for which it was built.



The diver is equipped with a clinometer to measure the inclination of the wall, a manual penetrometer to measure the consistency of the carbonate matrix of the basal layer and a metric cord to measure the maximum height of the elevated layer. The plots were randomly chosen from those that respect the characteristic of being at the established depth and have an inclination as close as possible to 90 ° with respect to the bottom. Squares of 2m × 2m will be selected; however, if the characteristics of the substrate do not allow it, rectangles that still have 4 m2 of surface can be selected.

As for the transects performed with ROV technology, a VideoRay PRO4 was used equipped with a digital camera and laser pointers (spaced so as to indicate the distance of the frame) and interfaced with a Micronav USBL positioning system.

Image analysis:

The photographic samples were obtained through frames of 50x40 cm in the case of scuba diving directly on the point, or from frames obtained from the videos taken with ROVs along the transept. 20 images were selected for each transept for each of the 2 campaigns, June and September, for a total of 40 images for each transept. The cataloged and numbered images were then divided into folders to simplify data processing. The photographic samples were chosen with the random method to ensure the reliability of the sample itself, having acquired on average three times the necessary images. Each photographic sample was subjected to image analysis in order to assess the presence of the main animal and vegetable (macroalgae) taxa and / or morphotypes (morphological groups). Furthermore, the presence of any elements of conservation and naturalistic interest or elements of anthropic disturbance if any was noted.

For the images analysis, we used software suitable for differentiating the coverage of taxa / groups. There are many software available on the market, but some open source or free software downloadable from the Internet, such as ImageJ, which among other things is the one used by us, also meet the purpose perfectly.

The ImageJ program allows you to analyze photographic data using the “mottled” or patches mosaic method. Each taxon or group is outlined and the area thus obtained is filled with a specific color. The result of this operation generates a heterogeneous mosaic with patches of different size and color, in order to allow discrimination between the various taxa / groups present in the photographed surface.

Organisms categories:

Some organisms can be easily recognized at the species or genus level; for all the others the morphological groups can be used. It is preferable to stop at a higher taxonomic level than to provide an incorrect determination. If within a category one could only partially recognize a species or genus, both items must be reported. Example:

- Rodophyta upright cylindrical
- Cylindrical upright Rhodophyta (Osmundea pelagosae)

Below is the table with the various taxa and the relative colors inserted in the patches to be able to recognize them.

CATEGORIES OF ORGANISMS (TAXA)
MACROALGAE
Alien species [es. Caulerpa cylindracea Sonder, 1845; Caulerpa taxifolia (M. Vahal) C. Agardh, 1817; Asparagopsis spp.]
Algal felt (color: purple) [es. Lophosiphonia spp., Polysiphonia spp., Sphacelaria spp.]
Red algae (color: red) Rhodophyta calcaree incrostanti [es. Mesophyllum spp., Lithophyllum spp., Neogoniolithon spp.] Rhodophyta calcaree articolate [es. Amphiroa spp., Tricleocarpa fragilis (Linnaeus) Huisman et R.A. Towsend, 1993] Peyssonnelia spp. Rodophyta erette cilindriche (2) [es. Botryocladia spp., Osmundea pelagosae (Shiffner) K.W. Nam, 1994]

Rhodophyta erette laminari [es. Kallymenia spp., Halymenia spp., Phyllophora spp., Meredithia microphylla (J.Agardh) J.Agardh, 1892, Acrodiscus vidovichii (Meneghini) Zanardini, 1868]

Green algae (color: green)
Chlorophyta sifonali/sifonocladali con filamenti separati [es. Pseudochlorodesmis spp.; Cladophora spp., Bryopsis spp.]
Chlorophyta sifonali con tallo a vescicole [Valonia spp., Codium spp.]
Flabellia petiolata Turra (Nizamuddin), 1987
Palmophyllum crassum (Naccari) Rabenhorst, 1868
Halimeda tuna (J. Ellis et Solander) J.V. Lamouroux, 1816

Brown algae (color: brown)
Dictyotales [es. Dictyota spp., Dictyopteris spp.]
Ochrophyta erette cilindriche [es. Halopteris spp., Sporochnus spp.]
Ochrophyta incrostanti [es. Aglaozonia spp., Zanardinia typus (Nardo) P.C. Silva, 2000]
Ochrophyta erette laminari [es. Laminaria spp., Phyllariopsis spp.]
Fucales [es. Cystoseira spp., Sargassum spp.]

Polychaetes (color: grey)
Serpulidi grandi [es. Protula intestinum (Lamarck, 1818), Serpula vermicularis Linnaeus, 1767)]
Salmacina-Filograna complex

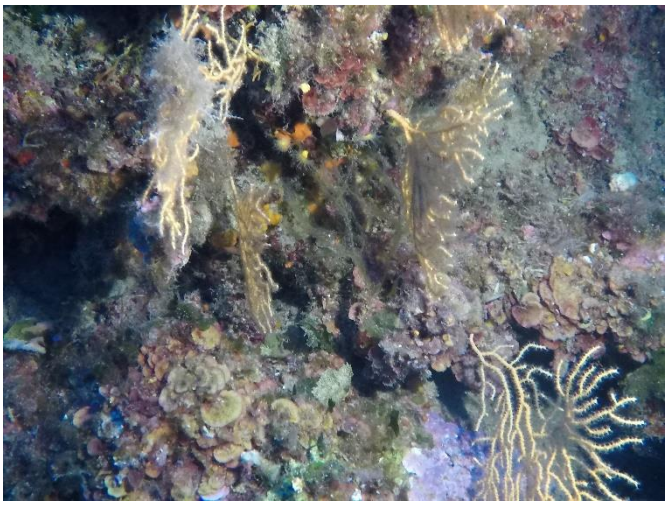
Macroforaminifers
[es. Miniacina miniacea (Pallas, 1766)]
Stoloniferi [es. Sarcodictyon catenatum Forbes, 1847)]

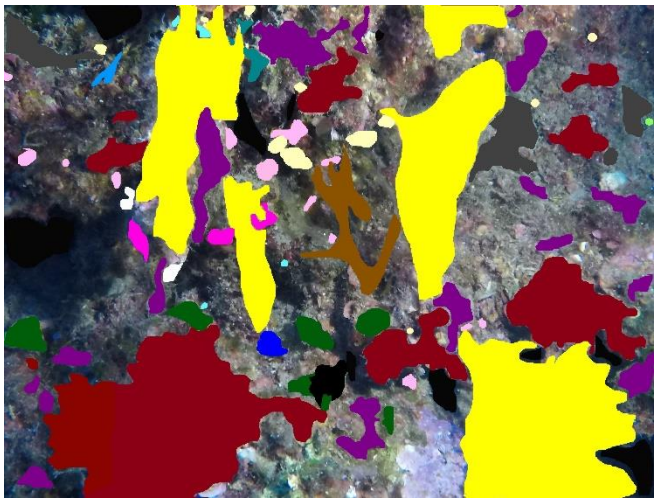
Bivalve molluscs
[es. Lithophaga lithophaga Linnaeus, 1758, Arca barbata Linnaeus, 1758, Pteria hirundo Linnaeus, 1758]

Actinia
[es. Cribrinopsis crassa Andrés, 1881]

Vermetids
[es. Thylacodes arenarius Linnaeus, 1758]

Examples of photographic processing:





The coordinates of the transepts along which the investigations were carried out are indicated below. There are 4 transepts (3 from specifications + 1 from improvement offer) for each area and have an approximate length of 400 meters each. The coverage for each area, in accordance with marine strategy protocols, is 1600 linear meters. On the basis of the observations found with the MBE survey and in agreement with the contracting authority, we proceeded to designate on which transects to carry out the ROV survey and on which to proceed with a timely survey in immersion, always in accordance with the specifications and with the investigation.

1. Ripagnola Coast (Polignano a mare)

Transept n. 1: coord. start LAT 41,04116 LONG 17,17009 – coord. finish LAT 41,04391 LONG 17,298
Dive spot n.1: coord. LAT 41,04136 LONG 17,17031 Depth 26.2 m

Transept n. 2: coord. start LAT 41,04015 LONG 17,17198 – coord. finish LAT 41,04304 LONG 17,17485
Dive spot n.2: coord. LAT 41,04029 LONG 17,17211 Depth 23.7 m

Transept n. 3: coord. start LAT 40,97399 LONG 17,28060 – coord. finish LAT 40,97759 LONG 17,28077
Dive spot n.3: coord. LAT 40,97738 LONG 17,28076 Depth -26.8 m

Transept n. 4: coord. start LAT 40,97723 LONG 17,26792 – coord. finish LAT 40,97898 LONG 17,27205
Dive spot n.4: coord. LAT 40.97894 LONG 17.27197 Depth -32 m

2. Park of the coastal dunes from Torre Canne to San Leonardo (Fasano and Ostuni)

The 4 transepts, of 400 meters each, were joined in a single transept of 1,600 meters, in agreement with the client, after having carried out and analyzed the data produced by the MBE survey in the area and investigated with ROV technology

Transept. n. 5 coord. start LAT 40,89141 LONG 17,47464 – coord. finish LAT 40,88409 LONG 17,49114

3. Torre Pozzelle (Ostuni)

Transept n. 6: coord. start LAT 40,78251 LONG 17,66517 – coord. finish LAT 40,78566 LONG 17,66722
Dive spot n.6: coord. LAT 40,78288 LONG 17,66541 Depth 23.7 m

Transept n. 7: coord. start LAT 40,78176 LONG 17,66699 – coord. finish LAT 40,78501 LONG 17,66911
Dive spot n.7: coord. LAT 40,78438 LONG 17,66870 Depth 27.4 m

Transept n. 8: coord. start LAT 40,78277 LONG 17,67678 – coord. finish LAT 40,78598 LONG 17,67904
Dive spot n.8: coord. LAT 40,78378 LONG 17,67749 Depth 27.4 m

Transept n. 9: coord. start LAT 40,78211 LONG 17,67862 – coord. finish LAT 40,78537 LONG 17,68097
Dive spot n.9: coord. LAT 40,78519 LONG 17,68083 Depth 29.3 m

Habitat of submerged or semi-submerged sea caves (Natura 2000 code: 8330), in the stretches of coast in Ripagnola Coast and Pozzelle Tower:

The surveys were carried out in accordance with the "Manuals for monitoring species and habitats of community interest (Directive 92/43 / EEC and Directive 09/147 / EC) in Italy: marine environment" (ISPRA, 2019).

The samples are non-destructive and consist of photographic surveys on standard surfaces of 400 cm2 (20x20 cm). A NIKON D60 digital camera with hood and LED lighting and a 20x20cm frame was used which was delicately placed on the wall in order not to damage the biocoenosis. The team was also equipped with a full hd gopro camera. In each of the caves a transept has been identified from the outside to the inside at a constant depth along a vertical wall. The surveys were conducted in stations located at the entrance, in the semi-dark area (intermediate) and in the dark area of the cave. At each station, 10 standard surface images were acquired in 2 replicates (20 images) in the spring and late summer period, compatibly with the morphology of the cavity. The objective of the survey is to be able to identify the following parameters:

- percentage coverage of the substrate;
- taxonomic identification of the component (macrobenthic);
- presence of species of conservation interest (identification and measurements);
- obvious disturbances (abandoned fishing gear, abandoned anchors, garbage, etc.).

A table file will be drawn up with the following for each cave:

- typology (submerged, semi-submerged, natural, artificial, offshore);
- synthetic description;
- schematic map;
- extension;
- depth;
- position with respect to the coast (eg coastal cave, cave of the sea);
- number, height and exposure of the entrance;

- geographic coordinates;
- exposure along the coast line;
- fund type;
- gradient of the cave.

For the choice of the caves, as per your suggestion, the Apulian Speleological Federation was contacted, which carried out the census of the caves on behalf of the Regione Puglia.

Below is the list and location of the caves where the surveys .

NAME CAVES	LAT	LONG
GROTTA SANTA CATERINA 1	41,002700	17,203173
GROTTA SANTA CATERINA 2	41,002911	17,202817
GROTTA CHIAR DI LUNA	41,002233	17,204600
GROTTA DELLA FOCA 1	41,001417	17,206950
GROTTA DELLA FOCA 2	41,000483	17,209161
GROTTA DELLA RONDINELLA	40,999967	17,210250
GROTTA DEI FIDANZATI	40,999700	17,211167
GROTTA AZZURRA	40,998150	17,216417
GROTTA PIANA	40,996600	17,218083
GROTTA SOTTO BASTIONE DI SANTO STEFANO	40,997013	17,218509
GROTTA DELL'ARCIVESCOVADO	40,996737	17,219583
GROTTA PALAZZESE	40,996173	17,221743
GROTTA SOTTO FAVALE	40,996233	17,222600
GROTTA ARDITO DELLE CALDAIE	40,996593	17,223100
GROTTA DELLA COLONNA	40,992470	17,234913
GROTTA DELL'EREMITA 1	40,992673	17,235547
GROTTA DELL'EREMITA 2	40,992911	17,235833
GROTTA DEI COLOMBI	40,986320	17,246157
GROTTA DEI PASSERI	40,984333	17,250917
GROTTA DI SELLA	40,982994	17,252833

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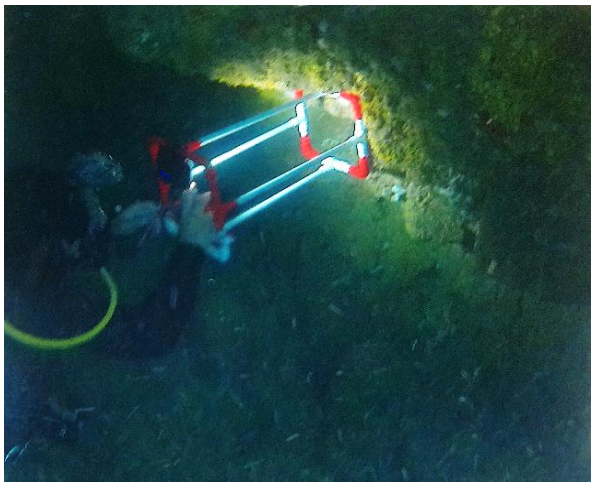
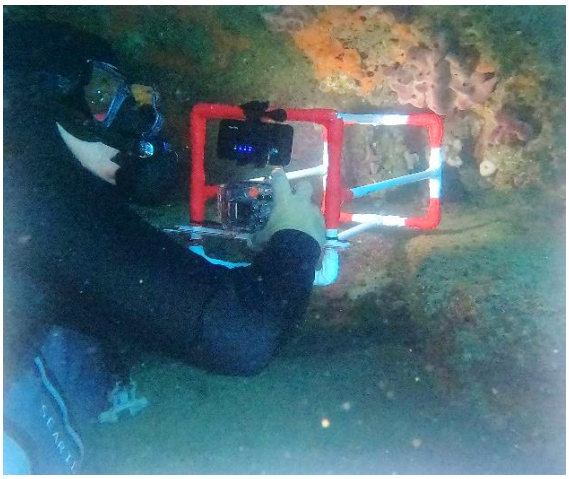
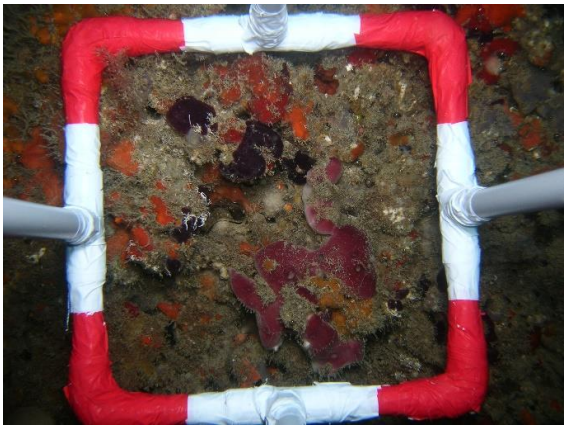
METHODOLOGY PROCESSING IMAGES CAVES

Image analysis:

The photographic samples were obtained in scuba diving with operators equipped with digital cameras and 20x20 cm frames specific for the caves (see attached photo below). 10 images were selected for each cave, for each single light gradient and for each of the 2 campaigns, in June and September, for a total of 20 images for each gradient. The cataloged and numbered images were then divided into folders to simplify data processing.



Examples of images with 20x20 cm frame from a cave

The photographic samples were chosen with the random method to ensure the reliability of the sample itself, having acquired on average three times the necessary images. Subsequently, the image was analyzed in order to assess the presence of the main animal and vegetable (macroalgae) taxa and / or morphotypes (morphological groups) present. Furthermore, the presence of any elements of conservation and naturalistic interest or elements of anthropic disturbance, if any, was noted.

For the analysis of the images, we used software suitable for differentiating the coverage of taxa / groups. There are many software available on the market, but some open source or free software downloadable from the Internet, such as ImageJ, which among other things is the one used by us, also meet the purpose perfectly.

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Algal felt (color: purple) [es. Lophosiphonia spp., Polysiphonia spp., Sphacelaria spp.]
Red algae (color: red) Rhodophyta calcaree incrostanti [es. Mesophyllum spp., Lithophyllum spp., Neogoniolithon spp.] Rhodophyta calcaree articolate [es. Amphiroa spp., Tricleocarpa fragilis (Linnaeus) Huisman et R.A. Towsend, 1993] Peyssonnelia spp. Rodophyta erette cilindriche (2) [es. Botryocladia spp., Osmundea pelagosae (Shiffner) K.W. Nam, 1994] Rhodophyta erette laminari [es. Kallymenia spp., Halymenia spp., Phyllophora spp., Meredithia microphylla (J.Agardh) J.Agardh, 1892, Acrodiscus vidovichii (Meneghini) Zanardini, 1868]
Green algae (color: green) Chlorophyta sifonali/sifonocladali con filamenti separati [es. Pseudochlorodesmis spp.; Cladophora spp., Bryopsis spp.] Chlorophyta sifonali con tallo a vescicole [Valonia spp., Codium spp.] Flabellia petiolata Turra (Nizamuddin), 1987 Palmophyllum crassum (Naccari) Rabenhorst, 1868 Halimeda tuna (J. Ellis et Solander) J.V. Lamouroux, 1816
Brown algae (color: brown) Dictyotales [es. Dictyota spp., Dictyopteris spp.] Ochrophyta erette cilindriche [es. Halopteris spp., Sporochnus spp.] Ochrophyta incrostanti [es. Aglaozonia spp., Zanardinia typus (Nardo) P.C. Silva, 2000]

Ochrophyta erette laminari [es. Laminaria spp., Phyllariopsis spp.] Fucales [es. Cystoseira spp., Sargassum spp.]
Polychaetes (color: grey) Serpulidi grandi [es. Protula intestinum (Lamarck, 1818), Serpula vermicularis Linnaeus, 1767)] Salmacina-Filograna complex **Macroforaminifers** [es. Miniacina miniacea (Pallas, 1766)] Stoloniferi [es. Sarcodictyon catenatum Forbes, 1847)] **Bivalve molluscs** [es. Lithophaga lithophaga Linnaeus, 1758, Arca barbata Linnaeus, 1758, Pteria hirundo Linnaeus, 1758] **Actinia** [es. Cribrinopsis crassa Andrés, 1881] **Vermetids** [es. Thylacodes arenarius Linnaeus, 1758]

Examples of photographic processing:

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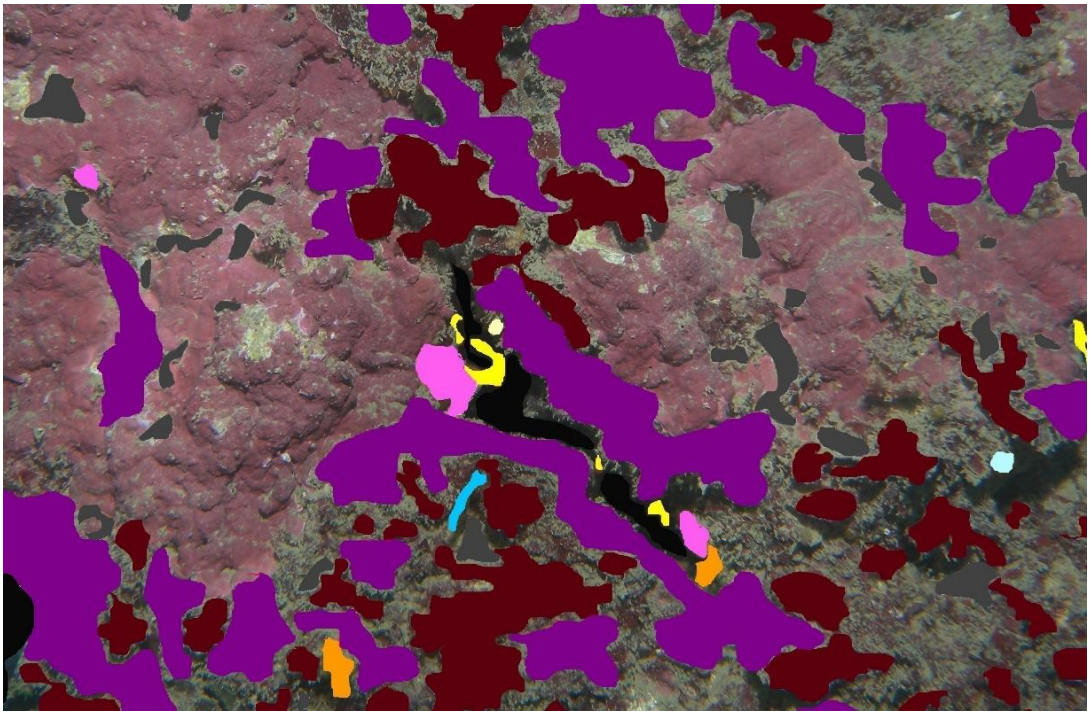

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Lagoon habitat (Natura 2000 code: 1150)

The objective for the study of lagoon habitats is the characterization and spatial distribution of the biocoenoses and zoobenthic communities present on the seabed of the Piccolo Sea of Taranto, through specific surveys, aimed at updating the existing biocenotic map.

This activity involves the sampling and analysis of the sediment and taxa contained therein, with the calculation of the M-AMBI index.

The methodology involves carrying out the following activities along transepts identified together with the client. For each sampling site, a Van Veen bucket was used (3 buckets per site) for the analysis of the macrozoobenthos. The sediment was analyzed according to the ISPRA protocols in order to proceed with the activities of Sorting, taxonomic determination of macrobenthic species, composition and abundance of benthic macroinvertebrates, including the reporting of sensitive taxa. Calculation of the M-AMBI index as indicated in Annex I to Decree 8 November 2010, no. 260 and according to the methodological sheet for the sampling and analysis of the macrozoobenthos of movable floors - ISPRA.

The abundance data were processed for the calculation of the M-AMBI Index as indicated in Annex I to the Decree of 8 November 2010, no. 260 and in the official method.

It is a multivariate index that derives from the evolution of the AMBI integrated with the Shannon-Wiener diversity index and the number of species (S).

M-AMBI provides a numerical index that varies from 0 (poor ecological status) to 1 (high ecological status) and corresponds to the Ecological Quality Ratio (RQE) required by the Water Framework Directive 2000/60 / EC; it uses a reference list for the subdivision of organisms into 5 ecological groups, in relation to different degrees of tolerance to a progressive increase in stress.

The identification of the species is subject to updating the existing bibliography.

Below are highlighted the sampling points of the sediment for carrying out the analyzes, as agreed with the client and the coordinates of the transepts investigated with ROV.

SEDIMENTS

Point 1: coordinates LAT 40,47797 LONG 17,27144

Point 2: coordinates LAT 40,47787 LONG 17,23476

Point 3: coordinates LAT 40,49633 LONG 17,30994

TRANSEPT ROV

Two transepts of 800 m each were made, the position of which was indicated by Dr. Dadamo consultant of the Regione Puglia and investigated with ROV technology, as agreed.

Transept n. 1: coord. start LAT 40,46951 LONG 17,29980 – coord. finish LAT 40,47625 LONG 17,29812

Transept n. 2: coord. start LAT 40,49435 LONG 17,32323 – coord. finish LAT 40,49047 LONG 17,31507

Further samplings were also carried out with bucket and camera, in order to obtain truths at sea necessary to update the existing bibliographic data and related to the biocenotic map of the Mar Piccolo.

4. TECHNICAL CHARACTERISTICS OF THE TOOLS USED

PLANO ALTIMETRIC SURFACE POSITIONING

The surface plano-altimetric positioning of the support vessel and all sensors (emerged and submerged) was carried out using **Trimble Net R9 Geospatial Multicostellation** satellite systems.

These receivers, designed for highly professional applications such as marine surveys in the environmental field, allow to receive the most important constellations of satellites in orbit such as: GPS -GLONASS - GALILEO - BEIDOU and consequently allow a more accurate positioning compared to satellite systems traditional.

The connection with both permanent and dedicated reference stations (range of action up to 30 km with high-speed correction transmission via modem) allows real-time detection of the tidal range present in the work area.

The position update frequency (10 times per second) allows the system to be aligned with the need for the latest generation Multibeam systems and with the characteristics of the hydroacoustic positioning systems and with the detection and compensation systems of dynamic motions (IMU).

The proposed receiver model is able to offer the following main features (further technical details are shown in the attached data sheet):

HYDROACOUSTIC POSITIONING OF IMMERSED SENSORS

The relative positioning between the nautical vessel and the sensors and submerged vehicles (wire-guided system R.O.V) was carried out by means of a **Tritech Micronav** ultra-short base hydroacoustic system (USBL).

The system consists of a sensor (Transducer) rigidly fixed to the nautical vessel and a Transponder (Beacon) placed on the sensors / submerged vessels. The connection between the transducer and the Transponder, with an update frequency of 1 Hz, allows to establish in real time the relative position between the vessel of the sensor / submerged vehicle and consequently, by interfacing with the GPS system, their absolute position.

The USBL positioning system also allows, through the interface with the motion sensor on the boat, to compensate for the effects of motions and consequently increase the positioning accuracy. This USBL system was used for the positioning of the wire-guided vehicle (R.O.V).

MULTIPARAMETRIC PROBES FOR SPEED DETECTION OF SOUND IN WATER

All surveys and measurements in the hydroacoustic field are strongly influenced by the speed of sound, in particular where bathymetric surveys, backscatter signal detection, morphological investigations and hydroacoustic-based surveys of sensors and submerged vehicles must be carried out.

With regard to this and in relation to the planned investigations, it is considered essential, to ensure the accuracy of the data collected, to adopt the following procedure for detecting the speed of sound in the water for each individual area investigated

- **N.3** Measurements of the vertical profile of the speed of sound at the maximum operating depth at the beginning, in the middle and at the end of each day of surveying and / or video shooting by means of a Valeport Mini SVP multiparametric probe and where there are factors of variation of the speed of sound such as for example the river mouths;
- Surface detection of the speed of sound in real time for the entire duration of the surveys and / or video recordings by means of a Valeport Mini SVS multiparameter probe.

The measured values were processed both in real time and in post processing by the software in charge of processing the detected data. Both probes are accompanied by valid calibration certificates.

VALEPORT MINI SVS probe data sheet **VALEPORT MINI SVP probe data sheet**

SOFTWARE FOR NAVIGATION, CONTROL AND DATA REGISTRATION

The Teledyne **PDS 2000 release 4.3.8.0 2020 software** was used for navigation, control and data recording operations.

The software is installed on a Workstation which, through 2 videos, allows the navigator technician and the pilot of the nautical vessel to manage all the navigation and data acquisition phases.

The Teledyne PDS 2000 software proposed is subject to an activated and valid maintenance and assistance contract that allows our company to have assistance in real time for any anomalies that may arise.

The management of the information detected by the sensors takes place via an Ethernet line (Multibeam) and via the Moxa high-speed 8-entry multi-port card. Data processing will be conducted using the following procedure:

On site before starting the demobilization of vehicles and equipment:

- ➢ Control of raw data collected;
- ➢ Elimination of anomalous data (spikes);
- ➢ Check for the existence of any undetected areas and / or with insufficient coverage.

On site after the demobilization of vehicles and equipment:

- Processing of bathymetric and morphological data using the following software:
  - o Raw data processing: Teledyne PDS 2000
  - o Bathymetric data processing: Surfer Release 15
  - o Backscatter morphological data processing: Teledyne PDS "Bottom Classification"
  - o Processing of morphological data Side Scan Sonar: EdgetechDiscover
  - o Realization of cartographic products and Shape files: Qgis

NAUTICAL VEHICLE

The proposed nautical vessel, owned by GE.CO. srl, has been designed and tested to be used as a hydrographic vessel within 6 miles from the coast.

The vessel is registered in the Register of Minor and Floating Ships with approval in **"Use on own account, within 6 miles from the coast, for investigation and monitoring activities at the service of companies and organizations in general"**; this particular approval facilitates obtaining the clearance to operate in port areas and / or in areas with limited and controlled navigation.

The main characteristics of the vehicle are set out below:

The main characteristics of the vehicle are set out below:

- **Model: BWA six-one**
- **Length: 6.01 m**
- **Width: 2.50 m**
- **Draft: 0.40 m**
- **Evinrude 150hp 4-stroke outboard engine**
- **Boat with low magnetic incidence**
- **Safety equipment**
- **Autopilot**
- **200 kHz depth sounder**
- **Sail again**
- **Cabin cruiser**
- **Permanent installation of the instrumentation that allow to reduce the time of mobilization / demobilization and calibration**
- **Reduced resistance to currents**
- **High maneuverability at low operating speeds**
- **Possibility of hosting 3 people on board in addition to the captain of the boat**
- **Trolleyable**
- **Large stern platform for safety launching of the instrumentation**

5. RESULTS

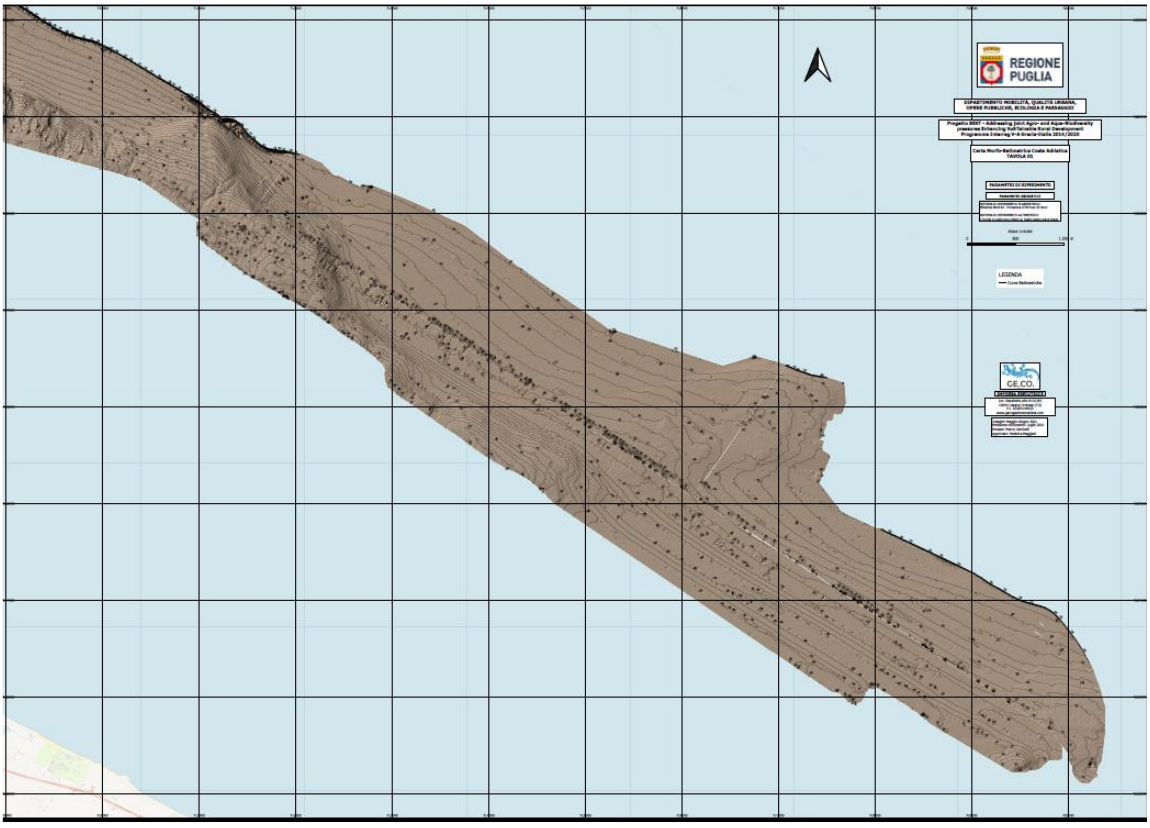
A. In the stretches of sea overlooking the areas considered within the pilot area and up to a depth of -60 m.

Morpho-bathymetric cartographic restitution and benthic and transitional priority habitats (Directive 92/43 / ecc.)

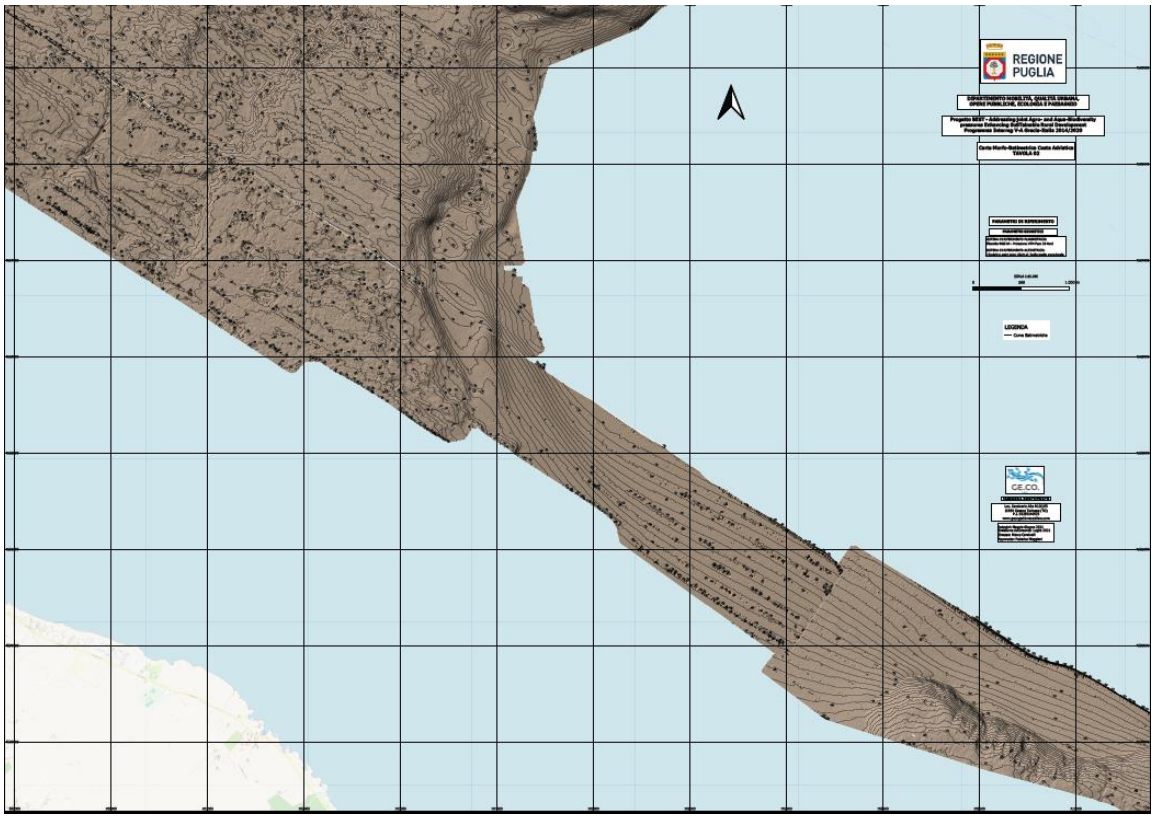
A morpho-bathymetric survey was carried out with the identification of the priority benthic and transition habitats of the areas not previously investigated by the Biomap campaign and up to the bathymetric depth of -60 meters.

5 Tables relating to Morpho-Bathymetric Maps, 5 Tables relating to Thematic Maps and a Charter called Union Framework were produced.

Regione Puglia_Costa Adriatica_Quadro di unione_Tavole 01-05

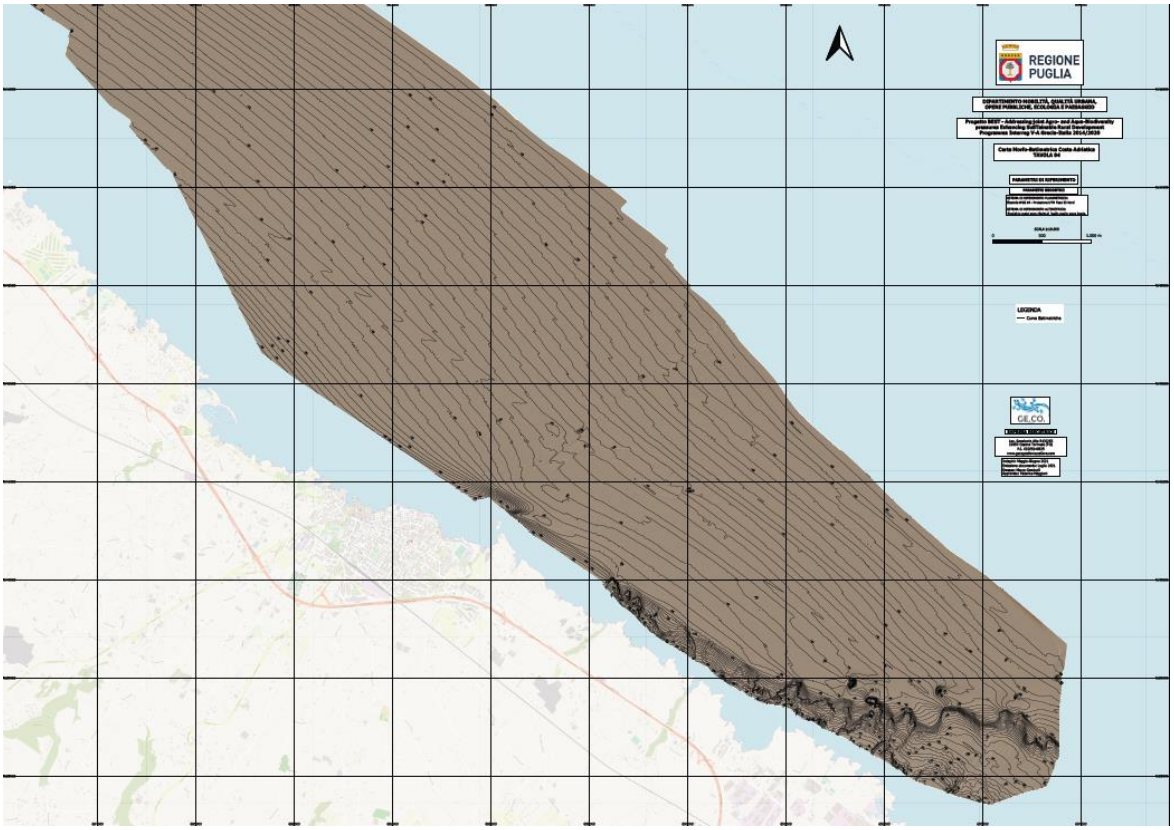


Regione Puglia_Carta Morfo-Batimetrica_Costa Adriatica_ Tavola 01



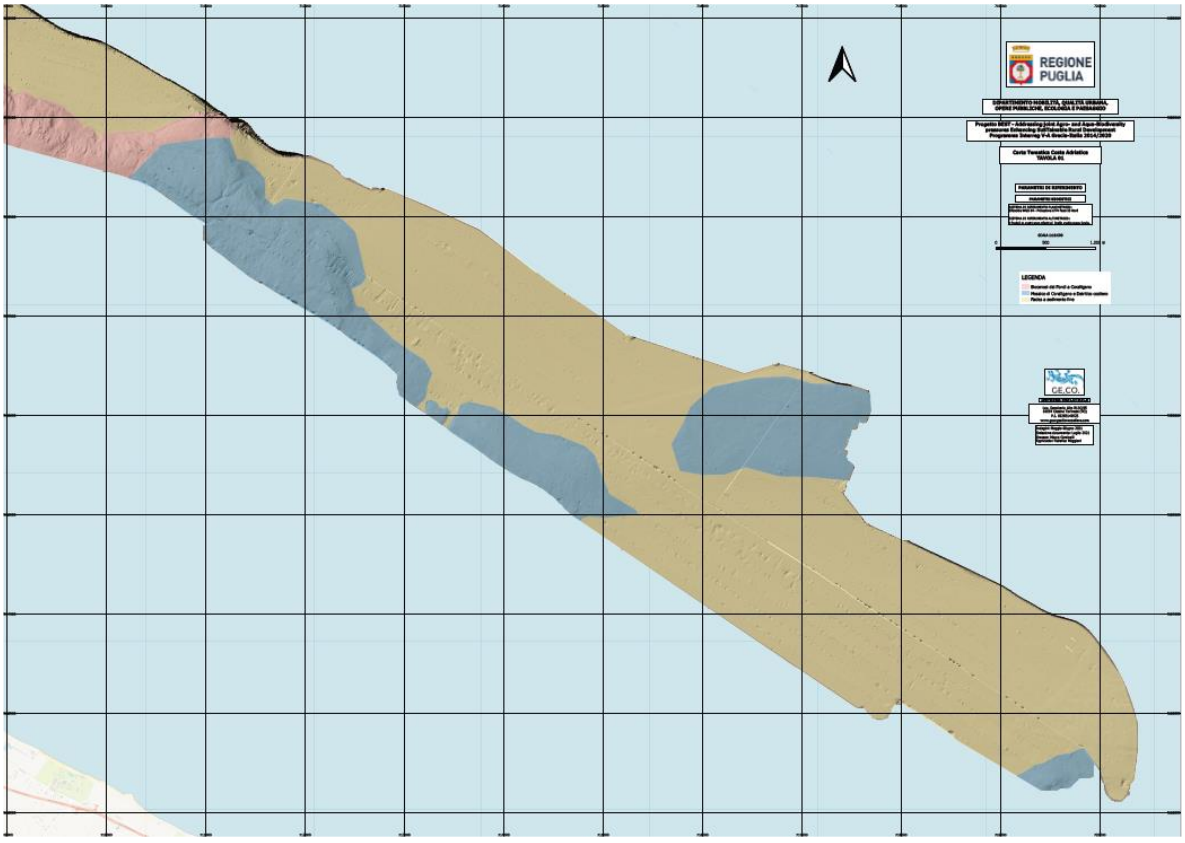
Regione Puglia_Carta Morfo-batimetrica_Costa Adriatica_ Tavola 02

Regione Puglia_Carta Morfo-Batimetrica_Costa Adriatica_ Tavola 03



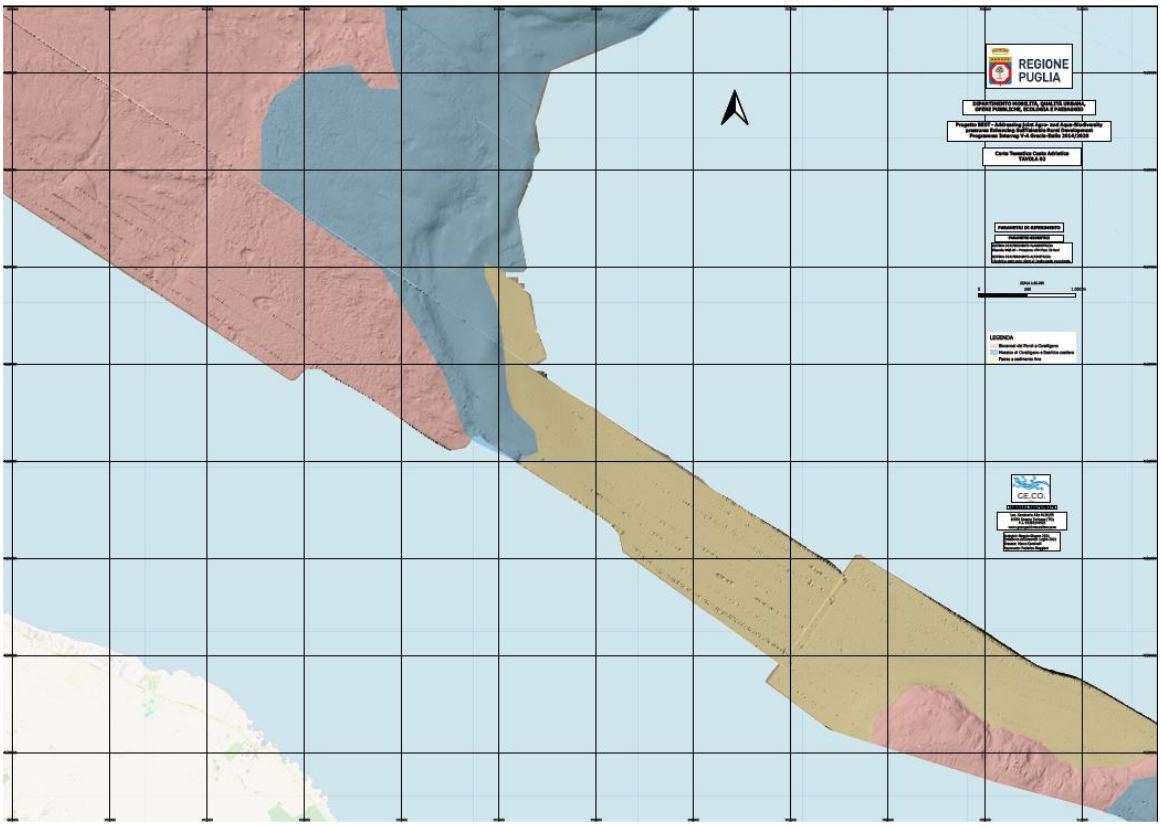
Regione Puglia_Carta Morfo-batimetrica_Costa Adriatica_ Tavola 04

Regione Puglia_Carta Morfo-batimetrica_Costa Adriatica_ Tavola 05



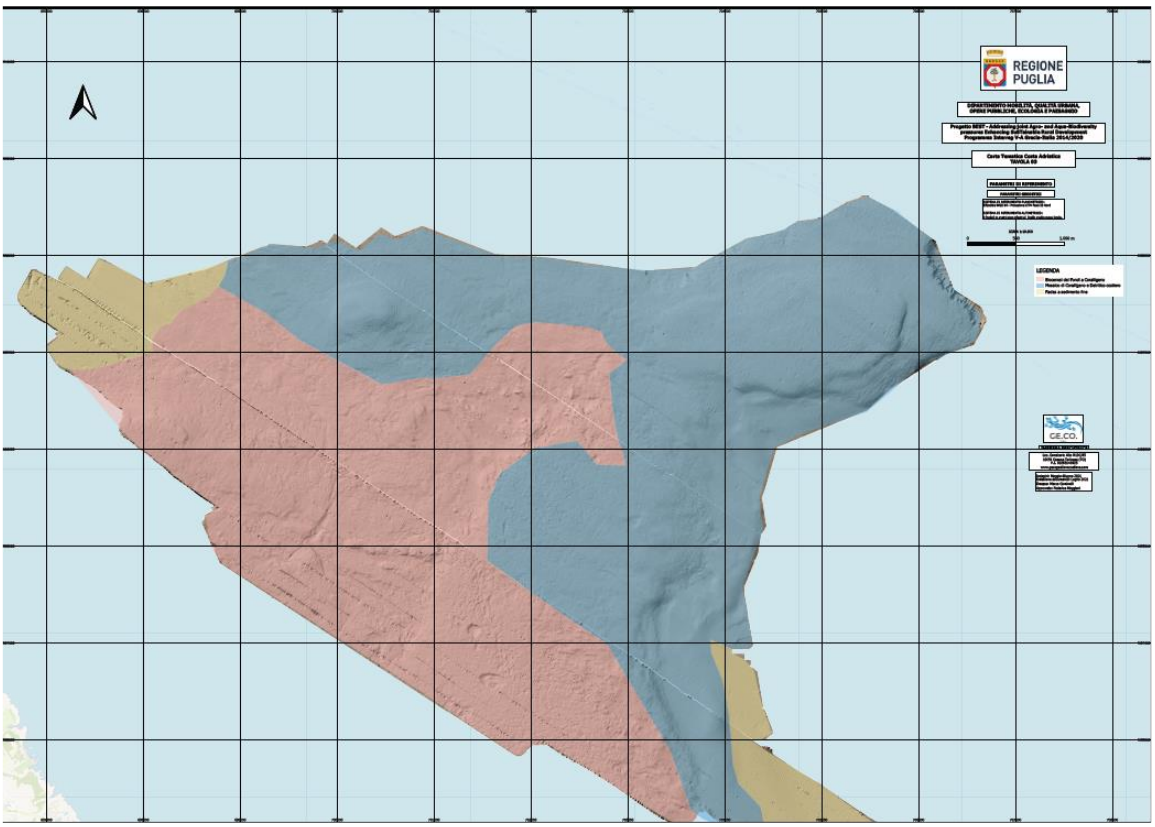
Regione Puglia_Carta Tematica_Costa Adriatica_ Tavola 01

In the table above, in correspondence with the most south-eastern area, we find a large area with “fine sediment facies” (brown color). We find a small area with "coastal coral and detrital mosaic" (blue color), which occurs further north between the bathymetric -35m and -50m. still proceeding towards NW we find an area identified as "Biocenosis of the coralligenous beds" (pink color).



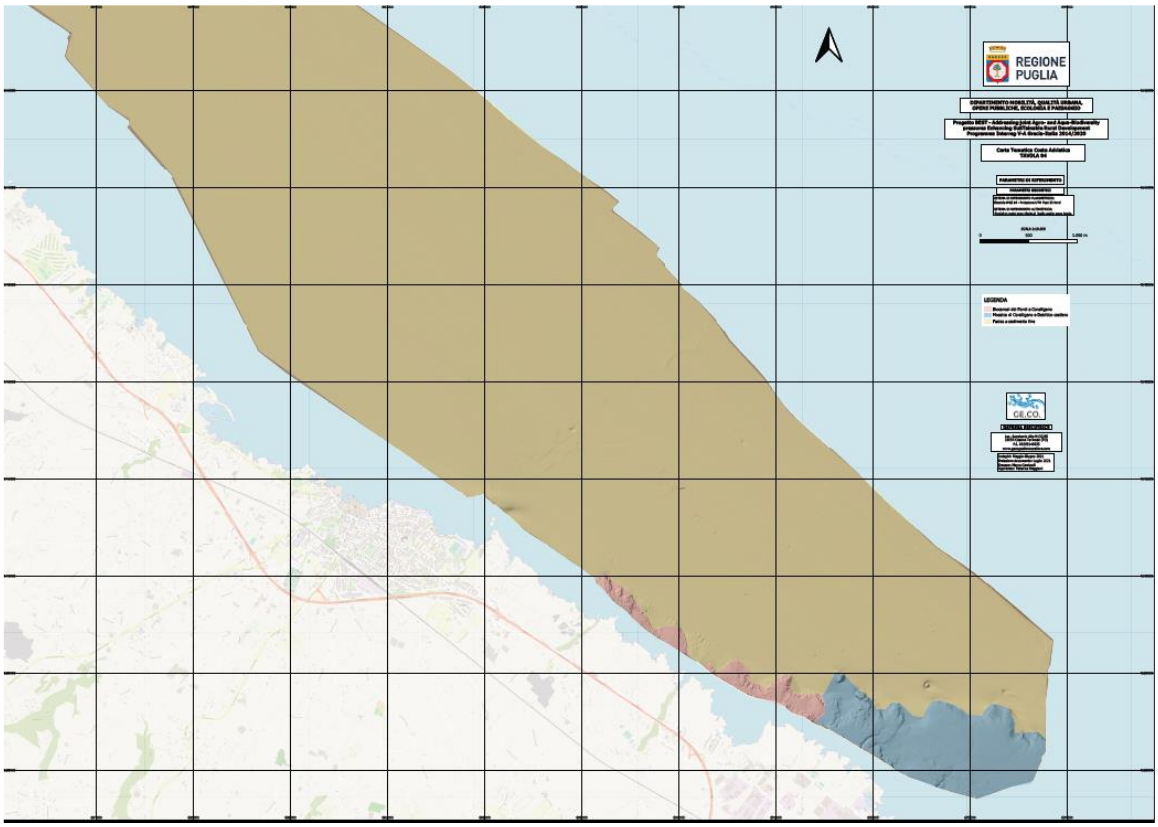
Regione Puglia_Carta Tematica_Costa Adriatica_ Tavola 02

In the second Table we find an area covered with fine sediments characterized by constant bathymetric curves. Subsequently, an area of "coastal coral and detrital mosaic" extends offshore; while towards the ground we find an area covered by "Biocenosis of the coralligenous beds".



Regione Puglia_Carta Tematica_Costa Adriatica_ Tavola 03

In Table 03 the “Biocenosis of coralligenous beds” alternate towards the ground and towards the open sea we find a seabed characterized as “Coralligenous mosaic and coastal detrital”.



Regione Puglia_Carta Tematica_Costa Adriatica_ Tavola 04

In Table 04 apart from a small offshoot to the south east covered by "Biocenosis of coralligenous beds" and by "Mosaic with coralligenous and coastal detrital", the remaining area investigated and characterized by the presence of fine sediment, as well as the underlying Table 05.

Regione Puglia_Carta Tematica_Costa Adriatica_ Tavola 05

CONCLUSIONS OF THE MBE SURVEY

The investigated areas find a confirmation with the previous investigations carried out in the Biomap project, as there is a natural continuation in the positioning of the biocenoses found. As regards the new surveys conducted in the BEST project, the most interesting area is certainly located off the SIC "Posidonieto San Vito-Barletta", from Monopoli to Egnazia Tower, and is visible in Table 03 where the coralligenous is well represented by a point of view both in extension and in biodiversity; in fact, a large area towards the ground alternates identified as "Biocenosis of coralligenous beds" and towards the open sea we find a large area of the seabed characterized as "Coralligenous mosaic and coastal detrital". It would be interesting to proceed with a new investigation starting from the aforementioned area in order to verify up to what depths the coralligenous extends offshore.

B. Areas of particular interest, identified in correspondence with the stretches of sea facing Ripagnola Coast (Polignano a mare), Park of the Coastal Dune Costiere da Torre Canne a San Leonardo (Fasano e Ostuni), Torre Pozzelle (Ostuni) e Mar Piccolo (Taranto) - Further information of the habitats 1170 (cliffs), 8330 (sea caves) and 1150 (coastal lagoons).

B. 1. Cliff habitat (Natura 2000 code: 1170)

"The coralligenous is a complex of biocoenoses rich in biodiversity that form a landscape of perennial and perennial animal and plant organisms with a more or less important concretion made up of calcareous algae". Ballesteros (2006) defines coralligenous as a hard, secondary substrate, formed by the concretion produced by organisms (both animal and vegetable) capable of producing limestone (calcium carbonate). The coralligenous can develop between 25 and 200 m of depth. The distribution of coralligenous is regulated by a combination of biotic and abiotic factors including light, nutrients, water circulation, temperature, sediment deposition and biological interactions. The coral structures for their formation have very specific needs: reduced brightness, low and relatively constant temperature, clear waters with little resuspension and hydrodynamics present, but not excessive. Coralligenous is a habitat characterized by a bioconstruction that is the result of the accumulation of carbonate skeletons that many plant and animal species produce and which give rise to macroscopic structures that are maintained over time. Calcareous red algae (Rhodophyta) belonging to the subclass of Corallinophycidae are the main builders of coralligenous. With increasing depth, the main builders become Lithophyllum frondosum, Lithophyllum stictiforme and Neogoniolithon mamillosum. The structures built by coralline algae are then strengthened by those organisms that are defined as secondary bioconstructors, such as the Peyssonneliaceae and various species of polychaetes, scleractinias (former madreporari) and bryozoans. The coral structures increase in size thanks to the progressive accumulation of the calcification product of successive generations of algae. The estimated growth rate for coralligenic concretions is about 0.006 / 0.83 mm per year (Ballesteros, 2006). The growth dynamics, however, is partly counterbalanced by mechanical demolition phenomena or by the action of demolition organisms that are able to pierce, crumble or dissolve calcium carbonate through different systems. Particularly important are the sponges (eg genus Cliona) and molluscs (eg the "date of the sea", genus Lithophaga). Coralligenous is considered the second most important "hot spot" of Mediterranean biodiversity, after the Posidonia oceanica meadows. However, in the absence of a precise estimate of the number of species present and given the structural complexity of its populations, it is believed that the coral habitat hosts more species than any other Mediterranean community. Bioconstruction leads to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The cavernous structure of the coralligenous hosts a very complex community of organisms dominated by filter feeders (sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates), while inside the cracks and interstices there is a very rich and diversified endofauna (polychaetes and crustaceans).

Below we find the evaluation of the transects on the basis of the qualitative and quantitative analyzes of the images. In the following transepts, with the expection of the transect 5, the sampling was carried out by

scuba diving at the point with the reported coordinates. This choice was proposed by us and accepted by the Puglia Region. The immersion allowed us to know the situation of the transept in situ and directly. As regards the significance of the sampling, the bathymatrics of the transepts remain constant along the entire length of the sampling, so that the data collection is reliable, as there are no variations in depth and therefore in light and temperature.

Ripagnola Coast (Polignano a mare)

Transept n.1: coord. start LAT 41,04116 LONG 17,17009 – coord. finish LAT 41,04391 LONG 17,298
Dive spot n.1: coord. LAT 41,04136 LONG 17,17031 **Depth:** - 26.2 m
The transept was evaluated by direct immersion and photographic survey with a 50x40 cm frame. The dive site has all the characteristics of a platform-type coralic biocenosis; the morphotype on which the coralligenous develops is mainly formed by mixed biogenic formations in blocks, whose cover with both vegetable and animal species of secondary bioconstructors such as the Peyssonneliaceae family in the case of plants and the Sclerattinie (ex Madreporari) (Leptopsammia pruvoti) , Bryozoans (*Pentapora fascialis* and *Myriapora truncata*), Polychaeta (*Serpula vermicularis*) in the case of animals, appears to be total. The bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in total biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.
There are no particular differences between the summer (June) and late summer (September) sampling.
The coralligenous of the transept examined has the following characteristics:
typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.
morphology of bioconstructions: platform
structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.
species of conservation interest: None
associated fauna: None
alien species: None
obvious disturbances: None
health status of structuring species: Good

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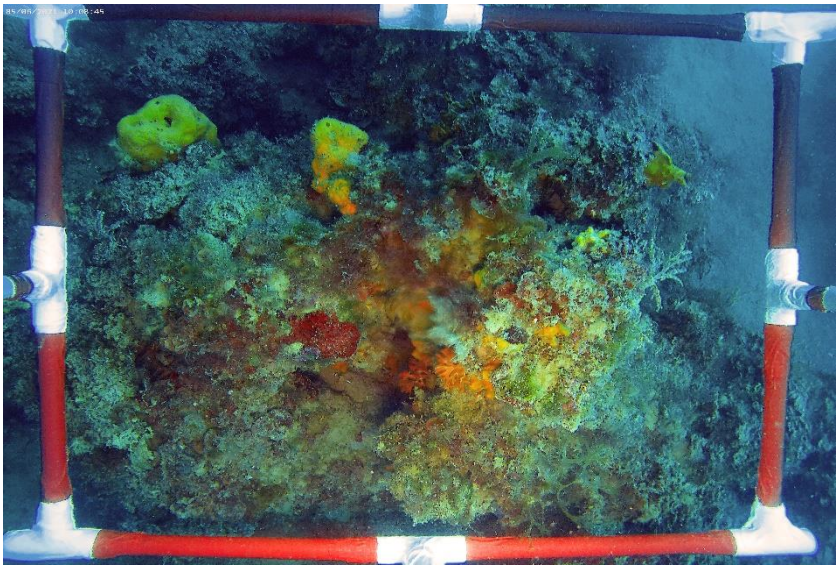

	Algae	Hydrozoans	Bryozoans	Ascidia	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Mollusccs
Jun	**Red:** *Mesophyllum Spp* *Nithophyllu Spp* *Amphiora Spp* **Brown:** *Dictyota dichotoma* *Zonaria tounefortii* **Green:** *Codium Spp*	*Sertularella Spp*	*Pentapora fascialis* *Reteporella grimaldii*		*Eunicella Spp* *Leptopsmmia pruvoti* *Cladocora caespitosa* *Cribinospis crassa*	*Bonelia viridis* *Filograna implexa*	*Axinella cannabina* *Axinella verrucosa* *Cliona SPP* *Ircinia SPP*	*Hacelia attenuata*	
Sep	**Red:** *Mesophyllum Spp* *Nithophyllu Spp* *Amphiora Spp* **Brown:** *Dictyota dichotoma* *Zonaria tounefortii* **Green:** *Codium Spp*	*Sertularella Spp*	*Pentapora fascialis* *Reteporella grimaldii*		*Eunicella Spp* *Leptopsammi a pruvoti* *Cladocora caespitosa*	*Bonelia viridis* *Filograna implexa*	*Axinella cannabina* *Cliona SPP* *Ircinia SPP* *Petrosia ficiformis*	*Hacelia attenuata*	

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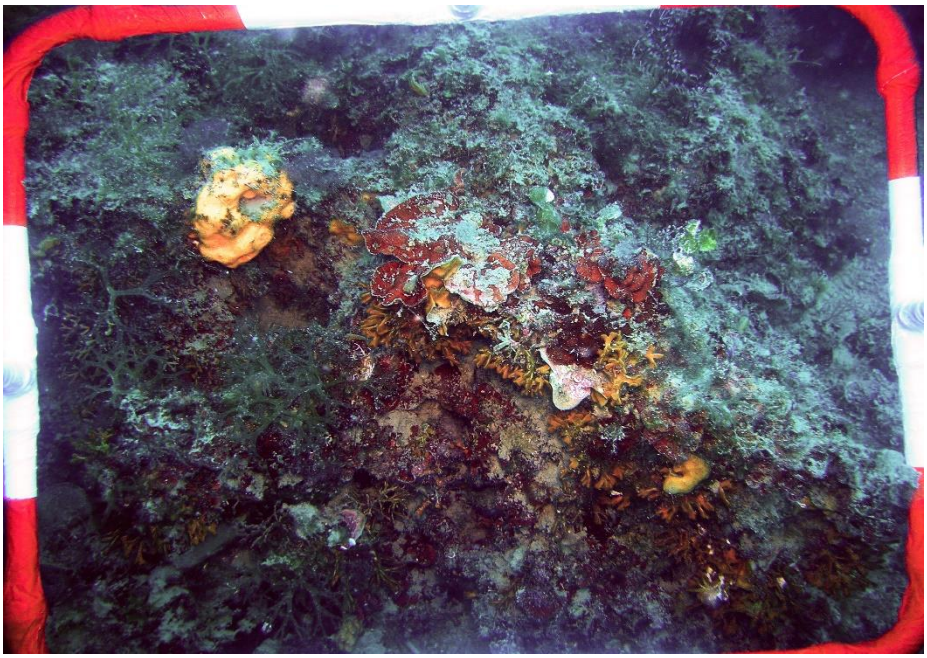
Transept n. 2: coord. start LAT 41,04015 LONG 17,17198 – coord. finish LAT 41,04304 LONG 17,17485
Dive spot n.2: coord. LAT 41,04029 LONG 17,17211 **Depth:** - 23.7 m

The transept was evaluated by direct immersion and photographic survey with a 50x40 cm frame. The diving point has all the characteristics of a platform-type coralic biocenosis, the morphotype on which the coralligenous develops is mainly composed of mixed biogenic formations in blocks whose coverage with both vegetable and animal species of secondary bioconstructors such as the family of the Peyssonneliaceae in the case of plants and the Sclerattinie (ex Madreporari) (*Leptopsammia pruvoti*), Bryozoans (*Pentapora fascialis* and *Myriapora truncata*), Polychaetes (*Serpula vermicularis*) in the case of animals, appears to be total. Also in the case of this transept, the bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.
There are no particular differences between the summer (June) and late summer (September) sampling.
The coralligenous of the transept examined has the following characteristics:
typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.
morphology of bioconstructions: platform
structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.
species of conservation interest: None
associated fauna: None
alien species: None
obvious disturbances: None
health status of structuring species: Good



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	Algae	Hydrozoans	Bryozoans	Ascidia	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Mollusccs
Jun	**Red:** *Mesophyllum Spp* *Nithophyllu Spp* *Amphiora Spp* **Brown:** *Dictyota dichotoma* *Zonaria tounefortii* **Green:** *Codium Spp*	*Sertularella Spp*	*Pentapora fascialis* *Reteporella grimaldii*		*Eunicella Spp* *Leptopsammia pruvoti* *Cladocora caespitosa* *Cribinospis crassa*	*Bonelia viridis* *Filograna implexa*	*Axinella cannabina* *Axinella verrucosa* *Cliona SPP* *Ircinia SPP*	*Hacelia attenuata*	
Sem	**Red:** *Mesophyllum Spp* *Nithophyllu Spp* *Amphiora Spp* **Brown:** *Dictyota dichotoma* *Zonaria tounefortii* **Green:** *Codium Spp*	*Sertularella Spp*	*Pentapora fascialis* *Reteporella grimaldii*		*Eunicella Spp* *Leptopsammia pruvoti* *Cladocora caespitosa*	*Bonelia viridis* *Filograna implexa*	*Axinella cannabina* *Cliona SPP* *Ircinia SPP* *Petrosia ficiformis*	*Hacelia attenuata*	

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Transept n. 3 coord start LAT 40,97399 LONG 17,28060 – coord. finish LAT 40,97759 LONG 17,28077

Dive spot n.3: coord. LAT 40,97738 LONG 17,28076 **Depth:** - 26.8 m

The transept was evaluated by direct immersion and photographic survey with a 50x40 cm frame. The dive site has all the characteristics of a platform-type coralic biocenosis; the morphotype on which the coralligenous develops is mainly formed by mixed biogenic formations in blocks whose coverage with both vegetable and animal species of secondary bioconstructors such as the Peyssonneliaceae family in the case of plants and the Sclerattinie (ex Madreporari) (*Leptopsammia pruvoti*), Bryozoans (*Pentapora fascialis* and *Myriapora truncata*), Polychaeta (*Serpula vermicularis*) in the case of animals, appears to be total. Also in the case of this transept, the bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.

There are no particular differences between the summer (June) and late summer (September) sampling.

The coralligenous of the transept examined has the following characteristics:

typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.

morphology of bioconstructions: platform

structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.

species of conservation interest: None

associated fauna: None

alien species: None

obvious disturbances: None

health status of structuring species: Good

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	Algae	Hydrozoans	Bryozoans	Ascidia	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Molluscs
Jun	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp Peyssonellia spp* **Brown:** *Dictyota dichotoma*	*Sertularella Spp*	*Pentapora fascialis*		*Leptopsammia pruvoti*	*Filograna implexa*	*Axinella cannabina Cliona SPP Ircinia SPP Petrosia ficiformis*	*Sphaerechinus granularis Echinaster spp*	*Discodoris atromaculata Flabellina Spp*
Sep	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp Peyssonellia spp* **Brown:** *Dictyota dichotoma*	*Sertularella Spp*	*Pentapora fascialis*		*Leptopsammia pruvoti Cladocora caespitosa*	*Filograna implexa*	*Axinella cannabina Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis*	*Sphaerechinus granularis*	*Discodoris atromaculata Flabellina Spp*

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Transept n. 4 coord. start LAT 40,97723 LONG 17,26792 – coord. finish LAT 40,97898 LONG 17,27205
Dive spot n.4: coord. LAT 40.97894 LONG 17.27197 Prof. **Depth: -** 32 m

The transept was evaluated by direct immersion and photographic survey with a 50x40 cm frame. The dive site has all the characteristics of a platform-type coralligenous biocenosis. The morphotype on which the coralligenous develops is mainly formed by mixed biogenic formations in blocks whose cover with both vegetable and animal species of secondary bioconstructors such as the Peyssonneliaceae family in the case of plants and the Sclerattinie (ex Madreporari) (*Leptopsammia pruvoti*), Bryozoans (*Pentapora fascialis* and *Myriapora truncata*), Polychaeta (*Serpula vermicularis*) in the case of animals, appears to be total. Also in the case of this transept, the bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.

The coralligenous of the transept examined has the following characteristics:
typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.
morphology of bioconstructions: platform
structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.
species of conservation interest: None
associated fauna: None
alien species: None
obvious disturbances: None
health status of structuring species: Good

	Algae	Hydrozoans	Bryozoans	Ascidie	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Molluscs
Jun	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp*	*Sertularella Spp*	*Pentapora fascialis*		*Leptopsammia pruvoti Cladocora caespitosa*	*Filograna implexa*	*Axinella cannabina Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis*	*Sphaerechinus granularis*	*Discodoris atromaculata Flabellina Spp*
Sem	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp*	*Sertularella Spp*	*Pentapora fascialis smittina cervicornis*		*Eunicella Spp Leptopsammia pruvoti Cladocora caespitosa*	*Filograna implexa*	*Axinella cannabina Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis Spirastrella Spp*	*Sphaerechinus granularis*	*Discodoris atromaculata Flabellina Spp*

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Parco delle dune costiere da Torre Canne a San Leonardo (Fasano e Ostuni)

Transept n.5 coord. start LAT 40,89141 LONG 17,47464 – coord. finish LAT 40,88409 LONG 17,49114

The 4 transepts, of 400 meters each, were joined in a single transept of 1,600 meters, in agreement with the client, after having carried out and analyzed the data produced by the MBE survey in the area and investigated with ROV technology. The photographic analysis of the transept was carried out by obtaining the images from the video of the ROV.

The transept has all the characteristics of a platform type coraliggeno biocenosis, the morphotype on which the coralligenous develops is mainly formed by mixed biogenic formations in blocks whose coverage with both vegetable and animal species of secondary bioconstructors such as the Peyssonneliaceae family in the case of vegetables and the Sclerattinie (ex Madreporari) (*Leptopsammia pruvoti*), Bryozoans (*Pentapora fascialis* and *Myriapora truncata*), Polychaetes (*Serpula vermicularis*) in the case of animals, it appears to be total. Also in the case of this transept, the bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.

There are no particular differences between the summer (June) and late summer (September) sampling.

The coralligenous of the transept examined has the following characteristics:

typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.

morphology of bioconstructions: platform

structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.

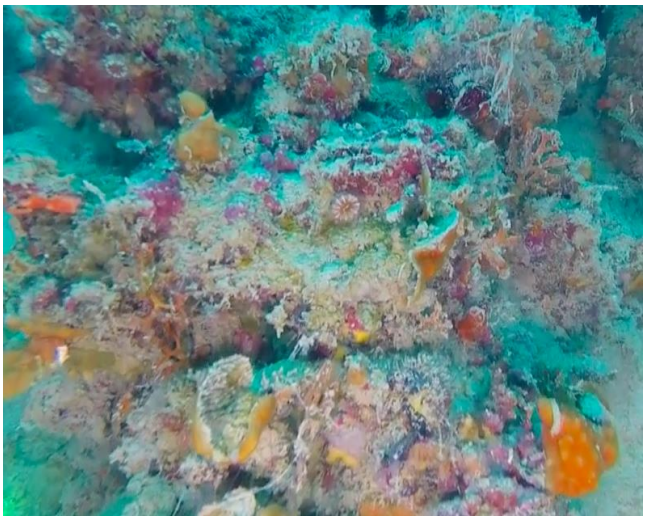
species of conservation interest: Centrostephanus longispinus

associated fauna: Octopus vulgaris, Palinurus elephas

alien species: None

obvious disturbances: None

health status of structuring species: Good



Being a transept carried out by ROV, the following parameters were also collected according to the methodological sheet of MODULE 7 - Coralligenous habitat of the MATTM as referred to in point B3 of the invitation letter.

Habitat condition With reference to the analysis of geo-referenced videos, the following parameters were calculated:

Specific and / or taxonomic wealth:

total number of taxa 36

	Algae	Hydrozoans	Bryozoans	Ascidia	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Molluscs
Jun	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp Peyssonneli a spp* **Brown:** *Dictyota dichotoma* **Green:** *Codium Spp*	*Sertularella Spp*	*Pentapora fascialis smittina cervicornis*	*Clavelina spp Ascidia spp Halocinth ya papillosa*	*Eunicella Spp Leptopsammia pruvoti Alcyonium spp Parazoanthus axinellae Cerianthus spp Caryophylla spp Cladocora cespitosa*	*Filograna implexa Sabella SPP*	*Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis Spirastrella Spp Phorbas tenacior Crambe crambe Axinella spp Dysidea spp Spongia agaricina Dysidea spp Terpios caerulea*	*Centrostephanus longispinus Ophidiaster spp*	*Octopus vulgaris*
Sep	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp Peyssonneli a spp* **Brown:** *Dictyota dichotoma* **Green:** *Codium Spp*	*Sertularella Spp Eudendrium*	*Pentapora fascialis smittina cervicornis*	*Clavelina spp Ascidia spp Halocinth ya papillosa*	*Eunicella Spp Leptopsammia pruvoti Alcyonium spp Parazoanthus axinellae Cerianthus spp Caryophylla spp Cladocora cespitosa*	*Filograna implexa Sabella SPP*	*Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis Spirastrella Spp Phorbas tenacior Crambe crambe Axinella spp Dysidea spp Spongia agaricina Dysidea spp Terpios caerulea*	*Holoturia Spp Ophidiaster spp*	

There is no anthropogenic waste along the transept. there are no colonies and / or individuals affected by the presence of fishing gear (entrapment)

Structuring species:

- *Mesophyllum Spp*
- *Nithophyllu Spp*
- *Pentapora fascialis*
- *Cladocora cespitosa*
- *Axinella cannubina*

Structuring spe	**Specific abundance / number of colonies / individuals per m2**	**Health state percentage of epibiosis and / or necrosis (<25%, 25%-50%; 50%-75%; 75%>);**	**Height Settler / individuals**
• *Pentapora fascialis*	2	<25%,	15 cm
• *Cladocora cespitosa*	2	<25%,	10 cm
• *Axinella cannabina*	5	<25%,	25 cm

For the two genera of benthic macrophytes (*Lithophyllum* spp and *Mesophyllum* spp) the parameters were calculated in according to Module 7- Marine Strategy Methodology.

Macrofita	% copertura	Stato di salute – percentuale di epibiosi e/o necrosi (<25%, 25%-50%; 50%-75%; 75%>)	Prof. – metri	Morfologia sub.	Inclinazione del sub (<30°, 30-80°, >80°)	Espos	Copertura Sed.	Biocov	coralligeno
Lithophyllum spp	<25%	<25%	45	Blocchi Form. Biogeniche	30-80°	NE	60%	++	Copertura a corralina
Mesophyllum spp	<25%	<25%	45	Blocchi Form. Biogeniche	30-80°	NE	65%	++	Copertura a corralina

Torre Pozzelle (Ostuni)

Transept n. 6: coord. start LAT 40,78251 LONG 17,66517 – coord. finish LAT 40,78566 LONG 17,66722

Dive spot n.6: coord. LAT 40,78288 LONG 17,66541 **Deep:** - 23.7 m

The transept was evaluated by direct immersion and photographic survey with a 50x40 cm frame. The dive site has all the characteristics of a platform-type coralligenous biocenosis; the morphotype on which the coralligenous develops is mainly formed by biogenic formations whose cover with both vegetable and animal species of secondary bioconstructors such as the Peyssonneliaceae family in the case of plants and the Sclerattinie (ex Madreporari) (*Leptopsammia pruvoti*), Bryozoans (*Pentapora fascialis* and *Myriapora truncata)*, Polychaeta (*Serpula vermicularis*) in the case of animals, appears to be total. Also in the case of this transept, the bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.
There are no particular differences between the summer (June) and late summer (September) sampling.

The coralligenous of the transept examined has the following characteristics:
typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.
morphology of bioconstructions: platform
structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.
species of conservation interest: None
associated fauna: None
alien species: Caulerpa racemosa
obvious disturbances: None
health status of structuring species: Good

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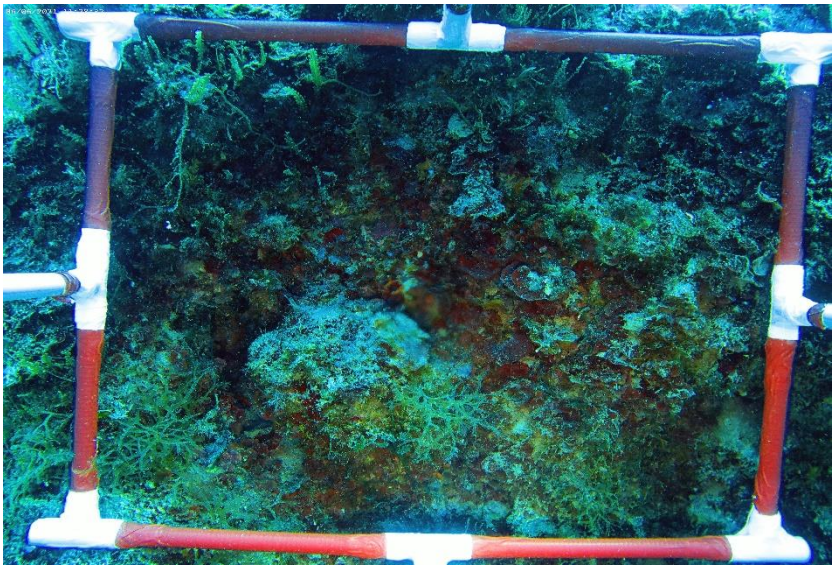

	Algae	Hydrozoans	Bryozoans	Ascidia	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Molluscs
Jun	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp* **Brown:** *Dictyota dichotoma* **Green:** *Codium Spp Caulerpa racemosa (sp Aliena)*	*Sertularella Spp*	*Pentapora fascialis smittina cervicornis*		*Eunicella Spp Leptopsammia pruvoti*	*Filograna implexa Sabella SPP*	*Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis Spirastrella Spp*		
Sem	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp Chrysimenia ventricosa Dudresnaya verticillata* **Brown:** *Dictyota dichotoma* **Green:** *Codium Spp Caulerpa racemosa (sp Aliena)*	*Sertularella Spp Eudendrium*	*Pentapora fascialis*		*Eunicella Spp Leptopsammia pruvoti*	*Filograna implexa Sabella SPP*	*Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis Spirastrella Spp*	*Holoturia Spp*	

Transept n. 7: coord. start LAT 40,78176 LONG 17,66699 – coord. finish LAT 40,78501 LONG 17,66911

Dive spot n.7: coord. LAT 40,78438 LONG 17,66870 **Depth:** - 27.4 m

The transept was evaluated by direct immersion and photographic survey with a 50x40 cm frame. The dive site has all the characteristics of a platform-type coralligenous biocenosis; the morphotype on which the coralligenous develops is mainly formed by biogenic formations whose cover with both vegetable and animal species of secondary bioconstructors such as the Peyssonneliaceae family in the case of plants and the Sclerattinie (ex Madreporari) (*Leptopsammia pruvoti*), Bryozoans (*Pentapora fascialis* and *Myriapora truncata*), Polychaeta (*Serpula vermicularis*) in the case of animals, appears to be total. Also in the case of this transept, the bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.
There are no particular differences between the summer (June) and late summer (September) sampling.

The coralligenous of the transept examined has the following characteristics:
typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.
morphology of bioconstructions: platform
structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.
species of conservation interest: None
associated fauna: None
alien species: Caulerpa racemosa
obvious disturbances: None
health status of structuring species: Good

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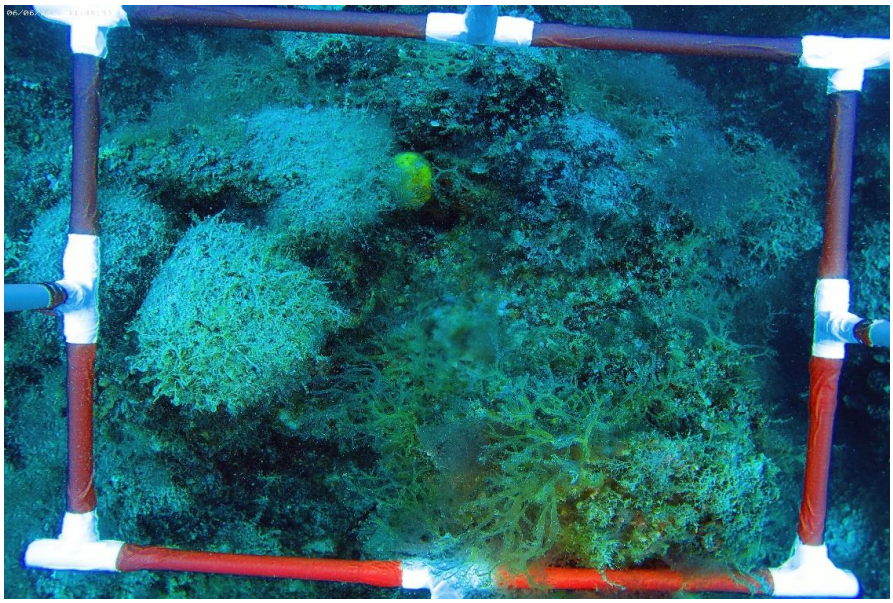

	Algae	Hydrozoans	Bryozoans	Ascidia	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Molluscs
Jun	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp* **Brown:** *Dictyota dichotoma* **Green:** *Codium Spp Caulerpa racemosa (sp Aliena)*	*Sertularella Spp*	*Pentapora fascialis Smittina cervicornis*		*Eunicella Spp Leptopsammia pruvoti*	*Filograna implexa Sabella SPP*	*Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis Spirastrella Spp*		
Sem	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp Chrysimenia ventricosa Dudresnaya verticillata* **Brown:** *Dictyota dichotoma* **Green:** *Codium Spp Caulerpa racemosa (sp Aliena)*	*Sertularella Spp Eudendrium*	*Pentapora fascialis*		*Eunicella Spp Leptopsammia pruvoti*	*Filograna implexa Sabella SPP*	*Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis Spirastrella Spp*	*Holoturia Spp*	

Transept n. 8: coord. start LAT 40,78277 LONG 17,67678 – coord. finish LAT 40,78598 LONG 17,67904

Dive spot n.8: coord. LAT 40,78378 LONG 17,67749 **Depth:** - 27.4 m

The transept was evaluated by direct immersion and photographic survey with a 50x40 cm frame. The dive site has all the characteristics of a platform-type coralligenous biocenosis; the morphotype on which the coralligenous develops is mainly formed by biogenic formations whose cover with both vegetable and animal species of secondary bioconstructors such as the Peyssonneliaceae family in the case of plants and the Sclerattinie (ex Madreporari) (*Leptopsammia pruvoti*), Bryozoans (*Pentapora fascialis* and *Myriapora truncata*), Polychaeta (*Serpula vermicularis*) in the case of animals, appears to be total. Also in the case of this transept, the bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.
There are no particular differences between the summer (June) and late summer (September) sampling.

The coralligenous of the transept examined has the following characteristics:
typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.
morphology of bioconstructions: platform
structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.
species of conservation interest: None
associated fauna: None
alien species: Caulerpa racemosa
obvious disturbances: None
health status of structuring species: Good

	Algae	Hydrozoans	Bryozoans	Ascidia	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Molluscs
Jun	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp* **Brown:** *Dictyota dichotoma Zonaria tounefortii* **Green:** *Codium Spp Halimeda tuna Caulerpa racemosa (sp Aliena) Flabellia petiolata*	*Sertularella Spp*	*Pentapora fascialis smittina cervicornis*		*Eunicella Spp Leptopsammia pruvoti Cladocora caespitosa*	*Filograna implexa*	*Axinella cannabina Axinella verrucosa Cliona SPP Ircinia SPP Petrosia ficiformis Spirastrella Spp*		
Sep	**Red:** *Mesophyllum Spp Nithophyllu Spp Amphiora Spp* **Brown:** *Dictyota dichotoma Zonaria tounefortii* **Green:** *Codium Spp Caulerpa racemosa (sp Aliena)*	*Sertularella Spp*	*Pentapora fascialis*		*Eunicella Spp Leptopsammia pruvoti Cladocora caespitosa*	*Filograna implexa*	*Axinella cannabina Axinella verrucosa Cliona SPP Ircinia SPP Chondrilla mucula*	*Hacelia attenuata*	

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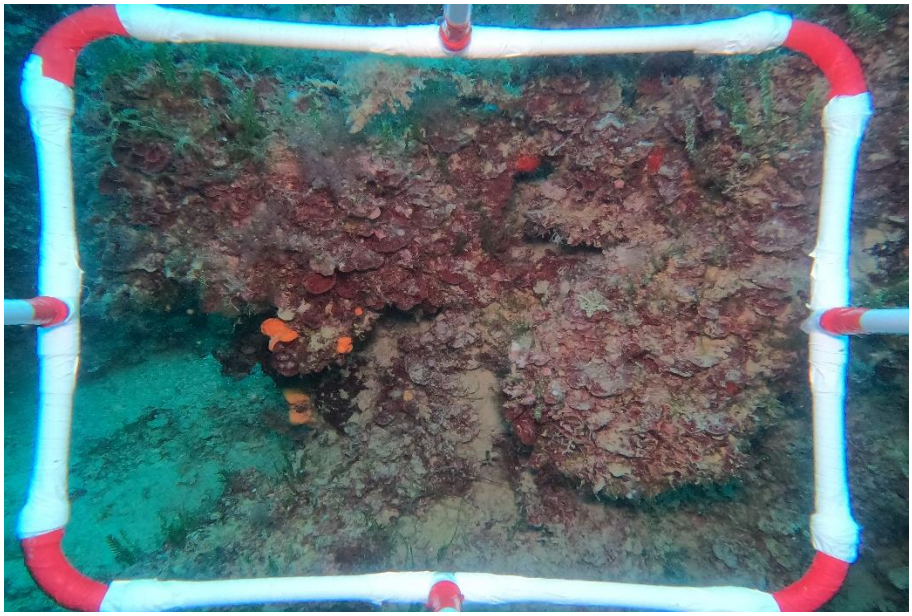
Transept n. 9: coord. start LAT 40,78211 LONG 17,67862 – coord. finish LAT 40,78537 LONG 17,68097

Dive spot n.9: coord. LAT 40,78519 LONG 17,68083 **Deep:** -29.3m

The transept was evaluated by direct immersion and photographic survey with a 50x40 cm frame. The diving point has all the characteristics of a platform-type coralligenous biocenosis The morphotype on which the coralligenous develops is mainly formed by biogenic formations whose cover with both vegetable and animal species of secondary bioconstructors such as the Peyssonneliaceae family in the case of plants and the Sclerattinie (ex Madreporari) (*Leptopsammia pruvoti*), Bryozoans (*Pentapora fascialis* and *Myriapora truncata)*, Polychaetes (*Serpula vermicularis*) in the case of animals, is total. Also in the case of this transept, the bioconstructions present have led to an increase in spatial heterogeneity, to greater structural complexity and therefore to an enrichment in the microhabitat resulting in an increase in biodiversity. The observed coralligenous structure hosts a very complex community of mostly filtering organisms such as sponges, hydrozoans, anthozoans, bryozoans, serpulids, molluscs, tunicates, although there is also a rich and diverse endofauna composed of polychaetes and echinoderms.
There are no particular differences between the summer (June) and late summer (September) sampling.

The coralligenous of the transept examined has the following characteristics:
typology of bioconstructions: Calcareous red algae (Rhodophyta), scleractinie.
morphology of bioconstructions: platform
structuring species: Red, brown, green algae, hydrozoans, anthozoans, molluscs, sponges, sea squirts, polychaetes, actinia.
species of conservation interest: None
associated fauna: None
alien species: Caulerpa racemosa
obvious disturbances: None
health status of structuring species: Good



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	Algae	Hydrozoans	Bryozoans	Ascidia	Anthozoans / actinia	Polychaetes / Annelids	Sponges	Echinoderms	Molluscs
Jun	**Red:** *Mesophyllum Spp* *Nithophyllu Spp* *Amphiora Spp* **Brown:** *Dictyota dichotoma* *Zonaria tounefortii* **Green:** *Codium Spp* *Halimeda tuna* *Caulerpa racemosa (sp Aliena)* *Flabellia petiolata*	*Sertularella Spp*	*Pentapora fascialis* *Smittina cervicornis*		*Eunicella Spp* *Leptopsammia pruvoti* *Cladocora caespitosa*	*Filograna implexa*	*Axinella cannabina* *Axinella verrucosa* *Cliona SPP* *Ircinia SPP* *Petrosia ficiformis* *Spirastrella Spp*		
Sep	**Red:** *Mesophyllum Spp* *Nithophyllu Spp* *Amphiora Spp* **Brown:** *Dictyota dichotoma* *Zonaria tounefortii* **Green:** *Codium Spp* *Caulerpa racemosa (sp Aliena)*	*Sertularella Spp*	*Pentapora fascialis*		*Eunicella Spp* *Leptopsammia pruvoti* *Cladocora caespitosa*	*Filograna implexa*	*Axinella cannabina* *Axinella verrucosa* *Cliona SPP* *Ircinia SPP* *Chondrilla mucula*	*Hacelia attenuata*	

CONCLUSIONS

From the analysis of the data collected, it appears that the coralligenous of the various locations studied in the area of interest is characterized by high variability in terms of population structure. This variability can be caused by a combination of different processes, which operate at different scales. Certainly, anthropogenic activities, both individually and in combination with each other, add a further source of variability, plausibly causing different changes depending on the type of activity that persists in the different areas.

Generally there is an evident difference in the populations depending on the type and interaction of the different impacts. Transept 5 is, among those analyzed, the one that has the most heterogeneous population, and also where species of conservation interest have been found, probably due to the greater depth and consequently less presence of light and greater hydrodynamics.

The coralligenous observed is characterized by the presence of taxa such as *Pentapora fascialis*, *Crambe crambe*, encrusting Corallinacee, it is therefore a three-dimensional population. This trend can be partly explained if we consider that we are in an area that tends to be subject to a moderate impact, due to little controlled but less intense fishing activities than in other areas.

Overall, the results obtained show that the sites examined do not show noteworthy changes depending on the summer season (June) and late summer (September).

An important note is the presence in transepts 6, 7, 8 and 9 of *Caulerpa racemosa*. This invasive species represents an important threat to the coral communities in the Mediterranean as it forms dense persistent mats capable of trapping sediments with the consequent suffocation of the species that characterize the coral.

The information obtained regarding the distribution patterns of the coralligenous populations in the area under examination indicate a state of health that overall appears to be good, as well as the three-dimensional nature of the sites themselves. The possible influence of the sources of impact must be controlled and monitored, in particular anthropogenic activities such as fishing, naval traffic and recreational tourism

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B.2 Habitat of submerged or semi-submerged sea caves (Natura 2000 code: 8330), in the stretches of coast in Costa Ripagnola and Torre Pozzelle

Below we see in detail the results found in the individual caves, in the two campaigns: pre-summer and late summer.

GROTTA DI SANTA CATERINA 1

Description:

GE.CO.-GESTIONE COSTIERA SRL con denominazione abbreviata GE.CO.SRL
Loc. San Sicario Alto, Residence 13C App.65 Cesana Torinese (TO)
P.I. 03265140925
Telefono +39 0122863082 Mobile +39 3505287750
info.geco.srl@gmail.com ge.co.srl@pec.it
Capitale sociale interamente versato € 100.000,00

The caves of Santa Caterina are wedged into the cliff for many tens of meters and offer a small pebble beach on the inside. They open for couples near the well-known Tuccino restaurant. The first cave presents at its entrance large boulders fallen due to a previous collapse of the vault, and an easy entrance. The second is larger than the first, which is entered through a very large entrance. The cave develops on a regular basis presenting a hard bottom and having an average depth of less than 3 meters. The inclination of the walls ranges from 30 to 45 degrees with exposure to E.

Map:

Position with respect to the coast: coastal cave
Geographical coordinates: 41.002700N - 17.203173E
Exposure along the coast line: NW
Typology: Semi-submerged
Depth: 2 meters
Number of entry : 1
Entrance height : 5 meters
Entrance orientacion: N
Extension: less than 100 square meters
Fund type: Bioclastic
Gradient of the cave: light, semi-darkness, darkness

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES CAVE SANTA CATERINA 1-JUNE

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
Light 85%	**Red:** • *Mesophyllum Spp* • *Nithophyllu*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
darkness 70%					• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV : There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES CAVE SANTA CATERINA 1-SEPTEMBER

The cave has all three relative light gradients; a decrease in the species present is observed with the decrease in the presence of light. There is a low presence of species probably due to disturbances related to the anthropogenic activity of the guided tours and in particular at the entrance of the boats inside the caves. No species of conservation significance were found.

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FINAL REPORT

GROTTA DI SANTA CATERINA 2

Description:

The caves of Santa Caterina are wedged into the cliff for many tens of meters and offer a small pebble beach on the inside. They open for couples near the well-known Tuccino restaurant. The first cave has large boulders at its entrance, yielded due to a previous collapse of the vault, and an easy entrance. The second is larger than the first one, which is entered through a very large entrance. Both are worth a visit coming from the open sea but it is possible to resume their conformation from a small external rocky outcrop. The cave develops on a regular basis presenting a hard bottom and having an average depth of less than 2 meters. The inclination of the walls is 90 degrees with NW exposures.

FINAL REPORT

Map:

Position with respect to the coast: coastal cave

Geographical coordinates: 41.002911N – 17.202817E

Exposure along the coast line: NW

Typology: Semi-submerged

Depth: 2 meters

Number of entry : 1

Entrance height : 5 meters

Entrance orientacion: N

Extension: less than 100 square meters

Fund type: Bioclastic

Gradient of the cave:, light semi-darkness, darkness

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES CAVE SANTA CATERINA 2 JUNE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 85%	**Red:** • *Mesophyllum Spp*				• *Ircinia SPP* • *Petrosia ficiformis*		
semi-darkness 100%	**Red:** • *Mesophyllum Spp*				• *Cliona SPP* • *Ircinia SPP*		
darkness 70%					• *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

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TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES CAVE SANTA CATERINA 2 JUNE SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 90%	**Rosse:** • *Mesophyllum Spp* • *Nithophyllu Spp* **Brune:** **Verdi:**				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
semi-darkness 90%	**Rosse:** • *Mesophyllum Spp* • *Nithophyllu Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
darkness 70%			• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three relative light gradients; a decrease in the species present is observed with the decrease in the presence of light. There is a low presence of species probably due to disturbances related to the anthropogenic activity of the guided tours and in particular at the entrance of the boats inside the caves. No species of conservation significance were found.

FINAL REPORT

GROTTA CHIAR DI LUNA

DESCRIPTION

The Chiar di Luna cave has a fairly indented elliptical shape, it appears to be semi-submerged and partially encumbered by collapsed boulders. The physical conditions of the cave, partly occupied by the boulders of the collapse of the vault, did not allow for monitoring, moreover there is no minimum depth to have the light gradients necessary for the purposes of the sampling itself.Position with respect to the coast: coastal cave.

Geographical coordinates: 41.002233N - 17.204600E
Exposure along the coast line: NE
Typology: Semi-submerged
Depth: ND
Number of entry : 1
Entrance height : 0.50 m
Entrance exposure: NE
Extension: less than 100 square meters
Fund type: rock
Cave gradient: ND

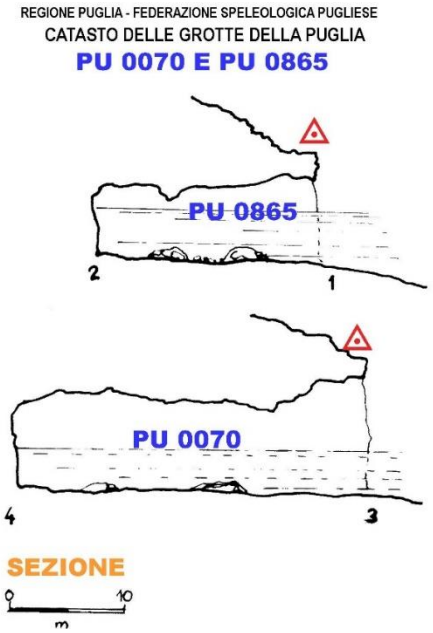
GROTTA DELLA FOCA 1

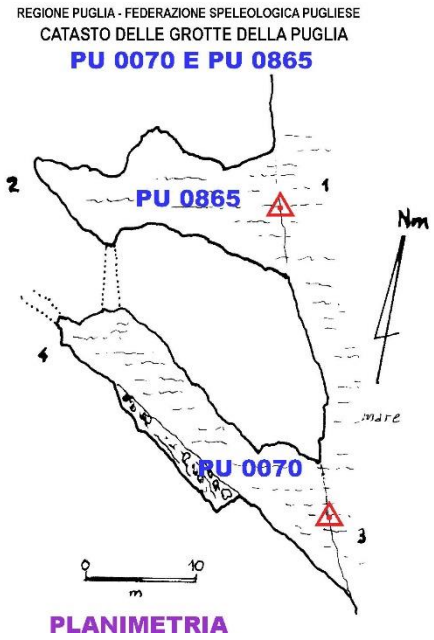
Description:

It is a branch of a larger system of cavities deriving from the retreat of the coastal cliff that has produced the current situation consisting of two caves located one next to the other (Grotta della Foca 1 and Grotta della Foca 2). These caves seem to be connected by siphoning passages. The grotte della foca are two large cavities, very deep but with a relatively narrow entrance. From the bottom of the caves you can see the exit, illuminated by the eastern or midday sun.

FINAL REPORT

Map:





Position with respect to the coast: coastal cave

Geographical coordinates: 41.001417N - 17.200950E

Exposure along the coastline: E.

Typology: Semi-submerged

Depth: 5.5 meters

Number of entry: 1

Entrance height: 3 meters

Entrance exhibition: E

Extension: less than 100 square meters

Bottom type: sand

Gradient of the cave: light, semi-darkness, darkness

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES GROTTA DELLA FOCA 1-JUNE

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* • *Amphiora Spp* • *Coralina elongata* **Brown:** • *Dictyota dichotoma* **Green:** *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*		
semi-darkness 100%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* **Green:** • *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Phorbas tenacior* • *Axinella spp*		• *Halocynthia papillosa*
darkness 80%	**Red:** • *Nithophyllu Spp* *Mesophyllum Spp*			• *Sabella spallanzani*	• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Ciona viridis*		
SPECIES REL CONSERV: There are no conservation-relevant species the presence of *Tripterygion spp e Gobius spp*							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES GROTTA DELLA FOCA 1-SEPTEMBER

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* • *Amphiora Spp* • *Coralina elongata* **Brown:** • *Cystoseira spp* • *Dictyota dichotoma* **Green:** *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*	• *Arbacia lixula*	• *Aplysia spp*
semi-darkness 100%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Phorbas tenacior*		• *Halocynthia papillosa*
darkness 85%	**Red:** • *Nithophyllu Spp*			• *Sabella spallanzani*	• *Cliona SPP* • *Ircinia SPP*		

	Mesophyllum Spp				• *Petrosia ficiformis* • *Spirastrella Spp* • *Axinella spp* • *Tethya aurantium*		
SPECIES REL CONSERV: There are no conservation-relevant species the presence of *Tripterygion spp e Gobius spp*							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, there is no decrease in the species present with the decrease in the presence of light, there seem to be slight changes related to the seasonality of the sampling, moreover no particular disturbances related to the anthropic activity present are reported. in the study area. No species of conservation significance have been found, although we report the presence of some tunicates and molluscs as per the list.

FINAL REPORT

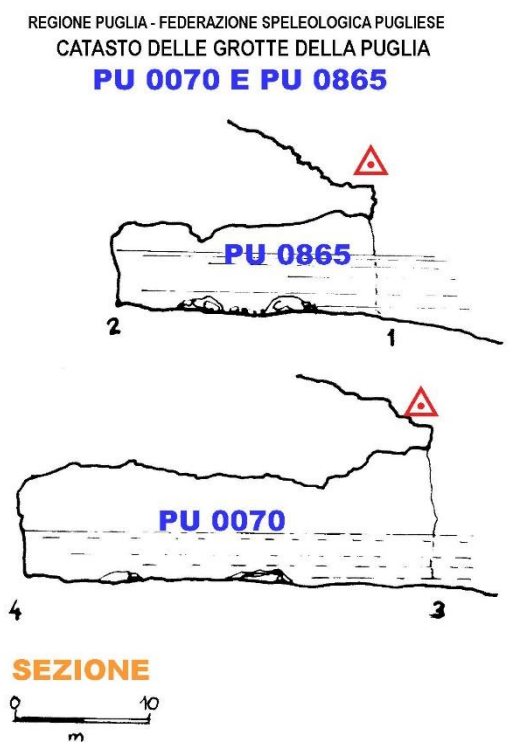
GROTTA DELLA FOCA 2

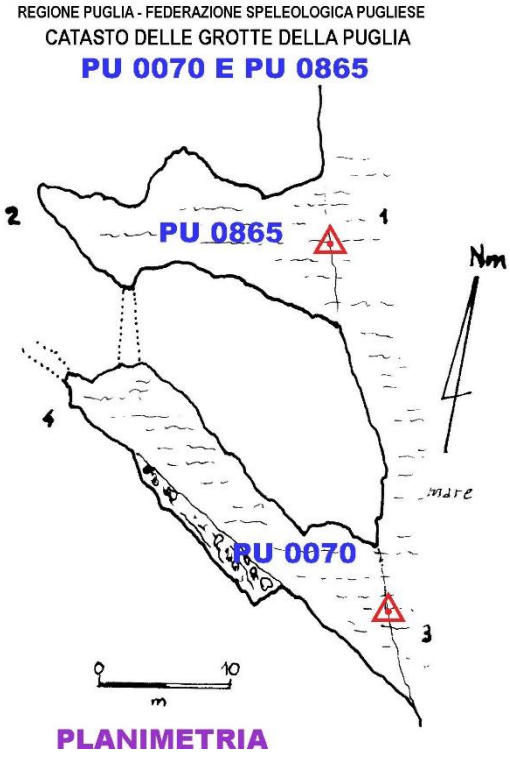
Description:

It is a marine cavity, a branch of a larger system created by the retreat of the coastal cliff that has produced the current situation consisting of two caves located next to each other (Grotta della Foca 1 and Grotta della Foca 2). These caves seem to be connected by siphoning passages. The grotte della foca are two large caves, very deep but with a not very wide entrance. From the bottom of the caves you can see the exit, illuminated by the eastern or midday sun.

FINAL REPORT

Map:





Position with respect to the coast: coastal cave

Geographic coordinates: 41.000483N - 17.209161E

Exposure along the coastline: E.

Typology: Semi-submerged

Depth: 6 meters

Number of entry: 1

Entrance height: 3 meters

Entrance orientacion: E

Extension: less than 100 square meters

Bottom type: sand

Gradient of the cave: light, semi-darkness, darkness

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DELLA FOCA 2-JUNE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 85%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* **Brown:** • *Dictyota dichotoma*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*	• *Arbacia lixula* • *Paracentrotus lividus*	
semi-darkness 100%	**Red:** • *Nithophyllu Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
darkness 80%			• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species the presence of *Tripterygion spp e Gobius spp*							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DELLA FOCA 2-SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* • *Amphiora Spp* • *Coralina elongata* **Green:** *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*		
semi-darkness 80%	**Red:** • *Nithophyllu Spp*				• *Cliona SPP* • *Ircinia SPP* • *Spirastrella Spp*		
darkness 85%	**Red:** • *Nithophyllu Spp* *Mesophyllum Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*		
SPECIES REL CONSERV: There are no conservation-relevant species the presence of *Tripterygion spp e Gobius spp*							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three relative light gradients; a decrease in the species present is observed with the decrease in the presence of light. There is a low presence of species probably due to disturbances related to the anthropogenic activity of the guided tours and in particular at the entrance of the boats inside the caves. No species of conservation significance were found.

FINAL REPORT

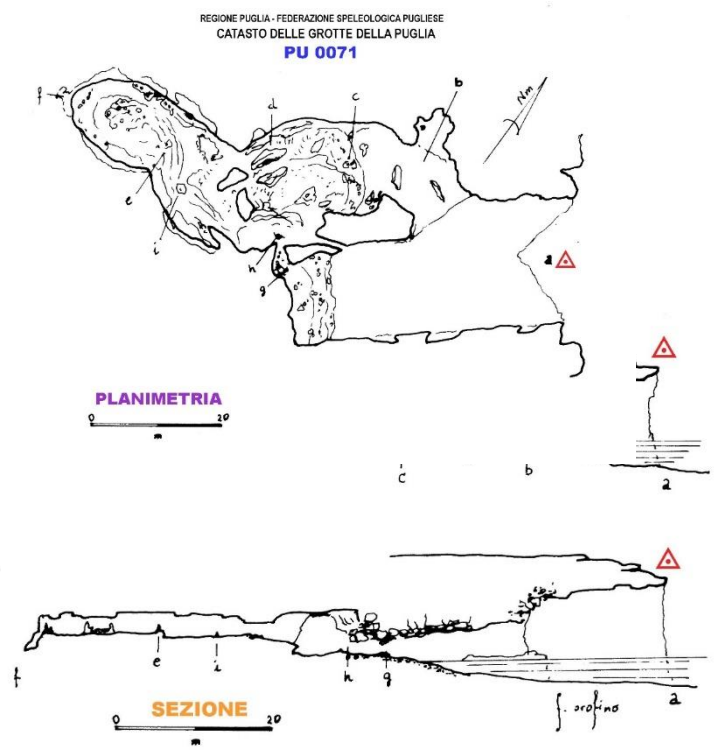
GROTTA DELLA RONDINELLA

Description:

The Grotta della Rondinella is the largest of all the Polignano caves of the northern coastal stretch. It consists of caves connected by tunnels and passages. Francoanellite (acid hydrophosphate of potassium and aluminum) was found in this cavity. The cave is accessible via two entrances. one is the marine one, the other is on the plateau overlooking the sea and is structured as a collapse chasm.

FINAL REPORT

Mappa:



Position with respect to the coast: coastal cave

Geographic coordinates: 40.99967N - 17.210250E

Exposure along the coast line: NE

Typology: Semi-submerged

Depth: 2.7 meters

Number of entry : 1

Entrance height: 5 meters

Entrance exposure: NE

Extension: less than 100 square meters

Fund type: pebbles

Gradient of the cave: light, semi-darkness, darkness

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES CAVE DELLA RONDINELLA JUNE

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*		
semi-darkness 100%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Agela oroides*		
darkness 80%			• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*		
SPECIES REL CONSERV: There are no conservation-relevant species the presence of *Tripterygion spp e Gobius spp*							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES CAVE DELLA RONDINELLA SEPTEMBER

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*	• *Coscinasterias tenuispina*	
semi-darkness 100%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* • *Peyssonelia spp* **Green:** • *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides*		
darkness 80%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* • *Peyssonelia spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*		
SPECIES REL CONSERV: There are no conservation-relevant species the presence of *Tripterygion spp e Gobius spp*							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, there is no decrease in the species present with the decrease in the presence of light; there seem to be slight changes related to the seasonality of the sampling, furthermore, no particular disturbances related to the anthropic activity present in the area under study were reported, both

for the pre-summer survey and for the late summer survey. No species of conservation significance have been found, although we report the presence of some fish as per the list.

GROTTA DEI FIDANZATI

Description:

Only by swimming you can enter the fidanzati cave, a small cave whose entrance is very low above sea level, below a very high and compact cliff. It takes its name from the intimacy it offers to those who want to escape the gaze of the numerous bathers. The cave develops on a regular basis, presenting a hard bottom and having an average depth of less than 3.5 meters. The inclination of the walls ranges from 45 to 70 degrees with NW exposures.

Position with respect to the coast: coastal cave

Geographic coordinates: 40.999700N - 17.211167E

Exposure along the coast line: NE

Typology: Semi-submerged

Depth: 3.7 meters

Number of entry: 1

Entrance height: 2 meters

Entrance exposure: NE

Extension: less than 100 square meters

Fund type: pebbles

Gradient of the cave: light, semi-darkness, darkness

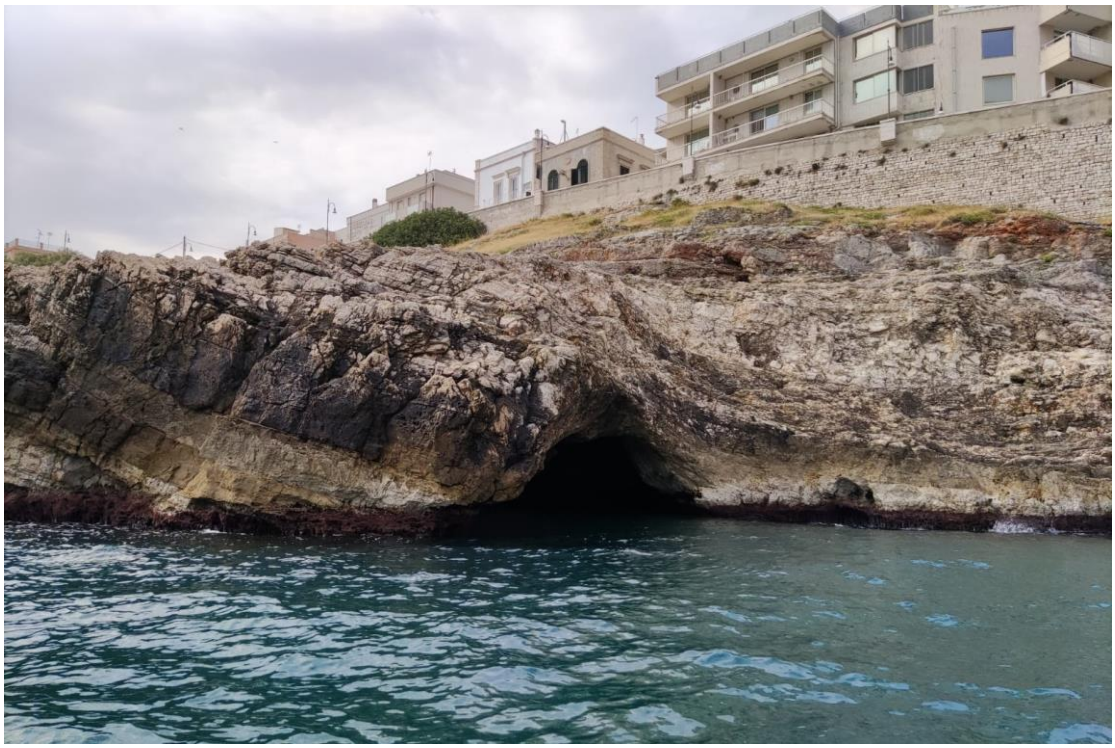
TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DEI FIDANZATI JUNE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Green:** • *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*	*Arbacia lixula*	
semi-darkness 100%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp*		
darkness 80%			• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*	• *Arbacia lixula*	
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DEI FIDANZATI SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Green:** • *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*		
semi-darkness 100%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* • *Peyssonelia spp* • *Mesophyllum Spp* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp*	• *Arbacia lixula*	
darkness 85%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* • *Peyssonelia spp* • *Mesophyllum Spp* **Green:** *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*	• *Arbacia lixula*	
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three relative light gradients; there is no decrease in the species present with the decrease in the presence of light, there seem to be slight changes related to the seasonality of the sampling, moreover no particular disturbances related to the anthropic activity present in the area under study are reported. No species of conservation significance were found

FINAL REPORT

GROTTA AZZURRA



Description:

Under the first offshoots of the town, in Grottone, the Grotta azzurra offers a captivating spectacle of reflections through the sun's rays that penetrate below a wall suspended in the water for about three meters.

The monitoring of the aforementioned cave was not undertaken due to the physical conditions of the cave itself, being characterized by a shallow and widely illuminated seabed, it did not have the minimum depth to have the light gradients necessary for the purposes of the sampling itself.

Position with respect to the coast: coastal cave

Geographic coordinates: 40.998150N - 17,216417E

Exposure along the coast line: N

Typology: semi-submerged

Depth: less than 2 meters

Number of entry : 1

Entrance height: 3 meters

Entrance exhibition: N

Extension: less than 100 square meters

Fund type: Rock

Gradient of the cave: none

FINAL REPORT

GROTTA PIANA

Description:

The grotta piana opens up under the built-up area of the old town. It is a large cave with a flat and not very high roof (just over two meters), located below the well-known Hotel Covo dei Saraceni. The Piana cave or Basso Porto cave, as the people of Polignano call it, is a sea cave consisting of a large quadrangular cave, characterized by a perfectly flat and horizontal vault. The cave develops on a regular basis, presenting a hard bottom and having an average depth of less than 4 meters. The inclination of the walls ranges from 50 to 90 degrees with NE and NW exposures.

Position with respect to the coast: coastal cave

FINAL REPORT

Geographic coordinates: 40.996600N - 17.218083E

Exposure along the coast line: NE

Typology: Semi-submerged

Depth: 2.2 meters

Number of entry: 1

Entrance height: 4 meters

Entrance exposure: NE

Extension: less than 100 square meters

Fund type: bioclastic

Gradient of the cave: light, semi-darkness, darkness

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES GROTTA PIANA JUNE

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 90%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* •		
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* • *Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp* • *Phorbas tenacior*		
darkness 95%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Green:** • *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Chondrosia reniformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

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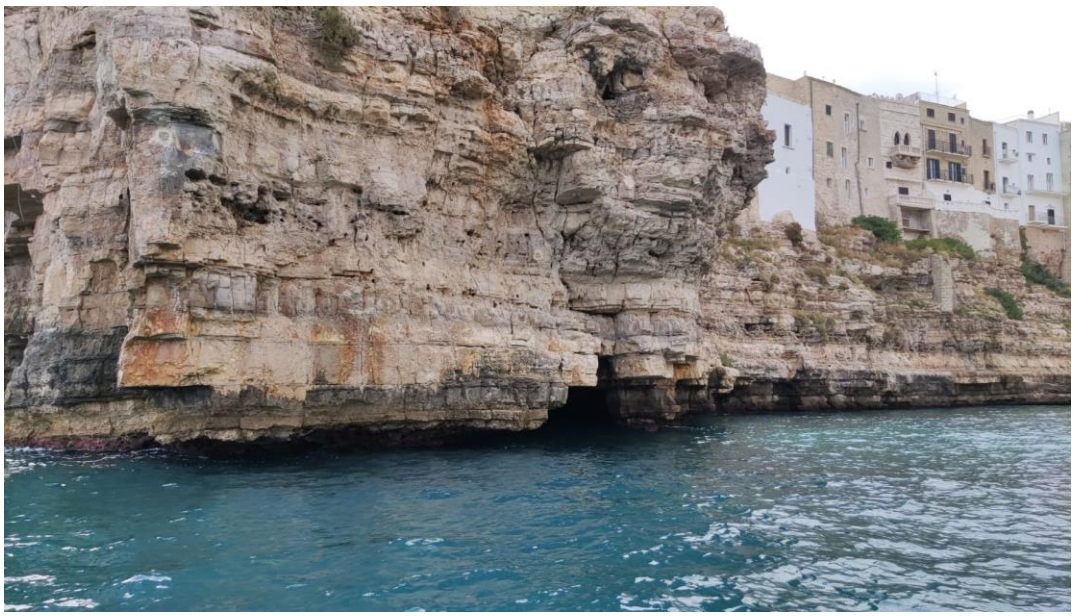
TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA PIANA SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 90%	**Rosse:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Tetia aurantium*	• *Coscinasteria s tenuispina*	
semi-darkness 80%	**Rosse:** • *Nithophyllu Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Spirastrella Spp* • *Chondrosia reniformis*		
darkness 95%	**Rosse:** • *Nithophyllu Spp* • *Mesophyllum Spp* **Verdi:** • *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The Grotta piana has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light, there seem to be slight changes related to the seasonality of the samples, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No species of conservation significance were found.

FINAL REPORT

GROTTA SOTTO BASTIONE DI SANTO STEFANO



Description:

Between Lama Monachile and the corner of the Bastion of Santo Stefano, there are two small openings in the rock that allow you to enter this cave. The cave develops on a regular basis, presenting a hard bottom and having an average depth of less than 2.5 meters. The inclination of the walls ranges from 60 to 70 degrees with NE and NW exposures.

Position with respect to the coast: coastal cave

Geographic coordinates: 40.997013N - 17.218509E

Exposure along the coast line: NW

Typology: Semi-submerged

Depth: 2.2 meters

Number of entry: 1

Entrance height: 4 meters

Exposure entrance: NW

Extension: less than 100 square meters

Fund type: bioclastic

Gradient of the cave: light, semi-darkness, darkness

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA SOTTO BASTIONE S. STEFANO JUNE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 90%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Green:** • *Codium Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Chondrosia reniformis*		
semi-darkness 90%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp* • *Mesophyllum Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp* • *Tetia aurantium*		
darkness 95%			• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Tetia aurantium*	• *Arbacia lixula*	
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA SOTTO BASTIONE S. STEFANO SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 90%	**Red:** • *Mesophyllum Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*		
semi-darkness 100%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp* • *Phorbas tenacior*		
darkness 95%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Chondrosia reniformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light, there seem to be slight changes related to the seasonality of the samples, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No species of conservation significance were found.

FINAL REPORT

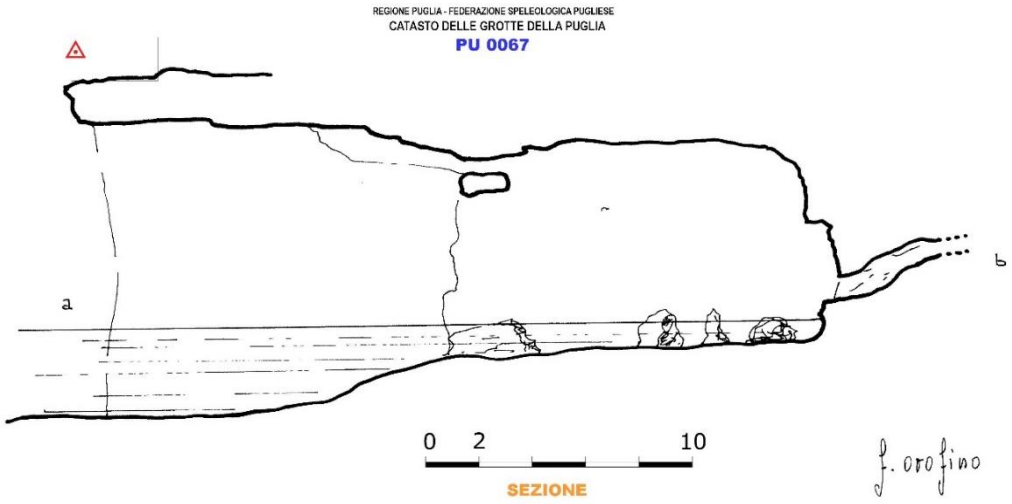
GROTTA DELL'ARCIVESCOVADO

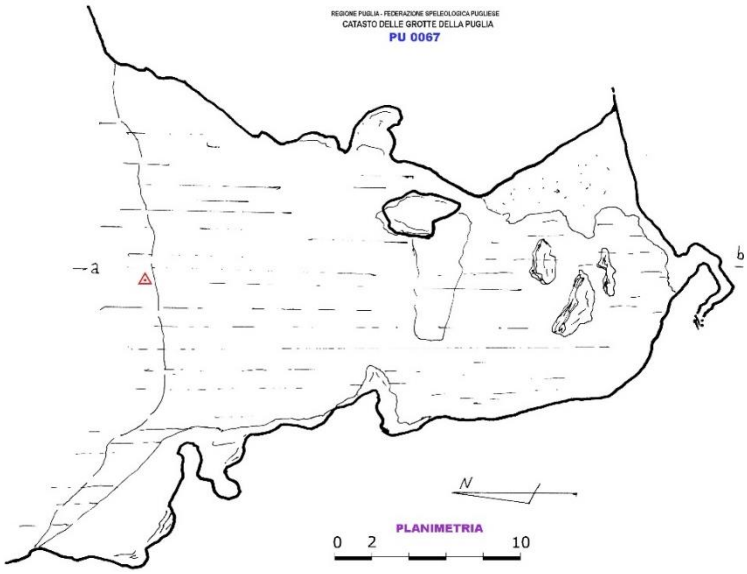
Description:

Karst cave - marina occupied by the sea consisting of a single ledge of 30 x 15 meters high 8 m. Surmounted by many buildings in the old town and partially by the amphitheater in Piazza San Benedetto, where numerous public cultural entertainment events take place, the archbishop's cave is very large, with one of the largest entrance doors on the coast. Looking at the outside from the right, there is a small natural arch. There is a belief in Polignano that this cave was the outlet to the sea of secret tunnels that allowed the Polignano prelates to escape from the bishop's palace during enemy raids. In reality, however, this large cave does not hide any secrets as the narrow passage becomes impracticable after a few meters. The cave develops on a regular basis, presenting a hard bottom and having an average depth of less than 3.7 meters. The inclination of the walls ranges from 80 to 90 degrees with NW exposures.

FINAL REPORT

Map:





Position with respect to the coast: coastal cave

Geographic coordinates: 40.996737N - 17.219583E

Exposure along the coast line: N

Typology: Semi-submerged

Depth: 4.2 meters

Entrance number: 2

Entrance height: 10 mt

Entrance exhibition: N

Extension: greater than 100 square meters

Fund type: bioclastic

Gradient of the cave: light, semi-darkness, darkness

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA ARCIVESCOVADO JUNE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 90%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Brown:** • *Dictyota dichotoma* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* •		•
semi-darkness 100%	**Red:** • *Nithophyllu Spp* • *Mesophyllum Spp*		• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp* • *Phorbas tenacior* • *Chondrosia reniformis*		• *Halocynthia papillosa*
darkness 95%			• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		• *Aplysia fasciata*
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA ARCIVESCOVADO SETTEMBRE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Brown:** • *Dictyota dichotoma* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*	*Paracentrotus lividus*	
semi-darkness 90%	**Rosse:** • *Mesophyllum Spp*		• *Leptopsammia pruvoti*	• *Hermadice cornuculta*	• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp*		
darkness 70%					• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light, there seem to be slight changes related to the seasonality of the samples, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No species of conservation significance were found.

FINAL REPORT

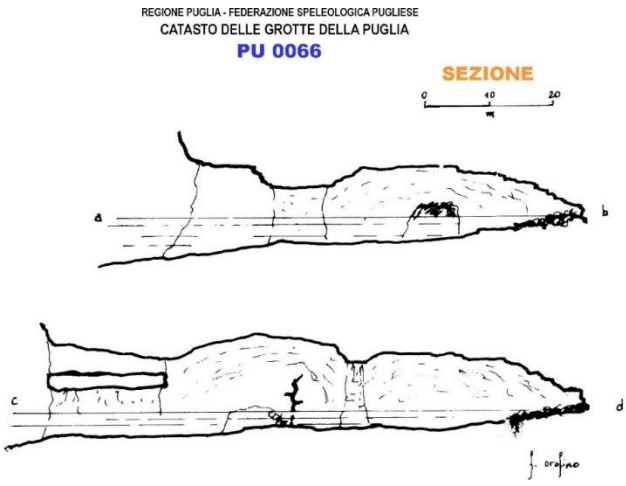
GROTTA PALAZZESE

Description:

Coastal cavity consisting of large caves occupied by the sea. The Grotta Palazzese is the largest of all the Polignano caves. It is so called because it belonged to the Leto marquises, feudal lords of Polignano in 1700. The cave can be accessed both from the ground, through a small staircase carved into the rock by the Leto marquises, and from the sea through two openings. A large terrace overlooks the cave and allows visitors to admire it in all its majestic beauty. Inside it is made up of a very large semicircular room, with a diameter of about 30 meters, communicating with a second smaller room with an outlet to the sea and a small pebble beach on the bottom. For several decades the cave has been home to a restaurant, with an adjoining hotel, known all over the world. The cave develops on a regular basis, presenting a hard bottom and having an average depth of less than 4 meters. The inclination of the walls ranges from 80 to 90 degrees with S, E and SE exposures.

FINAL REPORT

Map:



Position with respect to the coast: coastal cave

Geographic coordinates: 40.996173N - 17.221743E

Exposure along the coast line: N

Typology: Semi-submerged

Depth: 4.2 meters

Entrance number : 2

Entrance height: 10 mt

Entrance exhibition: N

Extension: greater than 100 square meters

Fund type: bioclastic

Gradient of the cave: light, semi-darkness, darkness

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA PALAZZESE GIUGNO**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Coralina elongata* • *Peyssonelia spp* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*	• *Paracentrotus lividus*	
semi-darkness 60%					• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp*	• *Arbacia lixula*	
darkness 60%					• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA PALAZZESE SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Peyssonelia spp* **Brown:** • *Dictyota dichotoma* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*	*Paracentrotus lividus*	
semi-darkness 90%	**Red:** • *Mesophyllum Spp*		•		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp*		
darkness 70%			• *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light, there seem to be slight changes related to the seasonality of the samples, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No species of conservation significance were found.

FINAL REPORT

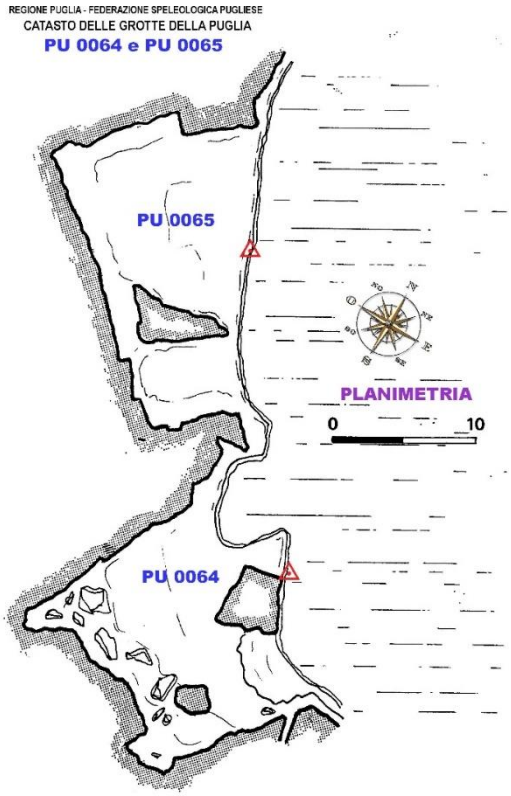
GROTTA SOTTO FAVALE

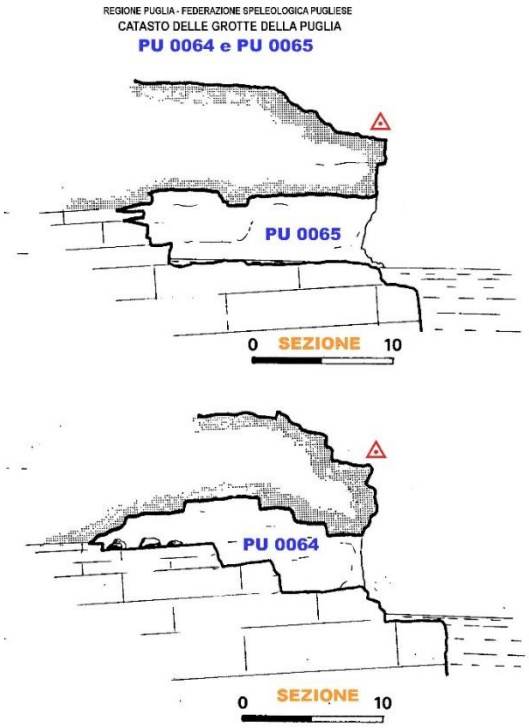
Description:

The grotta sotto Favale located to the right of the homonymous house looking from the sea. Filippo Franco Favale was a well-deserving scholar of local history and lived in a house above the cave. It is a purely terrestrial cave, not suitable for the monitoring undertaken in this study, not having the characteristics suitable for depth and light gradients.

FINAL REPORT

Map:





Position with respect to the coast: coastal cave

Geographic coordinates: 40.996233N - 17.222600E

Exposure along the coast line: NE

Typology: semi-submerged

Depth: 0 meters

Number of entry : 1

Entrance height: 5 mt

Entrance exposure: NE

Extension: less than 100 square meters

Fund type: Mud

Gradient of the cave: none

FINAL REPORT

GROTTA ARDITO DELLE CALDAIE

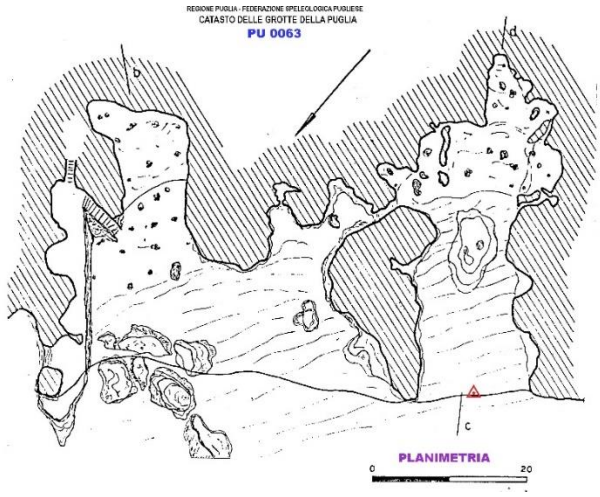
Description:

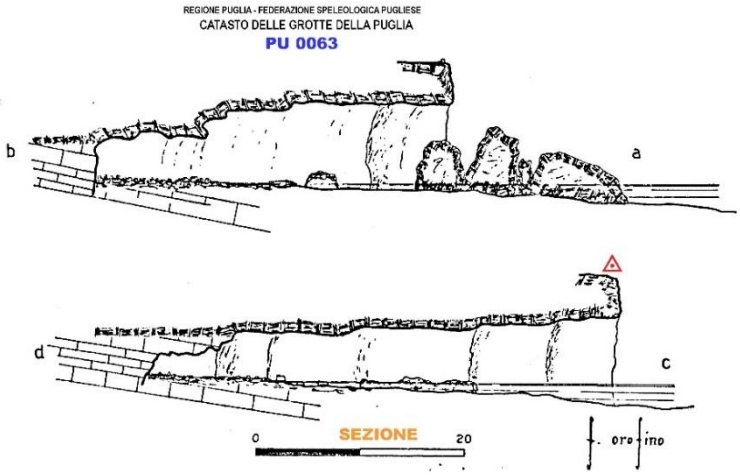
The grotta Ardito takes its name from its ancient owner, the priest Don Giuseppe Ardito, who had a long staircase dug into the limestone for easy access.It is the only cave of which there is historical news of a partial collapse, which took place on January 8th 1772.

The ladder was used until a few decades ago by the inhabitants of the Pozziglioni district to get to bathe in the sea. It is a cave with a low depth of seabed that does not have the minimum characteristics of light gradient, necessary to be able to be included in the monitoring.

FINAL REPORT

Map:





Position with respect to the coast: terrestrial cave

Geographic coordinates: 40.996593N - 17.223100E

Exposure along the coast line: N

Typology: terrestrial

Depth: 0 meters

Number of entry: 1

Entrance height: 6 mt

Entrance exhibition: N

Extension: greater than 100 square meters

Fund type: Rock

Gradient of the cave: none

FINAL REPORT

GROTTA DELLA COLONNA

Description:

The cave is divided towards the outside by a large limestone column. The cave develops on a regular basis presenting a hard bottom and having an average depth of less than 3 meters. The inclination of the walls ranges from 80 to 90 degrees with exposure to E.Position with respect to the coast: coastal cave

Geographic coordinates: 40.99247N - 17.2349133E

Exposure along the coast line: NW

Typology: Semi-submerged

Depth: 3.5 meters

Number of entry : 1

Entrance height (s): 5 mt

Exposure entrance: NW

Extension: About 50 square meters

Type of bottom: Sand

Gradient of the cave: light, semi-darkness, darkness

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES GROTTA DELLA COLONNA JUNE

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Coralina elongata* **Brown:** • *Dictyota dichotoma* **Green:** • *Codium Spp*			• *Spirografo spp*	• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*	*Paracentrotus lividus*	
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp* • *Phorbas tenacior*	• *Arbacia lixula*	
darkness 70%			• *Leptopsammia pruvoti*	• *Serpulidi spp*	• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES GROTTA DELLA COLONNA SEPTEMBER

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Coralina elongata* **Brown:** • *Dictyota dichotoma* **Green:** • *Codium Spp*			• *Spirografo spp*	• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*	*Paracentrotus lividus*	
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Spirastrella Spp* • *Phorbas tenacior*		
darkness 70%			• *Leptopsammia pruvoti*	• *Serpulidi spp*	• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

GE.CO.-GESTIONE COSTIERA SRL con denominazione abbreviata GE.CO.SRL
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info.geco.srl@gmail.com ge.co.srl@pec.it
Capitale sociale interamente versato € 100.000,00

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light. Some species of sponges exhibit significant discoloration with decreasing light. there seem to be some slight changes related to the seasonality of the sampling, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No anthropogenic and non-anthropogenic disturbances were found, both for the pre-summer survey and for the late summer survey. No species of conservation significance were found.

FINAL REPORT

GROTTA DELL' EREMITA 2

Description:

The cave is located in front of the hermit's rock, an islet with steep slopes on which a cross dominates. It is so called because for about thirty years a solitary religious lived here, eating only the fish he could catch. Small in size, these caves show no particularities, except for a deposit of red earth in the first cave, the one higher above sea level, and some finds of bones and flint worked in the second, which would suggest a prehistoric human presence in the site. The cave consists of two caverns, divided towards the outside by a large limestone column, a sort of nose with two nostrils invaded by the sea. The cave develops on a regular basis presenting a hard bottom and having an average depth of less than 3 meters. The inclination of the walls ranges from 70 to 90 degrees with SW and NW exposures.

FINAL REPORT

Position with respect to the coast: coastal cave

Geographic coordinates: 40.99267N - 17.23554E

Exposure along the coastline: E.

Typology: Semi-submerged

Depth: 3 meters

Number of entry: 1

Entrance height: 10 mt

Entrance exhibition: E

Extension: About 70 square meters

Fund type: Hard

Gradient of the cave: light, semi-darkness, darkness

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES GROTTA DELL'EREMITA 2- JUNE

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Coralina elongata* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Eudendrium*	• *Pentapora fascialis* • *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*	*Arbacia lixula*	*Fasciolaria lignaria*
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* • *Cystoseira spp* **Green:** • *Codium Spp*		• *Pentapora fascialis* • *Eunicella Spp* • *Leptopsammia pruvoti*	• *Filograna implexa*	• *Axinella verrucosa* • *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Petrosia ficiformis* • *Phorbas tenacior*	• *Ophiyura Spp* • *Paracentrotus lividus*	
darkness 90%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma*	• *Sertularella Spp*	• *Pentapora fascialis* • *Leptopsammia pruvoti*	• *Serpulidi spp*	• *Axinella cannabina* • *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Phorbas tenacior*	*Paracentrotus lividus*	
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DELL'EREMITA 2- SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Coralina elongata* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Eudendrium*	• *Pentapora fascialis* • *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*	*Arbacia lixula*	*Fasciolaria lignaria*
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* • *Cystoseira spp* **Green:** • *Codium Spp*		• *Pentapora fascialis* • *Eunicella Spp* • *Leptopsammia pruvoti*	• *Filograna implexa*	• *Axinella verrucosa* • *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Petrosia ficiformis* • *Phorbas tenacior*	• *Ophiyura Spp* • *Paracentrotus lividus*	
darkness 90%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma*	• *Sertularella Spp*	• *Pentapora fascialis* • *Leptopsammia pruvoti*	• *Serpulidi spp*	• *Axinella cannabina* • *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Phorbas tenacior*	*Paracentrotus lividus*	
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light. Some species of sponges exhibit significant discoloration with decreasing light. there seem to be some slight changes related to the seasonality of the sampling, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No anthropogenic and non-anthropogenic disturbances were found, both for the pre-summer survey and for the late summer survey. No species of conservation significance were found.

FINAL REPORT

GROTTA DELL' EREMITA 1

Description:

The cave is located in front of the hermit's rock, an islet with steep slopes on which a cross dominates. It is so called because for about thirty years a solitary religious lived here, eating only the fish he could catch. Small in size, these caves show no particularities, except for a deposit of red earth in the first cave, the one higher above sea level, and some finds of bones and flint worked in the second, which would suggest a prehistoric human presence in the site. The cave consists of two caverns, divided towards the outside by a large limestone column, a sort of nose with two nostrils invaded by the sea. The cave develops on a regular basis presenting a hard bottom and having an average depth of less than 3 meters. The inclination of the walls ranges from 70 to 90 degrees with exposure to SW, NW.

FINAL REPORT

Position with respect to the coast: coastal cave

Geographic coordinates: 40.99267N - 17.23554E

Exposure along the coastline: E.

Typology: Semi-submerged

Depth: 3 meters

Number of entry : 1

Entrance height : 10 mt

Entrance exhibition: E

Extension: About 70 square meters

Fund type: Hard

Gradient of the cave: light, semi-darkness, darkness

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES GROTTA DELL'EREMITA 2- JUNE

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Coralina elongata* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Eudendrium*	• *Pentapora fascialis* • *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*	*Arbacia lixula*	*Fasciolaria lignaria*
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* • *Cystoseira spp* **Green:** • *Codium Spp*		• *Pentapora fascialis* • *Eunicella Spp* • *Leptopsammia pruvoti*	• *Filograna implexa*	• *Axinella verrucosa* • *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Petrosia ficiformis* • *Phorbas tenacior*	• *Ophiyura Spp* • *Paracentrotus lividus*	
darkness 90%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma*	• *Sertularella Spp*	• *Pentapora fascialis* • *Leptopsammia pruvoti*	• *Serpulidi spp*	• *Axinella cannabina* • *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Phorbas tenacior*	*Paracentrotus lividus*	
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DELL'EREMITA 1- SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Coralina elongata* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Eudendrium*	• *Pentapora fascialis* • *Leptopsammia pruvoti*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Phorbas tenacior*	*Arbacia lixula*	*Fasciolaria lignaria*
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma* • *Zonaria tounefortii* • *Cystoseira spp* **Green:** • *Codium Spp*		• *Pentapora fascialis* • *Eunicella Spp* • *Leptopsammia pruvoti*	• *Filograna implexa*	• *Axinella verrucosa* • *Cliona SPP* • *Ircinia SPP* • *Agela oroides* • *Petrosia ficiformis* • *Phorbas tenacior*	• *Ophiyura Spp* • *Paracentrotus lividus*	
darkness 90%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma*	• *Sertularella Spp*	• *Pentapora fascialis* • *Leptopsammia pruvoti*	• *Serpulidi spp*	• *Axinella cannabina* • *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Phorbas tenacior*	*Paracentrotus lividus*	
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light. Some species of sponges exhibit significant discoloration with decreasing light. there seem to be some slight changes related to the seasonality of the sampling, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No anthropogenic and non-anthropogenic disturbances were found, both for the pre-summer survey and for the late summer survey. No species of conservation significance were found.

FINAL REPORT

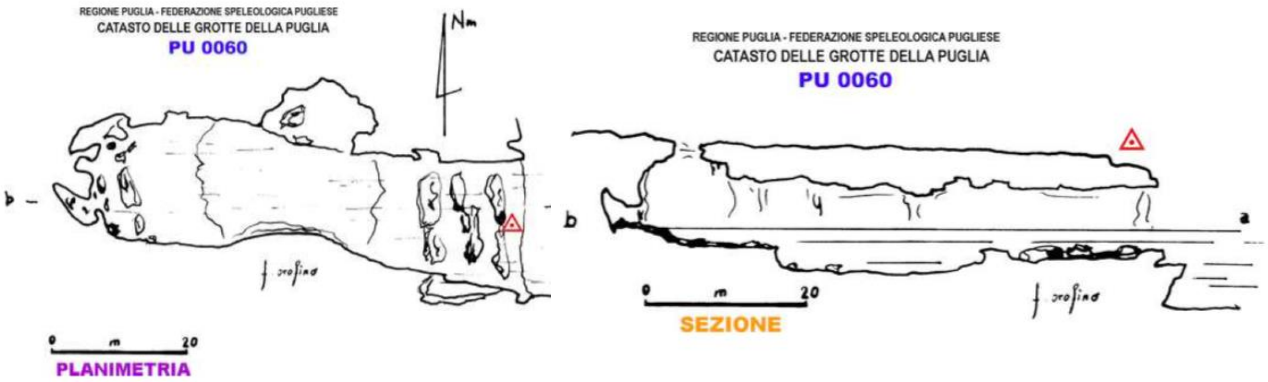
GROTTA DEI COLOMBI

Description:

the grotta dei piccioni, also known as the pagumm cave, a dialect term for pigeons, takes its name from these birds that nestle in large numbers in the cave. Its peculiarity is that it extends over 60/70 meters from the coast line. Four skylights that from above allow a glimpse of the calm or turbulent sea and the blue of the sky from the sea inside. It is a large interlayer cavity with a bottom totally occupied by the sea. It belongs to an ancient underground karst system that came to light due to the retreat of the coastal cliff. Consisting of three levels: the first is the balcony on which the remains of ossiferous breccias are found; the second with a long and wide cavity invaded by the sea and the third submerged consisting of modest rooms connected by tunnels. The cave develops on a regular basis, presenting a hard bottom and having an average depth of less than 4 meters. The inclination of the walls ranges from 60 to 90 degrees with exposures in E.

FINAL REPORT

Map:



Position with respect to the coast: coastal cave

Geographic coordinates: 40.98632N - 17.2461566E

Exposure along the coastline: E.

Typology: Semi-submerged

Depth: 3.5 meters

Number of entry: 1

Entrance height: 8mt

Entrance exhibition: E

Extension: About 100 square meters

Fund type: Hard

Gradient of the cave: light, semi-darkness, darkness

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DEI COLOMBI JUNE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Peyssonelia rubra* **Brown:** • *Dictyota dichotoma* **Green:** • *Codium Spp*	• *Sertularella Spp* • *Eudendrium*	• *Pentapora fascialis* • *Leptopsammia pruvoti*	• *Filograna implexa*	• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*		
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Sertularella Spp*			• *Axinella verrucosa* • *Cliona SPP* • *Ircinia SPP* • *Spirastrella Spp* • *Petrosia ficiformis*		

darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Green:** *Codium Spp*		• *Pentapora fascialis*	• *Serpulidi spp*	• *Axinella verrucosa* • *Cliona SPP* • *Ircinia SPP* • *Spirastrella Spp* • *Petrosia ficiformis*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT
LIST OF SPECIES GROTTA DEI COLOMBI SEPTEMBER

GRADIENT	Algae	Hydrozoans	Bryozoans / Anthozoans	Polychaeta / Annelids	Sponges	Echinoderms	Molluscs Tunicates
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Peyssonelia rubra* **Brown:** • *Dictyota dichotoma* **Green:** • *Codium Spp*	• *Sertularella Spp*	• *Pentapora fascialis*		• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp*		
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Peyssonelia rubra* **Brown:** • *Dictyota dichotoma* **Green:** • *Codium Spp*	• *Sertularella Spp*	• *Pentapora fascialis* • *Reteporella grimaldii*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides Spirastrella Spp*		
darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Peyssonelia rubra* **Brown:** • *Dictyota dichotoma* **Green:** *Codium Spp*			• *Serpulidi spp*	• *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Cliona SPP*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light. Some species of sponges exhibit significant discoloration with decreasing light. there seem to be some slight changes related to the seasonality of the sampling, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No anthropogenic and non-anthropogenic disturbances were found, both for the pre-summer survey and for the late summer survey. No species of conservation significance were found.

FINAL REPORT

GROTTA DEI PASSERI

Description:

The cave is excavated in the calcareous-arenaceous deposits of the Pleistocene by the action of the sea; it develops on a regular basis, presenting a hard bottom and having an average depth of less than 2 meters. The inclination of the walls ranges from 60 to 70 degrees with exposures in W.

FINAL REPORT

Position with respect to the coast: coastal cave

Geographic coordinates: 40.9843333N - 17.2509166E

Exposure along the coastline: W

Typology: Semi-submerged

Depth: 2 meters

Number of entry : 1

Entrance height : 4mt

Entrance exposure: W

Extension: About 50 square meters

Fund type: Hard

Gradient of the cave: light, semi-darkness, darkness

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DEI PASSERI JUNE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Corallina elongata* **Brown:** • *Dictyota dichotoma* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Sertularella Spp*	• *Pentapora fascialis*	• *Filograna implexa*	• *Axinella verrucosa* • *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp Spp*		
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Sertularella Spp*	• *Pentapora fascialis* • *Reteporella grimaldii*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides Spirastrella Spp*	• *Arbacia lixula*	
darkness 80%				• *Serpulidi spp*	• *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Cliona SPP* • *Agela oroides*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

FINAL REPORT

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DEI PASSERI SETTEMBRE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Sertularella Spp*	• *Pentapora fascialis*		• *Axinella verrucosa* • *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp Spp* • *Spongia spp* • *Phorbas spp*	*Arbacia lixula*	
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Brown:** • *Dictyota dichotoma* • *Cystoseira spp* **Green:** • *Codium Spp*	• *Sertularella Spp*	• *Pentapora fascialis* • *Reteporella grimaldii*		• *Cliona SPP* • *Ircinia SPP* • *Agela oroides Spirastrella Spp*	• *Arbacia lixula*	
darkness 80%				• *Serpulidi spp*	• *Ircinia SPP* • *Petrosia ficiformis* • *Spirastrella Spp* • *Cliona SPP* • *Agela oroides*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light. Some species of sponges exhibit significant discoloration with decreasing light. there seem to be some slight changes related to the seasonality of the sampling, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No anthropogenic and non-anthropogenic disturbances were found, both for the pre-summer survey and for the late summer survey. No species of conservation significance were found.

FINAL REPORT

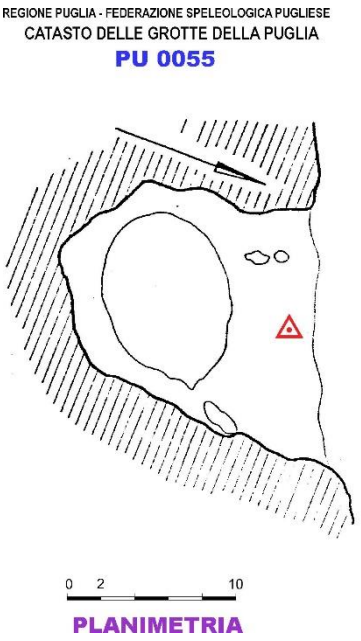
GROTTA DI SELLA

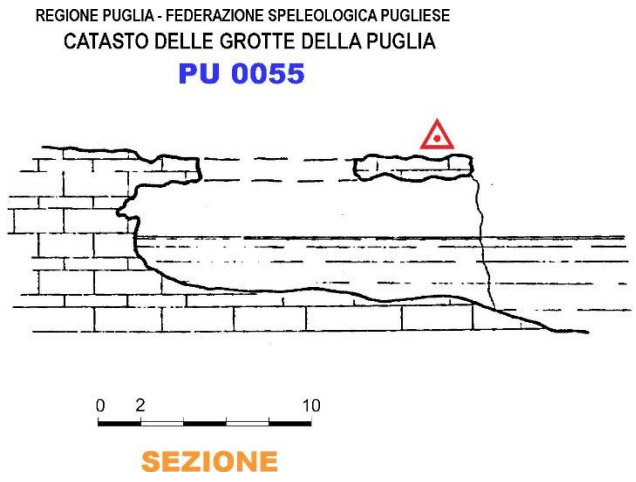
Description:

The cave has a large cavity dug into the limestone-arenaceous deposits of the Pleistocene by the action of the sea and is affected by collapse phenomena that have settled the lines of the vault and created a striking natural skylight. The Sella cave takes its name from the presence of a natural arch on the marine side, pierced in five points, which is what was left over after the collapse of the inner part of the vault in a very remote period. The cave develops on a regular basis presenting a bioclastic bottom and having an average depth of 3 meters. The inclination of the walls ranges from 45 to 60 degrees with SW and NW exposures.

FINAL REPORT

Map:





Position with respect to the coast: coastal cave

Geographical coordinates: 40. 982994 N - 17.252833E

Exposure along the coast line: NW

Typology: Semi-submerged

Depth: 6 meters

Number of entry : 1

Entrance height: 6mt

Exposure entrance: NW

Extension: About 80 square meters

Fund type: Bioclastic

Gradient of the cave: light, semi-darkness, darkness

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DI SELLA JUNE**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Neogoniolithon brassica* • *Peyssonnelia squamaria* • *Jania rubens*	• *Plumaria spp*			• *Ircinia SPP* • *Cliona SPP* • *Petrosia ficiformis* • *Spirastrella Spp*	• *Arbacia lixula*	

	• *Peyssonnelia rubra* **Brown:** • *Dictyota dichotoma* • *Padina pavonica* **Green:** • *Codium Spp*						
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllum* • *Spp* • *Amphiora Spp* **Brown:** • *Padina pavonica* **Green:** • *Codium Spp*	• *Plumaria spp*		• *Filograna implexa*	• *Cliona SPP* • *Ircinia SPP* • *Spirastrella Spp* • *Petrosia ficiformis* • *Spongia Spp*	• *Marthasterias glacialis*	
darkness 80%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* **Green:** • *Codium Spp*				• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Chondrosia Spp* • *Crambe crambe*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

TAXONOMIC IDENTIFICATION OF THE MACROBENTONIC COMPONENT **LIST OF SPECIES GROTTA DI SELLA SEPTEMBER**							
GRADIENT	**Algae**	**Hydrozoans**	**Bryozoans / Anthozoans**	**Polychaeta / Annelids**	**Sponges**	**Echinoderms**	**Molluscs Tunicates**
light 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllum Spp* **Brown:** • *Dictyota dichotoma* • *Padina pavonica* **Green:** • *Codium Spp*	• *Plumaria spp*			• *Ircinia SPP* • *Cliona SPP*	• *Arbacia lixula*	
semi-darkness 100%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* • *Peyssonnelia squamaria* • *Jania rubens* • *Peyssonnelia rubra* **Brown:** • *Padina pavonica* **Green:**			• *Filograna implexa*	• *Cliona SPP* • *Ircinia SPP* • *Spirastrella Spp* • *Petrosia ficiformis* • *Spongia Spp*		• *Discodoris atromaculata*

	• *Codium Spp*						
darkness 80%	**Red:** • *Mesophyllum Spp* • *Nithophyllu Spp* • *Amphiora Spp* **Green:** • *Codium Spp*	• *Plumaria spp*			• *Cliona SPP* • *Ircinia SPP* • *Petrosia ficiformis* • *Chondrosia Spp* • *Crambe crambe* • *Phorbas tenacior*		
SPECIES REL CONSERV: There are no conservation-relevant species							
EVIDENT DISORDERS: There are no anthropic and non-anthropogenic disorders.							

The cave has all three gradients relating to light, a decrease in the species present is observed with the decrease in the presence of light. Some species of sponges exhibit significant discoloration with decreasing light. there seem to be some slight changes related to the seasonality of the sampling, moreover there are no particular disturbances related to the anthropic activity present in the area under study. No anthropogenic and non-anthropogenic disturbances were found, both for the pre-summer survey and for the late summer survey. No species of conservation significance were found.

CAVES CONCLUSION

In general, the absence of species of particular conservation value within the investigated caves is evident. Without a doubt, the high summer turnout of visitors who do not comply with current legislation and enter the caves with motor boats for tourism purposes have caused a washout of the walls due to the unnatural wave motion induced by the propellers of the engines. This effect is more evident in the caves closest to the port of Polignano, from where tourist trips start, and decreases as you move away towards Monopoli. Greater biodiversity has also been found in the caves which, due to their morphology, do not allow entry to boats. It is advisable to intensify the awareness-raising work among the tour operators in the area and to enforce the regulations in force.

B.3 Lagoon habitat (Natura 2000 code: 1150)

spatially explicit characterization and distribution of biocoenoses and zoobenthic communities present on the seabed of the Mar Piccolo di Taranto

STUDY OF THE COMMUNITIES OF BENTONIC MACROINVERTEBRATES OF MOBILE BOTTOM

Description of the Indicator and M-Ambi index:

The study of macrobenthic communities of the seabed of transition environments is mainly applied in the investigation of perturbed environments, subject to different types of pollution, or systems naturally subject to anoxic events. This indicator has proved to be a valid tool for the synthetic description of the ecosystem of transition environments; in fact, the organisms that are part of it are characterized both by scarce mobility and by sufficiently long life cycles, resulting therefore closely linked to the variations of the main environmental parameters. Furthermore, macrozoobenthos organisms, which live in close relationship with the substrate, play a fundamental role in the exchanges between sediment and water column. For the Biological Quality Element (EQB) the benthic invertebrates, for the purposes of the classification of the ecological status, the M-AMBI index is applied. The M-AMBI is a multivariate index, which derives from an evolution of the AMBI integrated with the Shannon-Wiener diversity index and the number of species (S).

The calculation method of the M-AMBI provides for the processing of the aforementioned 3 components with multivariate statistical analysis techniques.

The following diagram shows the class limits in terms of RQE for the M-AMBI referred to in tab. 4.4.1/c of Ministerial Decree 260/10:

Ecological Quality Report EQR) – M-AMBI			
High / Good	*Good / Sufficient*	*Sufficient / Poor*	*Poor / Bad*
0.96	0.71	0.57	0.46

Final remarks:

In this document, the results of the operational ecological monitoring carried out in June 2021 were processed and evaluated, the samplings of the benthic invertebrates identified as significant of the pressures that persist at each sampling point, as required by the legislation, were carried out, and for which the DM 260/2012 defined indices and EQRs for ecological classification. From the application of the M-AMBI indices, it emerges that no sampling point of the Piccolo Sea of Taranto resulted in a "bad state". The PPN 1 and PPN 3 points were in a "slightly disturbed state", while the PPN 2 point was in an "undisturbed state". Analyzing the presence of taxa

in the 3 points, it is obvious that the only real difference between the points and the presence in point 2 of tunicates, animals that are particularly affected by anthropogenic pressures.

Di seguito riportiamo le tabelle con la descrizione e il nuemero dei taxa presenti in ciascun punto e il relative calcolo dell'indice M-AMbi con un software creato appositamente.

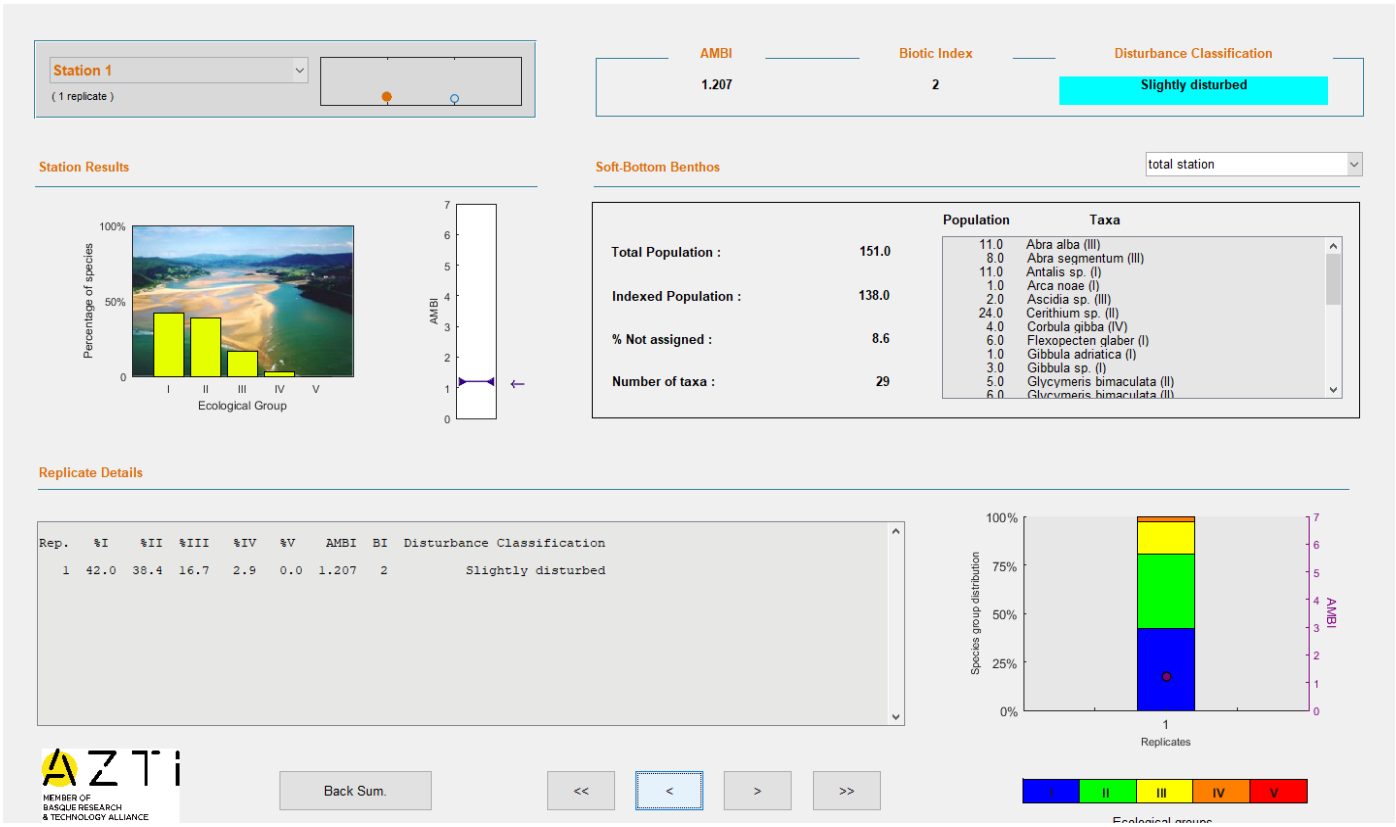
Species list SAMPLE PPN1					
TAXA	GENERE	SPECIE	Replica 1	Replica 2	Replica 3
CHORDATA	*Ascidia*	*spp*	0	0	2
ECHINODERMI	*Paracentratus*	*lividus*	2	0	0
	Ophiura	*ophiura*	2	1	1
	Olothuroidei	*spp*	1	0	0
MOLLUSCHI (Bivalvi)	*Flexopecten*	*glaber*	3	1	2
	Arca	*noae*	0	0	1
	Abra	*segmentum*	5	1	2
	Abra	*alba*	6	1	4
	Glycymeris	*bimaculata*	2	1	2
	Glycymeris	*spp*	1	3	2
	Loripes	*lacteus*	1	1	1
	Corbula	*gibba*	2	1	1
	Parvicardium	*spp*	1	2	2
	Musculus	*spp*	1	1	1
	Tellina	*spp*	3	2	2
MOLLUSCHI (Gastropodi)	*Cerithium*	*spp*	10	8	6
	Mangelia	*spp*	2	3	4
	Gibbula	*spp*	2	1	0
	Gibbula	*adriatica*	0	0	1
	Nassarius	*spp*	1	2	1
	Patella	*spp*	0	1	0
	Rissoidae	*spp*	0	2	0
	Murex	*spp*	0	1	0
	Tricolia	*spp*	1	0	0
	Natica	*spp*	0	1	0
MOLLUSCHI (Scaphopodi)	*Antalis*	*spp*	5	3	3
ANNELLIDI	*Serpula*	*spp*	4	4	4
	Notomastus	*spp*	1	5	5
	Vermetidae	*spp*	0	1	1

Species list SAMPLE PPN2					
TAXA	GENERE	SPECIE	Replica 1	Replica 2	Replica 3
CHORDATA	*Ascidia*	*spp*	2	0	0
CROSTACI	*Decapode*	*spp*	0	0	1
ECHINODERMI	*Paracentratus*	*lividus*	0	0	0
	Ophiura	*ophiura*	1	0	0
	Olothuroidei	*spp*	0	0	0
MOLLUSCHI (Bivalvi)	*Flexopecten*	*glaber*	2	2	1
	Arca	*noae*	1	3	2

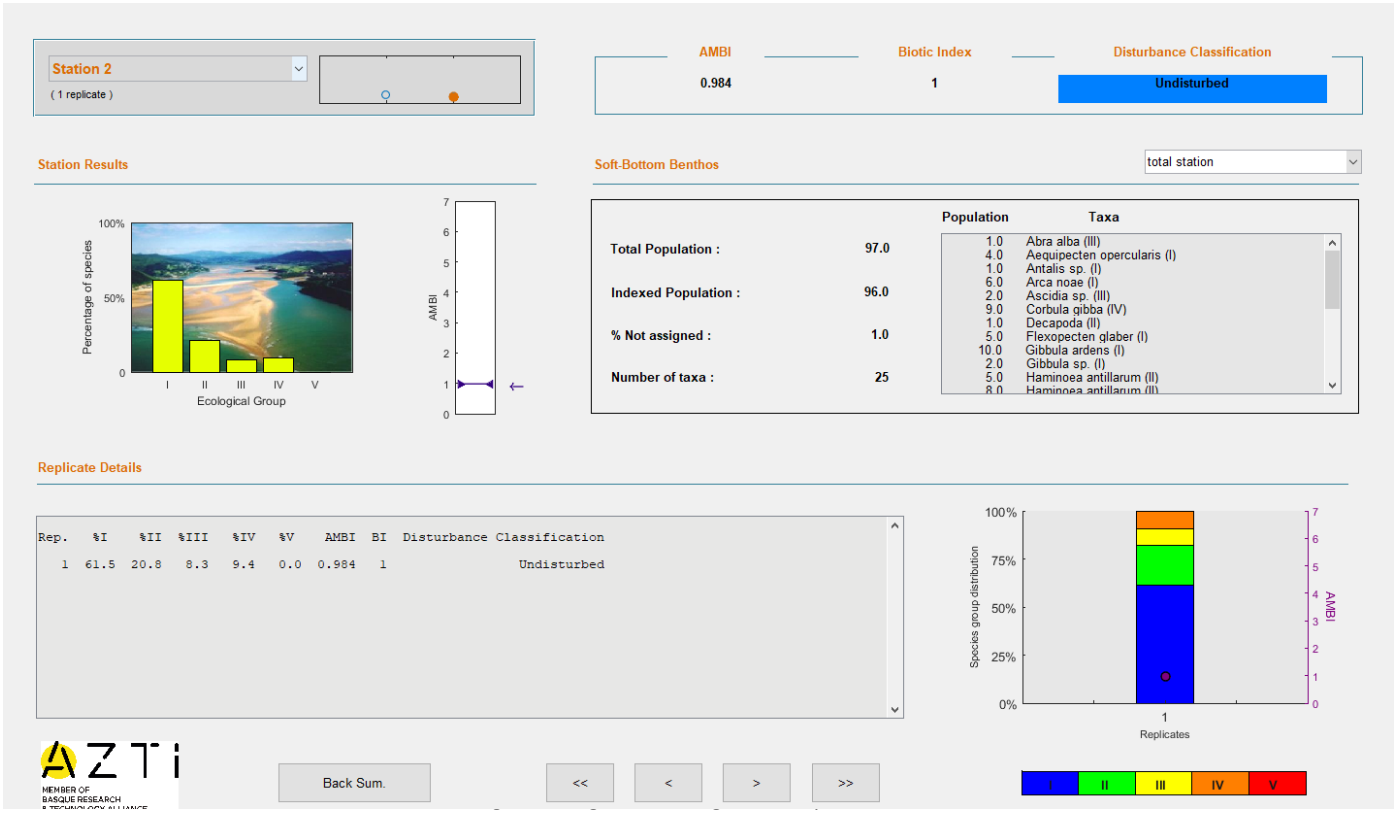
	Abra	*alba*	0	0	1
	Corbula	*gibba*	1	2	6
	Parvicardium	*spp*	2	2	2
	Aequipecten	*opercularis*	2	1	1
	Loripes	*lacteus*	1	1	1
	Mytilus	*galloprovincialis*	0	0	1
MOLLUSCHI (Gastropodi)					
	Gibbula	*ardens*	2	5	3
	Haminoa	*hydatis*	2	1	2
	Haminoa	*navicula*	1	2	5
	Nassarius	*spp*	1	3	1
	Rissoidae	*spp*	2	1	2
	Tricolia	*pullus*	3	2	3
	Hexaplex	*trunculus*	2	1	0
MOLLUSCHI (Scaphopodi)	*Antalis*	*spp*	1	0	0
ANNELLIDI	*Serpula*	*spp*	0	3	1
	Vermetidae	*spp*	2	0	2
	Sabella	*spp*	1	0	0

Species list SAMPLE PPN3					
TAXA	GENERE	SPECIE	Replica1	Replica2	Replica3
CHORDATA	*Ascidia*	*spp*	1	0	0
CROSTACI	*Paracerceis*	*sculpta*	4	5	3
	Gammarus	*aequicauda*	1	2	1
ECHINODERMI	*Paracentratus*	*lividus*	0	1	0
	Olothuroidei	*spp*	0	0	0
MOLLUSCHI (Bivalvi)	*Flexopecten*	*glaber*	2	0	1
	Arca	*noae*	1	1	3
	Abra	*alba*	9	10	16
	Corbula	*gibba*	15	12	45
	Parvicardium	*spp*	4	2	2
	Musculus	*spp*	1		1
	Abra	*segmentum*	1	1	0
	Arcuatula	*senhousia*	1	3	0
	Polititapes	*aureus*	1	1	1
	Moerella	*distorta*	1	0	1
	Cerastoderma	*glaucum*	2	1	1
	Mimachlamys	*varia*	1	0	1
	Mytilus	*galloprovincialis*	1	1	3
MOLLUSCHI (Gastropodi)	*Tricolia*	*pullus*	7	12	10
	Gibbula	*ardens*	4	5	3
	Cerithium	*spp*	2	2	1
	Haminoa	*hydatis*	4	5	2
	Haminoa	*navicula*	2	4	1
	Nassarius	*spp*	4	5	3
	Rissoidae	*spp*	1	2	1
	Hexaplex	*trunculus*	3	2	3
	Tricolia	*spp*	1	2	2
	Phorcus	*spp*	4	2	8
	Gibbula	*varia*	18	22	15
MOLLUSCHI (Scaphopodi)	*Antalis*	*spp*	1	0	1
ANNELLIDI	*Serpula*	*spp*	2	1	2
	Policheti	*spp*	1	4	0

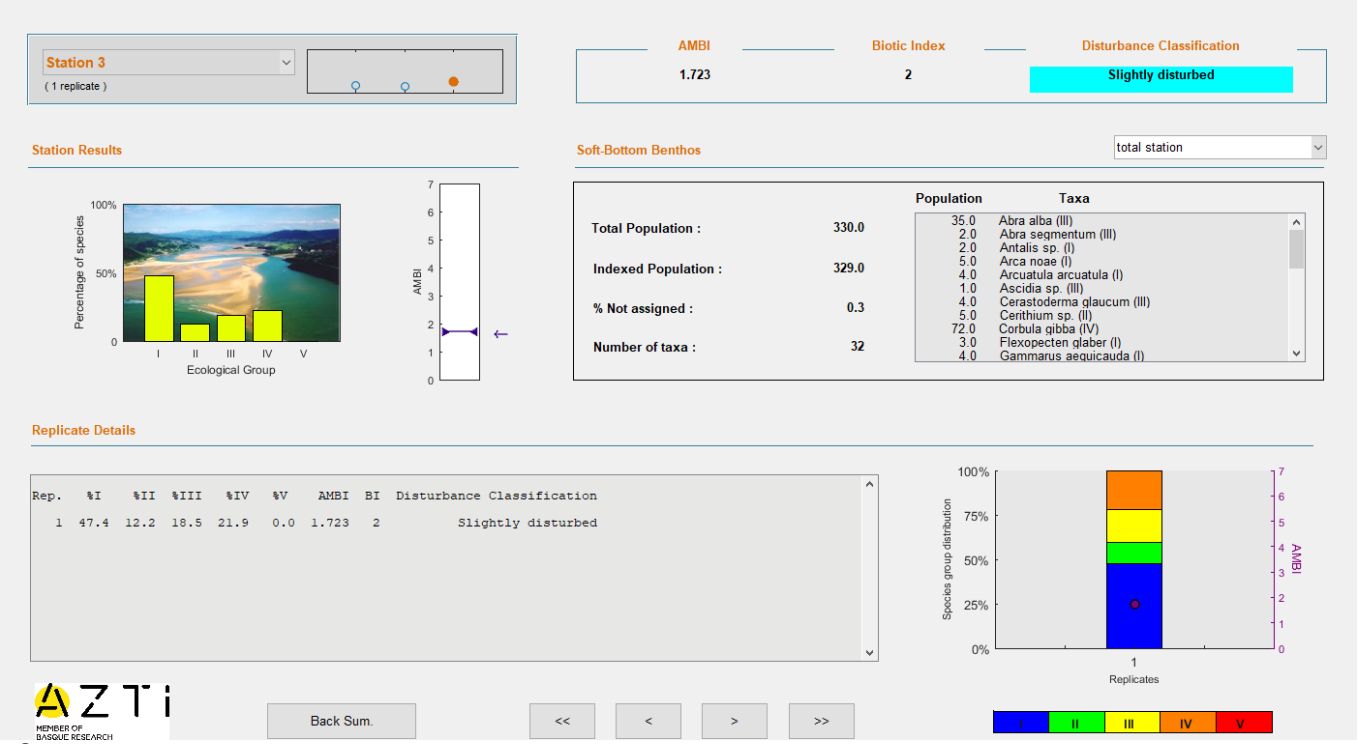
M-Ambi Station 1 index results



M-Ambi Station 2 index results



M-Ambi Station 3 index results



3

From the analysis of the transects inspected with ROVs, the following biocoenoses emerged.

N. Tr.						
	Algae	**Hydrozoe**	**Ascidie**	**Polichaeti/Anellids**	**Sponge**	**Molluscs**
1	**Green:** *Codium Spp* *Cladophora sp* *Chaetomorpha sp*	*Sertularella Spp*	*Phallusia mammillata* *Steyla plicata*	*Bispira volutacornis* *Sabella spp*	*Cliona spp* *Ircinia spp* *Agela oroides* *Pleuraplysilla spp*	*Cardium spp* *Gibbula spp* *Clanculus spp*
2	**Green :** *Codium Spp* *Cladophora sp* *Chaetomorpha sp*	*Sertularella Spp*	*Phallusia mammillata* *Steyla plicata*	*Bispira volutacornis* *Sabella spp*	*Cliona spp* *Ircinia spp* *Agela oroides*	*Cardium spp* *Gibbula spp* *Clanculus spp*

FINAL REPORT

Conclusions

From the examination of the sediment and the calculation of the M-Ambi index, it is clear that the situation in terms of the ecological status of the Piccolo Sea is not totally negative, in fact, two points out of three have been classified as "slightly disturbed". The sampling and analysis point n. 2, the one closest to the access channel that connects the open sea with the Piccolo Sea, has been classified as "undisturbed" thanks to the discovery of some species of Tunicates, a presence facilitated by the exchange of water with the open sea. The large presence of anthropogenic activities, first of all aquaculture, however, present in a massive and poorly regulated way, does not facilitate the situation. Other environmental criticalities are also present in the area such as industrial complexes, port activities, shipbuilding, military activities, which increase the state of compromise of the environment. From the analysis of the ROV videos, a strong presence of chaetomorpha and cladophora algae was highlighted in both sites, an index of concentration of nitrates and nitrites deriving from anthropogenic activities such as aquaculture or the washing away of land subject to agricultural activity. In addition to the investigations described above, further samplings were carried out with the aim of identifying some "truths at sea" and better defining the facies identified with the MBE survey, in order to update the existing biocenotic map (Parenzan 1970). These checks have led to a re-measurement of the main facies present which have substantially undergone slight variations.