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FINAL SURVEY OF MARINE CAVES INCLUDING MONK SEAL HABITATS IN MONTENEGRO (CAPE VOLUICA - CAPE ĐERAN)

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INTRODUCTION

Thanks to the generous donation of Jugopetrol AD, we systematically surveyed the coastline of Montenegro between cape Arza and cape Platamuni in 2013 and the coastlinebetween cape Platamuni and cape Voluica in 2014. The aims of the study were to (a) register the marine caves along the coastline as an important and endangered habitat in the area, (b) to detect the presence/absence of the critically endangered Mediterranean monk seal, *Monachus monachus* and (c) to evaluate the environmental status of coastal waters by mapping the algal superficial layer as requested by the Water Frame Directive (2000/60/EC). In 2015, the third -and last- survey was carried out in the area from cape Voluica to cape Đeran in the south of the country in order to complete the registration of marine caves and monk seal habitats all over Montenegro's coastline along with the evaluation of the quality of coastal sea water in this last part of the coast.

Marine caves are an important and endangered habitat listed in Annex I of the EU Habitats Directive (1992/43/EC). They are widely acknowledged for their unique biodiversity and constitute a typical feature of the Mediterranean coastline. They are a biodiversity hotspot and an important terrestrial habitat for the critically endangered Mediterranean monk seal, *Monachus monachus*, for resting and reproduction. This species is protected by national law as also by the Barcelona Convention, the Bern Convention and the Annexes I and II of the EU Habitats Directive at the international level. Additionally, other endangered species, encountered in and around marine caves, were also registered. It is important to underline that the two areas surveyed in 2013-2014 included the future Marine Protected Area of Platamuni (MPA Platamuni) close to cape Platamuni and the future MPA Katič (close to Petrovac). Thus, our results are an important contribution to the establishment of MPAs in Montenegro where presently no MPAs exist yet, to the creation of an urgently needed Cave Kataster for Montenegro and to the protection of marine environment in general.

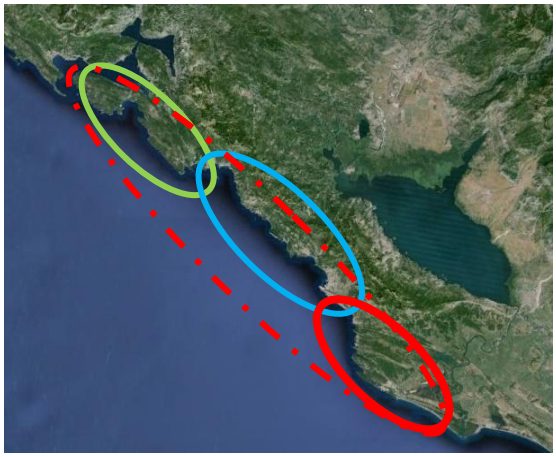


Figure 1. Area surveyed in 2013; Area surveyed in 2014 and Area surveyed in 2015

MATERIALS AND METHODS

Aim of our survey in 2015

In spring 2015, we surveyed the coastline of Montenegro from cape Voluica (Bar) to cape Đeran (Ulcinj) in order to complete the survey of the entire Montenegrian coastline (except for the Bay of Boka Kotorska) t. The data will be submitted to the Ministry of Sustainable Development and Tourism, to the Agency of Environment and to Morsko Dobro in the same format as the data of the previous surveys were submitted. Our survey included 3 parts as follows:

(1) Survey of the marine caves along the part of the coastline of Montenegro not yet surveyed: from cape Voluica (Bar) to cape Đeran (Ulcinj) (ca. 30 km of coastline). As marine caves are considered holes more than 5 metres deep, situated under the sea level or open to it, including partially submerged sea caves. For the purpose of this survey we entered all openings at the sea level by snorkelling. The caves have been checked for the presence of any protected species and for the presence of beaches in the interior suitable as a terrestrial habitat for monk seals. For all registered caves the following basic data were noted: Location name, geographic Coordinates, Dimensions (in meters), Exposition, morphological characteristics, Date of survey, and typical Living organisms in the cave and in front of it. During the post processing of the collected data all Locations are mapped by Quantum GIS software.

(2) Furthermore, we surveyed again 19 caves already known from the previous surveys in 2013 and 2014 between cape Arza and cape Voluica for monk seal evidence, since only regular surveys may yield significant results about the presence of this species.

(3) Last but not least, we continued the systematic registering of algal communities along the coastline since these data are necessary for the evaluation of the ecological state of the water body (seawater quality) as requested by the EU Waterframe Directive. We used the so-called CARLIT method for the evaluation of the seawater quality as we did in 2014.

The surveys has been carried out by the same -already trained- team members as in September 2013 and in May 2014: we invited again experts with long experience on monk seal conservation from abroad (Aliki Panou, NGO Archipelagos - environment and development, Greece and Luigi Bundone, Archipelagos Italy) and one member of the local NGO MedCEM (Dušan Varda, Mediterranean Center For Environmental Monitoring) active in marine conservation. Additionally, for help in speleological measurements we invited Miloš Pavićević from the local NGO Bio-speleological association of Montenegro. The surveys were carried out by Vesna Mačić and Branislav Lazarević from the Institute of Marine Biology, Kotor in May 2015 and in August 2015. The field work was mainly carried out in May, before the start of the high season, since tourism along the coastlines may drive away

potentially present monk seals and algae communities are at an excellent state of development after the winter. Because of some days with waves and difficulties to enter the caves safely in May, some work was carried out in August.

1. Survey of the coast from cape Voluica to cape Đeran for mapping of marine caves and potential habitats for monk seals

This part of the survey was done by snorkeling and caves were checked for beaches in the interior and for the presence of protected species. For all registered caves the following basic data were noted: Location name, geographic Coordinates, Dimensions (in meters measured by Leica DISTO DXT, Exposition, morphological characteristics, Date of survey, and typical Living organisms in the cave and in front of it. During the post processing of the collected data all Locations were mapped by Quantum GIS software.

We would like to emphasize that, by national law on nature protection (Sl. list no. 51/08), speleological objects are naturally formed holes in the rock longer than 5m, where a person can enter and their entrance is smaller than their length or depth. In the recently issued law on nature protection (Sl. list br. 62/13), no Dimensions for the definition of speleological objects are given. However, and for the purpose of this study, we use here the first definition as described above as we did also in our two previous reports. Furthermore, it would be useful for the future to select the final list of speleological objects of the present as also of the previous study according to the definition given by the new regulation on the Cave Kataster (No. 09-166/6) and adapt them to the format required by this regulation.

2. Potential monk seal habitat in the area surveyed in 2013-2015 (from cape Arza to cape Đeran)

During our survey, we carefully checked every cave with a beach inside, suitable as a resting and reproduction site for the highly endangered Mediterranean monk seal. Additionally, we surveyed again the 19 caves already known as potential monk seal habitats in the area between cape Arza and cape Voluica since only regular surveys may detect seal presence.

3. Mapping of algae and evaluation of the ecological status of the sea water using the CARLIT method

For the analysis of the ecological status, algal communities were mapped last year at the sea level, and the EQ index was calculated along the coast from cape Arza to the island of Stari Ulcinj. This was a first step in the evaluation of the sea water quality according to EU Water Frame Directive and to the CARLIT method we used for this purpose . In 2015, we mapped the algal layer in the remaining area from the island of Stari Ulcinj to cape Đeran.

Figure 2. Area from cape Arza to the island of Stari Ulcinj (where mapping of algae was carried out in 2014) and down to cape Đeran surveyed in 2015

The cartography of littoral rocky-shore communities (CARLIT) is a European Union Water Framework Directive-compliant monitoring method widely used in the Western Mediterranean Sea. This non-destructive method is based on a visual observation of the type and length of the coast occupied by rocky-shore communities in the upper-sublittoral zone (Ballesteros et al. 2007; Nikolić et al. 2013).

The CARLIT methodology in this study was applied according to the general procedures elaborated by Ballesteros et al. (2007) and some slight modifications elaborated by Nikolić et al. 2013 for the Adriatic Sea.

$$EQ = \frac{\sum(l_i \times SL_i)}{\sum l_i}$$

EQ = ecological quality value of a coastline sector
l_i = length of the coastline with the community category *i*
SL_i = sensitivity level of the community category *i*

In Table 1. different community types are shown, according to a "sensitivity level" (SL), ranging from 1 to 20. As proposed in the North-Western Mediterranean Sea CARLIT table, the highest SL values were assigned to well developed algal forests of *Cystoseira* , intermediate values to degraded communities with photophilic turf algae and mussel beds, whilst the lowest values were assigned to heavily degraded communities found in extremely polluted areas, consisting mostly of green algae and/or cyanobacteria. The proposed list of communities included the most common *Cystoseira* species which can be found in the upper-sublittoral in the Adriatic Sea. The most characteristic species is *Cystoseira amentacea* var. *spicata*, which forms a visible belt in the upper-sublittoral zone of the areas which are exposed. In order to simplify data collection and analysis, the abundance of its stands was classified into three levels: continuous belt, abundant patches and rare scattered plants. A lower SL value was assigned to *Cystoseira barbata*, because it is commonly observed in slightly polluted zones across the studied area, as well as to *Cystoseira compressa* already known for higher toleration of pollution (Nikolić et al., 2013).

Table 1. Type of algal communities and sensitivity level

Type of algal community	Sensitivity level
Trottoir *Lithophyllum byssoides*	20
Continuous belt *C. amentacea var. spicata*	20
Abundant patches C. amentacea var. spicata	15
Rare scattered plants of *C. amentacea var. spicata*	10
Cystoseira compressa	12
Photophilic algae	10
Corallina officinalis	8
Mytilus	6
Green algae	3
Cyanobacteria	1

The establishment and abundance of natural shallow water macroalgal communities is known to be mainly determined by the geomorphology of the coastline (Ercegović, 1964; Ballesteros, 1992) and such variability has to be taken into account in order to properly highlight the effects of potential human impacts. Following the original CARLIT method (Ballesteros et al., 2007), a set of geomorphologic features potentially affecting the distribution of macroalgal communities along the Adriatic coastline has been also taken into account (Nikolić et al. 2013). For the purpose of this study we analyzed two characters: the morphology of the coast and the coastline slope (Table 2). We also used reference values for the central Adriatic Sea from the above mentioned scientific paper(Table 3).

Table 2. Category "Geomorphologic factor"

Category: Geomorphology of the cooastline	
Coast morphology	High coast Low coast Blocks
Coastline slope	Horizontal (0–30◦) Sub-vertical (30–60◦) Vertical (60–90◦) Overhanging

Table 3. Reference area values

Geomorphological factors		Ecological quality value (EQ_{ref})
High coast	Horizontal (0–30◦)	20
High coast	Sub-vertical (30–60◦)	17,55
High coast	Vertical (60–90◦)	12,96
High coast	Overhanging	10
Low coast	Horizontal (0–30◦)	19,02
Low coast	Sub-vertical (30–60◦)	17,72
Low coast	Vertical (60–90◦)	14,62
Low coast	Overhanging	9,66
Blocks		12,76

RESULTS

1. Survey of the coast from cape Voluica to cape Platamuni for mapping of marine caves and potential habitats for monk seals

After the field work all data were organized in tables. LLocations were mapped in Quantum GIS (Figure 3). In the surveyed area from cape Voluica to cape Đeran we registered 33 caves and 3 more entrances as potential caves (altogether 36 caves). The great majority of the caves found during this survey are located in the surroundings of Ulcinj town towards the south: 24 caves out of a total of 36. The data for each Location are presented in a single, separate table for each cave

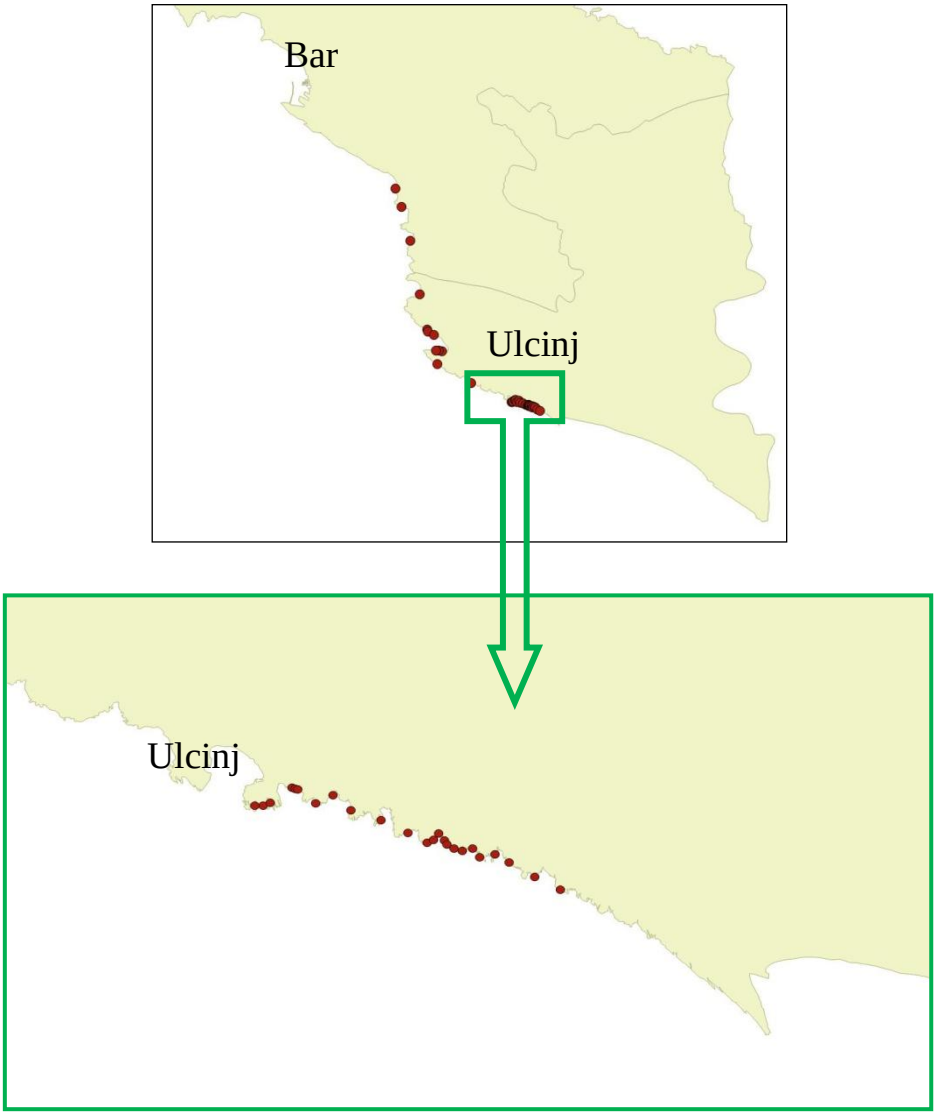


Figure 3. Caves in the surveyed area from cape Voluica to cape Đeran

During this survey we also encountered several protected species, thus contributing to the general knowledge of their distribution and underlining the ecological importance of this area. Of all species found inside the caves or close to them we may underline the presence of the following protected species:

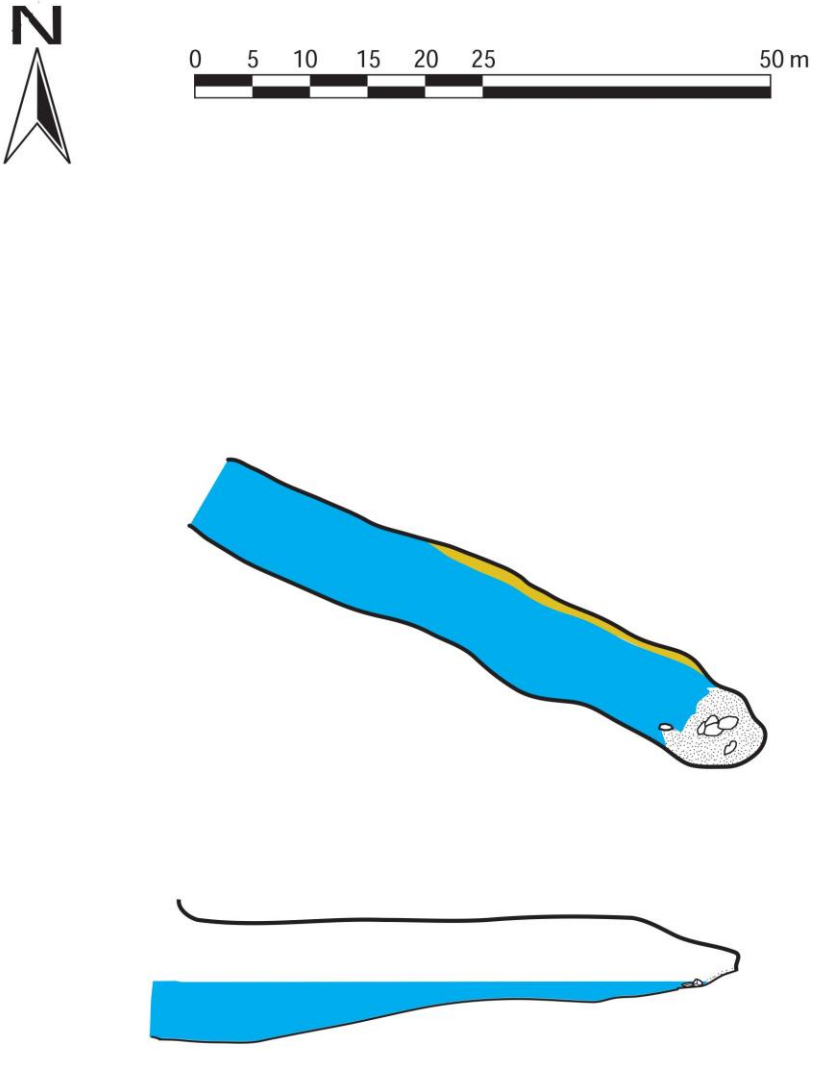
(a) Algae and seagrass: *Lithophyllum byssoides, Cystoseira amentacea, Cymodocea nodosa*

(b) Molluscs: *Lithophaga lithophaga*

(c) Bats**:** *Miniopterus schreibersii*

(d) The herons around cape Deran (photo)? Larus michahellis

No. 1.	**Location: Nišice (u. M. pijesak)**   Foto: Vesna Mačić
Coordinates	N 42º 02' 20.83" E 19º 08' 35.65"
Dimensions	Wide 6m x high 4,6m x long 17m; (rock and pebble beach 7m)
Exposition	North-west
Morpho-characteristics	Wide entrance of the cave continues in direction north-south. At the end of the cave there are big rocks and a pebble beach.
Living organisms	It was not possible to observe organisms on rocky walls of the cave because of many Posidonia dead leafs floating in the water or deposited on the beach. However, we observed limpets on upper walls and pigeons.
Notes	Very close to houses
Date of survey	12. 05. 2015.
In front of the cave	Rocky blocks, boulders, barren, some *Corallina* and limpets.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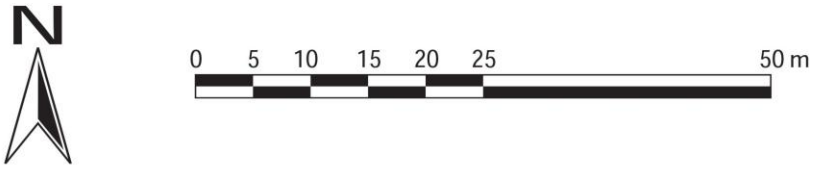
No. 2.	**Location: rt Meret**  Foto: Vesna Mačić  Foto: Luigi Bundone
Coordinates	N 42º 01' 40.48" E 19º 08' 42.19"
Dimensions	Wide 3m x high 2m x long 10m (high inside 5m) (pebble beach 2m long)
Exposition	South-west
Morpho-characteristics	After a few meters the cave is 1m (and less) wide and ends with a small beach.
Living organisms	Very scarce, almost nothing. On the walls above, pigeons.
Notes	Strong smell of waste water
Date of survey	12. 05. 2015.
In front of the cave	Barren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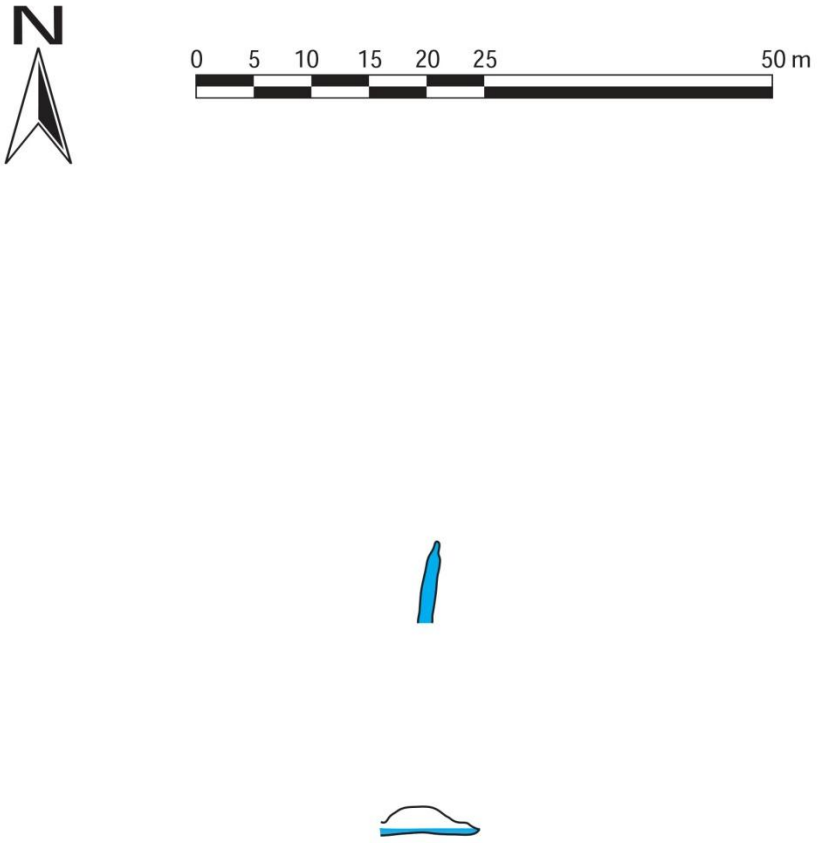
No. 3.	**Location: rt Komina**  Foto: Vesna Mačić
Coordinates	N 42º 00' 35.75" E 19º 08' 53.11"
Dimensions	Wide 2m x high 0,4m x long 6m
Exposition	South-west
Morpho-characteristics	After the low entrance there is a small room.
Living organisms	*Patella sp.,* incrusting algae
Notes	
Date of survey	12. 05. 2015.
In front of the cave	Pebbles and barren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No. 4.	**Location: rt Kep**  Foto: Vesna Mačić
Coordinates	N 42º 58' 55.26" E 19º 09' 01.44"
Dimensions	Wide 1,1m x high 1,4m x long 13m (pebble beach is 3,3m long)
Exposition	West
Morpho-characteristics	One single room ending with a small beach.
Living organisms	Scarce, incrusting algae, some limpets.
Notes	
Date of survey	12. 05. 2015.
In front of the cave	Large barren and there are some *Cystoseira amentacea.*


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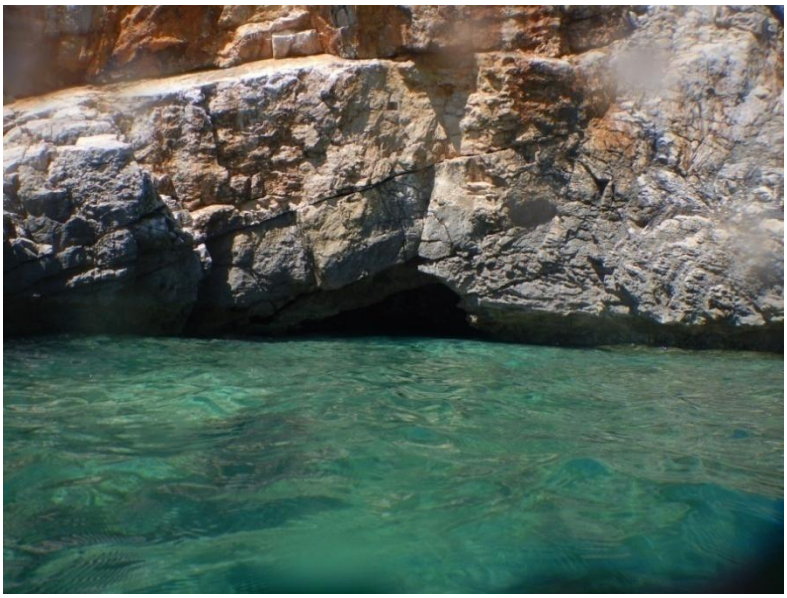
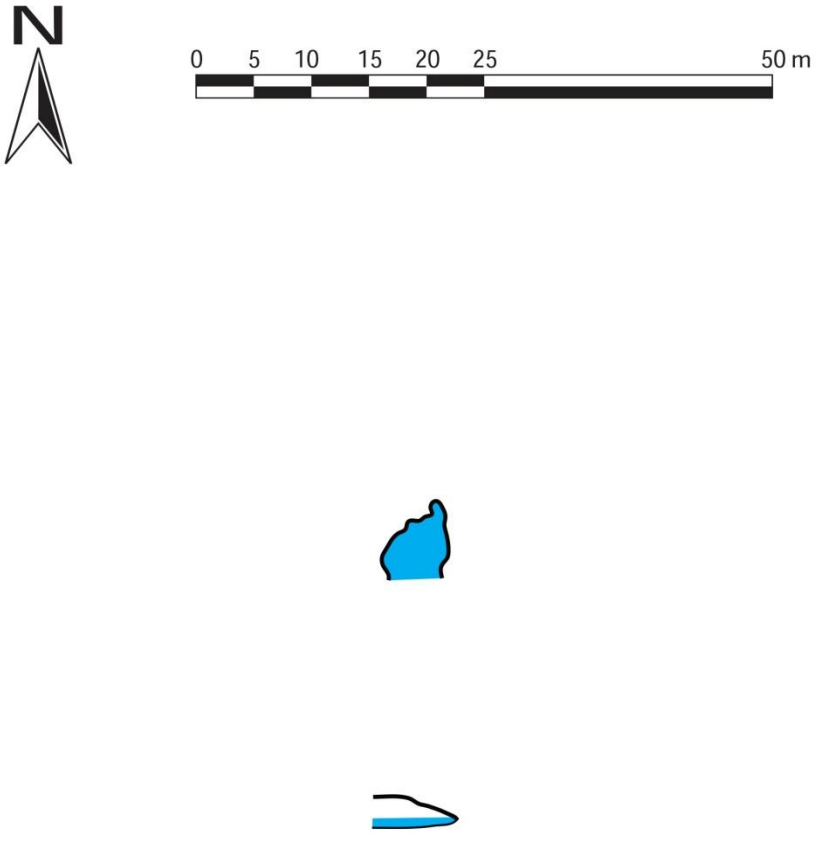
No. 5.	**Location: u. Valdanos 1**  Foto: Vesna Mačić
Coordinates	N 42º 58' 09.49" E 19º 08' 39.62"
Dimensions	Wide 4,2m x high 0,5m long 7m
Exposition	West
Morpho-characteristics	Small hall with a siphon at the end. The siphon is probably not very long because waves were splashing.
Living organisms	Incrusting algae
Notes	
Date of survey	12. 05. 2015.
In front of the cave	Boulders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No. 6.	**Location: u. Valdanos 2**  Foto: Vesna Mačić
Coordinates	N 42º 58' 06.46" E 19º 08' 41.00"
Dimensions	Wide 4m x high 2m x long 11m (rocky beach 1m long)
Exposition	West
Morpho-characteristics	Singel room ending with some emerging rocks and pebbles.
Living organisms	Scarce, incrusting algae
Notes	
Date of survey	12. 05. 2015.
In front of the cave	Barren


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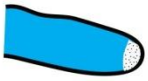
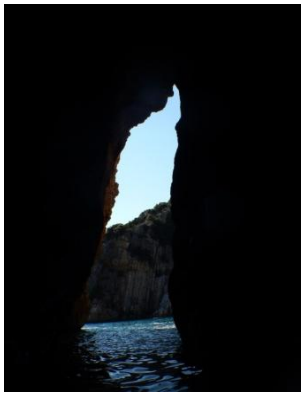
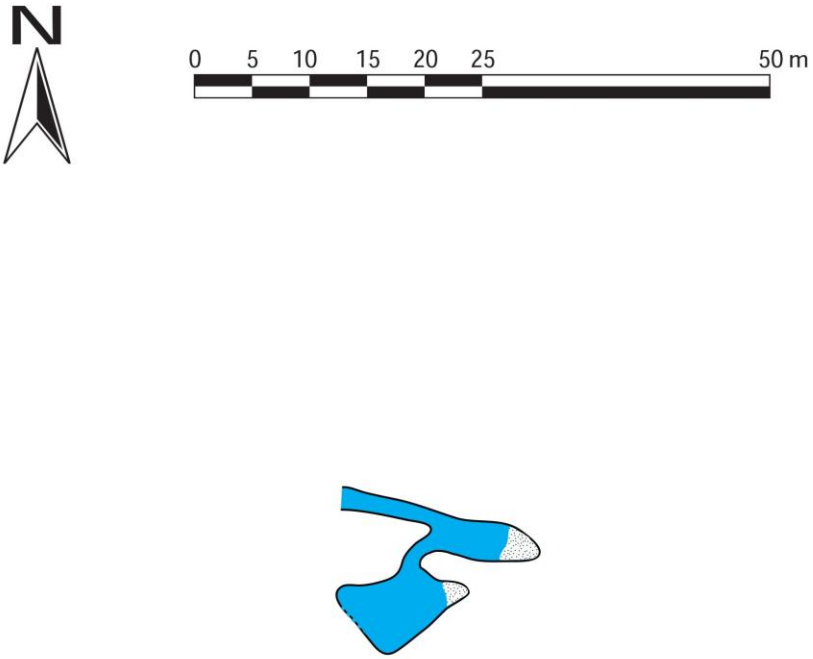


No. 7.	**Location: u. Valdanos 3**  Foto: Vesna Mačić  Foto: Dušan Varda
Coordinates	N 42º 57' 50.01" E 19º 09' 10.11"
Dimensions	Wide 4m x high 7m x long 17m (two pebbles beaches, 4m and 5m long)
Exposition	West
Morpho-characteristics	The first room is ending with a pebble beach 4m long. Close to the ending of this first room there is a passage to the second, rounded room. In this, second room there is also a small pebble beach, 5m long and there is an underwater passage to the open sea.
Living organisms	Incrusting algae, limpets, some sponges.
Notes	Very good location for monk seals.
Date of survey	12. 05. 2015.
In front of the cave	*Cystoseira amentacea* in patches, *Actinia equina* and barren.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No. 8.	**Location: u. Valdanos 4**  Foto: Dušan Varda
Coordinates	N 42º 57' 05.19" E 19º 09' 38.58"
Dimensions	Wide 2,4m x high 3,6m x long 9,7m
Exposition	North
Morpho-characteristics	At the entrance and in front of the cave, in the sea there are several boulders. The single room has rocks above the sea on both two sides.
Living organisms	Not observed
Notes	
Date of survey	12. 05. 2015.
In front of the cave	Not observed


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No. 9.	**Location: Valdanos 5**  Foto: Luigi Bundone
Coordinates	N 41º 57' 06.04" E 19º 09' 33.76"
Dimensions	Wide 1,8m x high 2,3m x long 11,5m (small pebble beach 6m long)
Exposition	North
Morpho-characteristics	The cave room is ending in two parts with two small pebble beaches.
Living organisms	Incrusting algae, limpets, *Osilinus turbinatus.*
Notes	Good location for monk seals! Dynamite fishing!!
Date of survey	14. 05. 2015.
In front of the cave	Barren, *Cystoseira amentacea, Cystoseira compressa, Actinia equina, Lithophyllum byssoides.*


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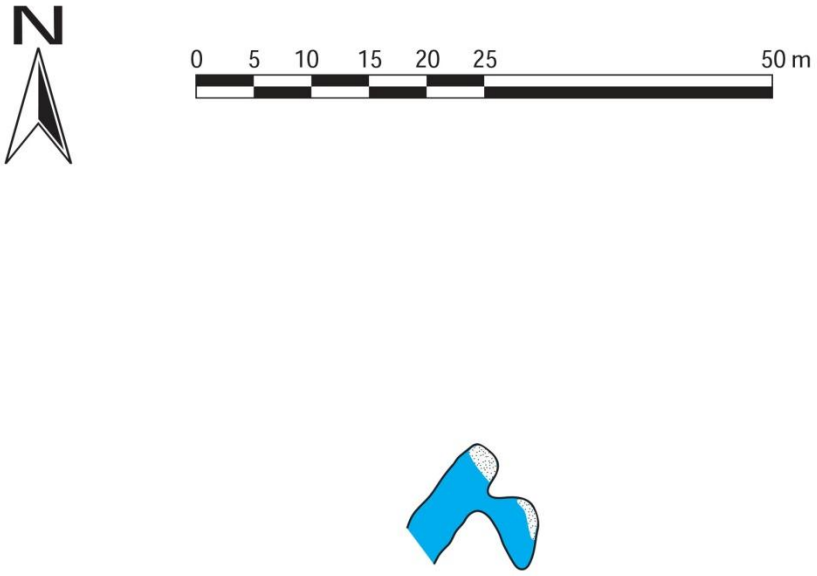
0 5 10 15 20 25 50 m

No. 10.	**Location: Valdanos 6**  Foto: Dušan Varda
Coordinates	N 41º 57' 06.98" E 19º 09' 24.40"
Dimensions	Wide 3,5m x high 3m x long 13m (two small pebble beaches 5m and 7m long)
Exposition	North
Morpho-characteristics	On the bottom there are pebbles as well as on the small beach.
Living organisms	Incrusting algae, limpets.
Notes	Good location for monk seals! Dynamite fishing!
Date of survey	14. 05. 2015.
In front of the cave	Pebbles, barren, *Cystoseira amentacea, Cystoseira comperssa.*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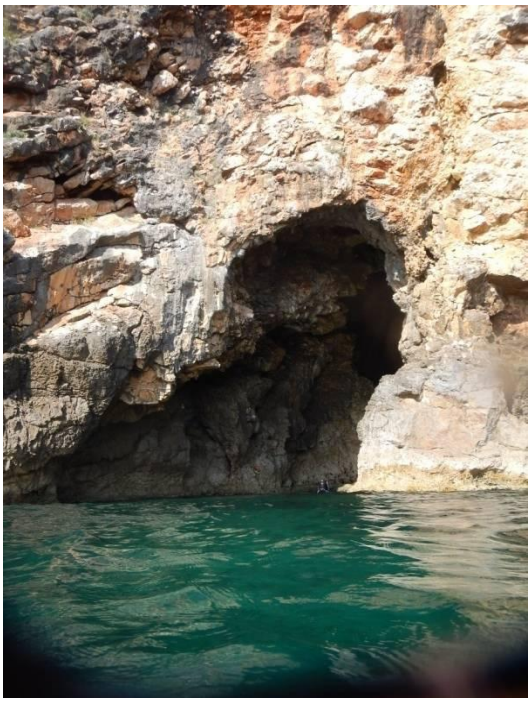
No. 11.	**Location: Golubinjska cave (rt Mendra)**  Foto: Luigi Bundone
Coordinates	N 41º 56' 42.40" E 19º 09' 24.45"
Dimensions	Wide 7m x high 10m x long 20m
Exposition	West
Morpho-characteristics	Large room, cave with many boulders in front of the entrance and inside.
Living organisms	Incrusting algae
Notes	
Date of survey	14. 05. 2015.
In front of the cave	Incrusting algae, limpets, *Lithophyllum byssoides*, *Gastroclonium clavatum*, *Corallina elegans*, *Cystoseira amanetacea*, *Cystoseira compressa.*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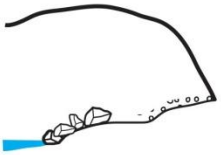
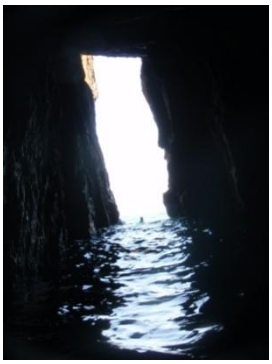
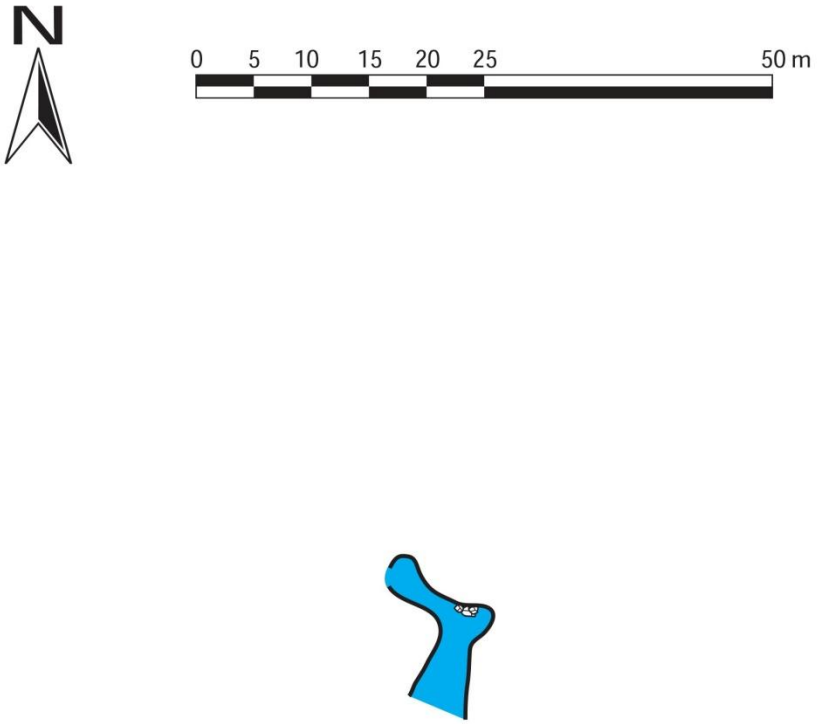


No. 12.	**Location: Opaljike**  Foto: Dušan Varda  Foto: Dušan Varda
Coordinates	N 41º 56' 12.60" E 19º 10' 25.59"
Dimensions	Wide 2,5m x high 7m x long 10,4m
Exposition	South-West
Morpho-characteristics	Wide entrance and wide single room that continues towards the left hand direction. Close to the ending of this part there is a second, smaller entrance, mostly submerged.
Living organisms	Incrusting algae, limpets and barnacles. Other organisms could not be observed because of waves.
Notes	
Date of survey	14. 05. 2015.
In front of the cave	Not observed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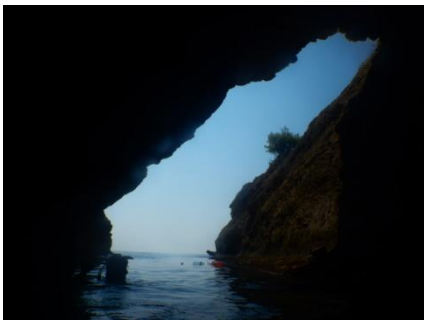
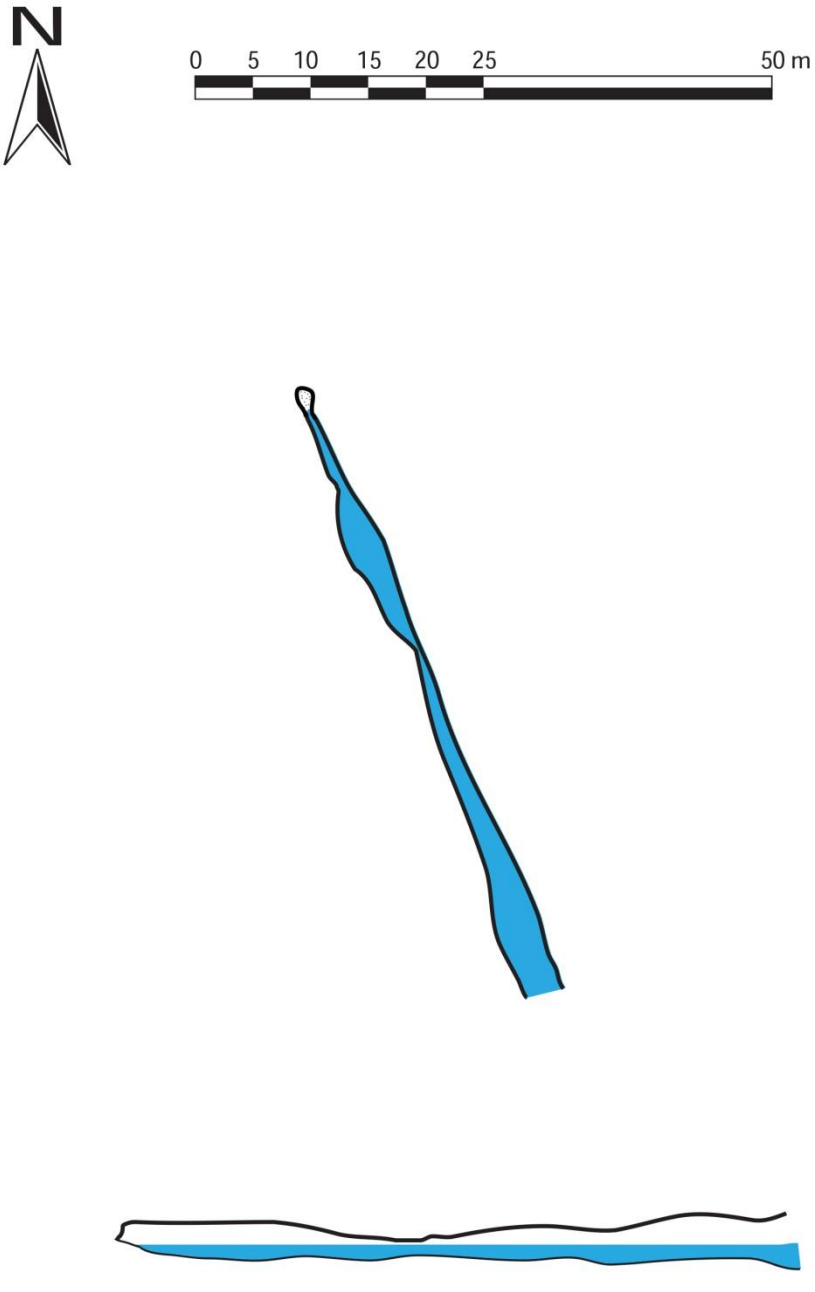
No. 13.	**Location: rt Kraljeve skalice 1**   Foto: Vesna Mačić
Coordinates	N 41º 55’ 14.01’’ E 19º 12’ 19.53’’
Dimensions	Wide 2,9m x high 2,6m x long 57,4m
Exposition	South
Morpho-characteristics	The first part of the cave is of larg dimensions while the second part is a narrow channel. At the end of the cave there is a beach of 7m , mostly rocks.
Living organisms	Some sponges, barnacles, *Actinia equina*, many *Palaemon serratus.*
Notes	Marine litter in front and inside.
Date of survey	31. 08. 2015.
In front of the cave	Trottoir of red algae with many muddy particles on it.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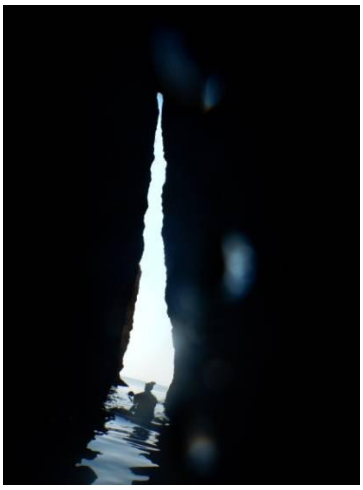
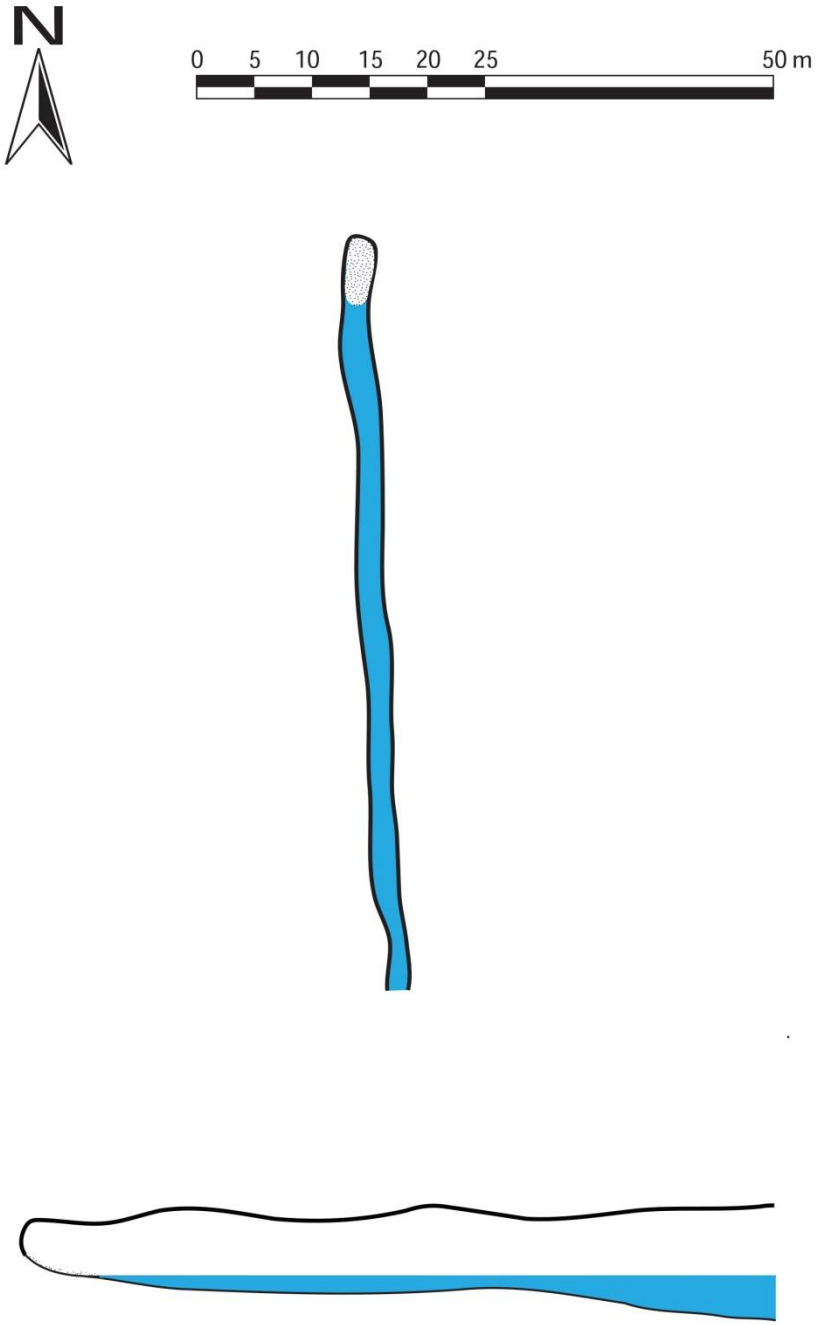
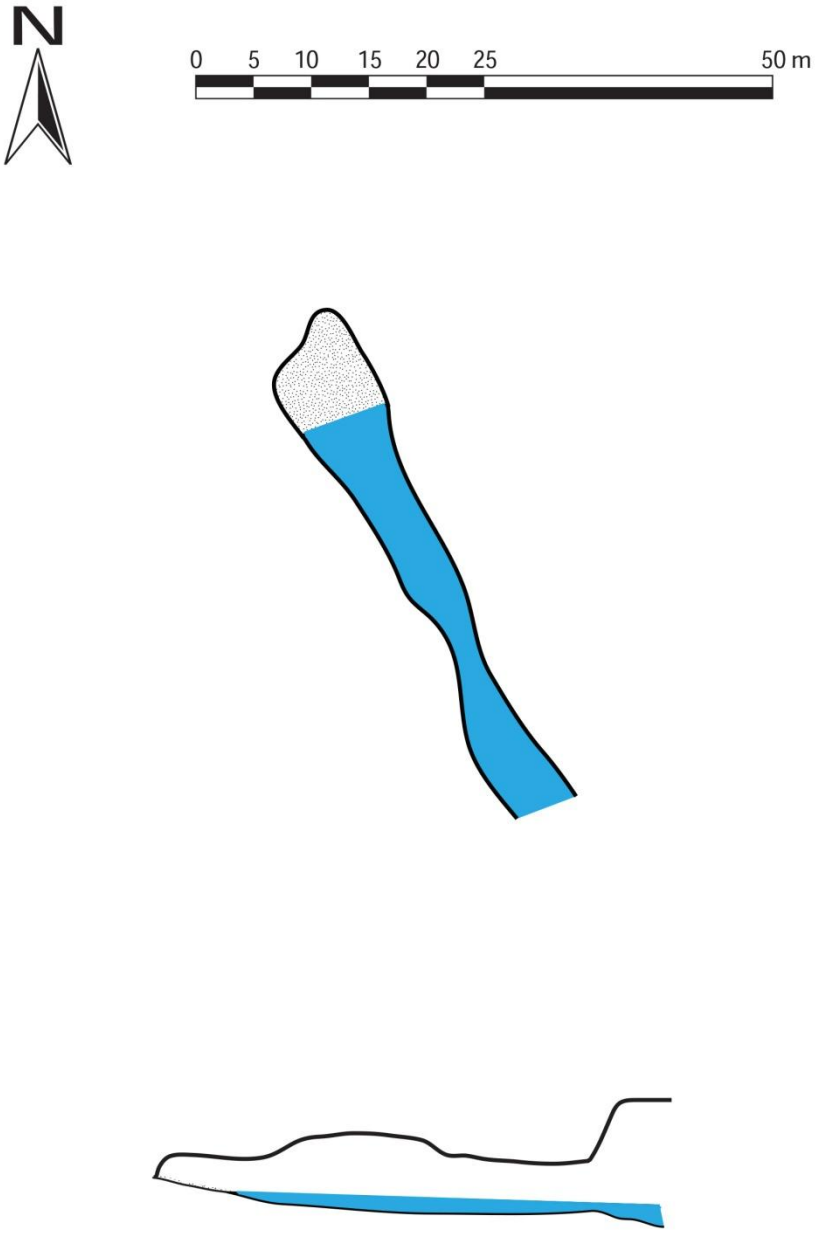
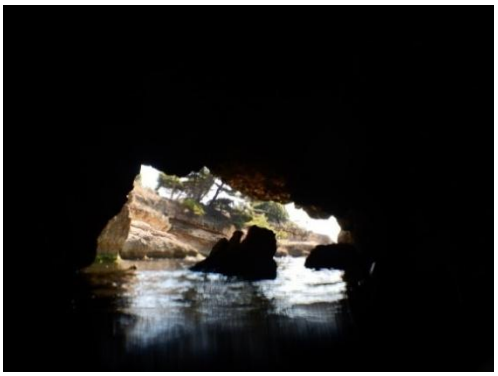
No. 14.	**Location: rt Kraljeve skalice 2**  Foto: Vesna Mačić
Coordinates	N 41º 55’ 01’’ E 19º 12’ 19.62’’
Dimensions	Wide 1,7m x high 6m x 65m (sandy beach is 6m long)
Exposition	South
Morpho-characteristics	The high opening is continuing into a singlenarrow channel.
Living organisms	Few *Actinia equina*, many *Palaemon serratus*, barnacles, low visibility.
Notes	Many marine litter items on the beach. Not good for seals with such a beach with litter.
Date of survey	31. 08. 2015.
In front of the cave	On the rocks red algae and *Ulva.*

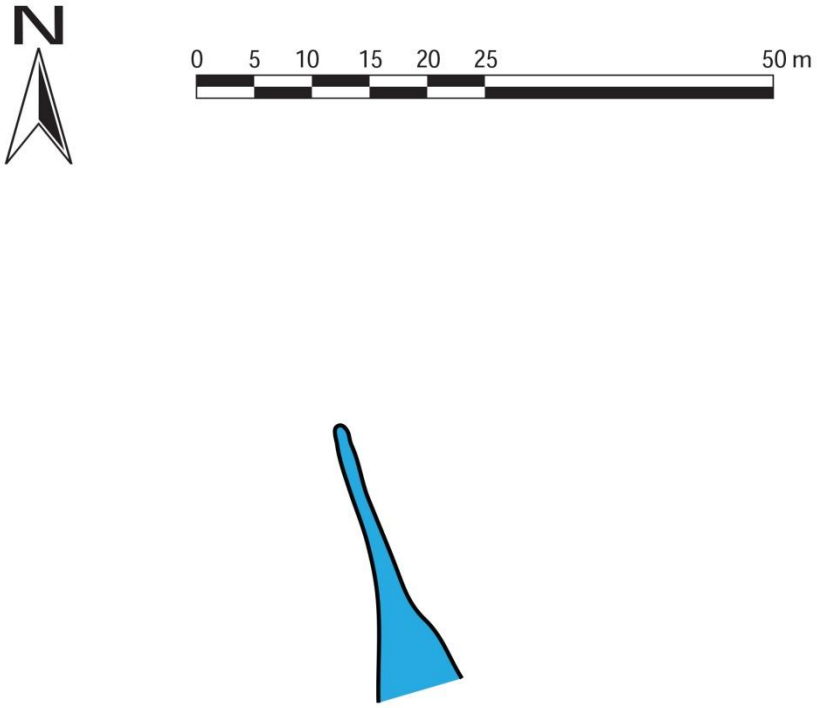

N
0 5 10 15 20 25 50 m

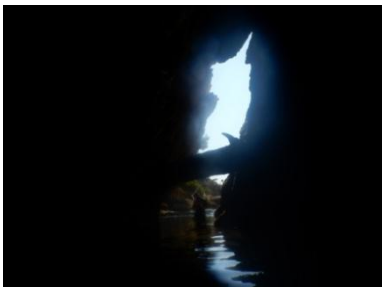
No. 15.	**Location: rt Kraljeve skalice 3**  Foto: Vesna Mačić
Coordinates	N 41º 55’15.61’’ E 19º 12’ 21.55’’
Dimensions	Wide 5m x high 7m x long 44,2m (pebble beach 8,4m long)
Exposition	South
Morpho-characteristics	After a wide entrance, inside the cave on 13m of cave length there is a very narrow part, than the channel is few meters wide and high.
Living organisms	Few *Actinia equina*, *Actinia cari*, barnacles, many *Palaemon serratus.*
Notes	Marine litter on the beach, few bats. Infront of the cave it seems also as a place for dumping litter into the sea.
Date of survey	31. 08. 2015.
In front of the cave	Further from the entrance there are some *Corallina elongata* and *Cystoseira compressa, Cystoseira amentacea, Mytillus galoprovincialis, Lithophillum byssoides.*

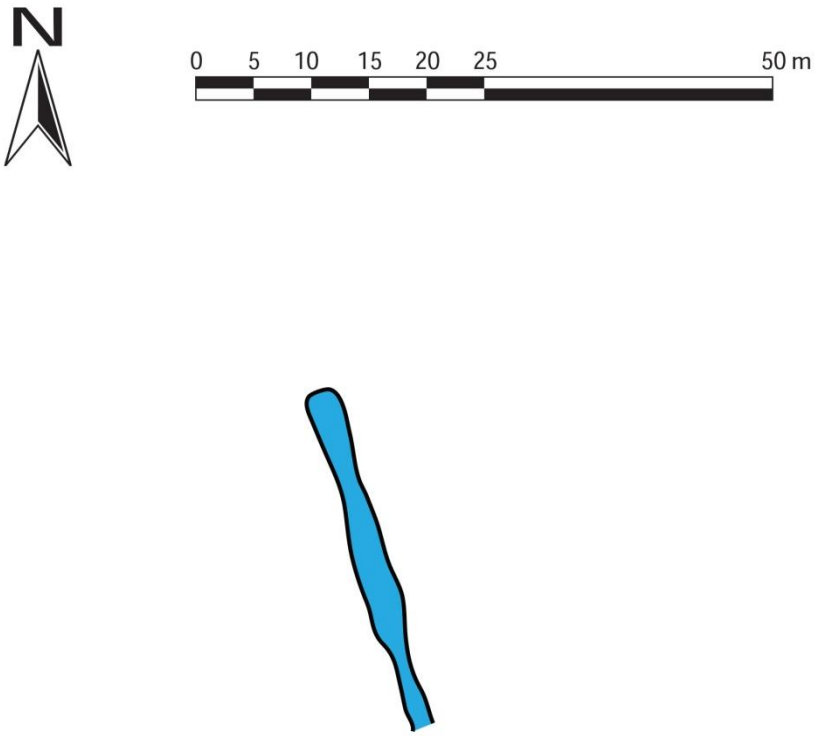

N
0 5 10 15 20 25 50 m

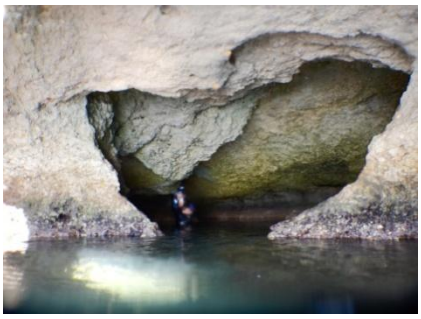
No. 16, 17, 18.	**Location: Pinješ 1**   Foto: Vesna Mačić
Coordinates	N 41º 55’ 17.34’’ E 19º 12’ 27.21’’
Dimensions	
Exposition	
Morpho-characteristics	
Living organisms	
Notes	Of these three locations 2 are possibly caves but because of the heavily polluted water by the waste water discharge, the interior of these locations could not be surveyed .
Date of survey	31. 08. 2015.
In front of the cave	*Ulvales*

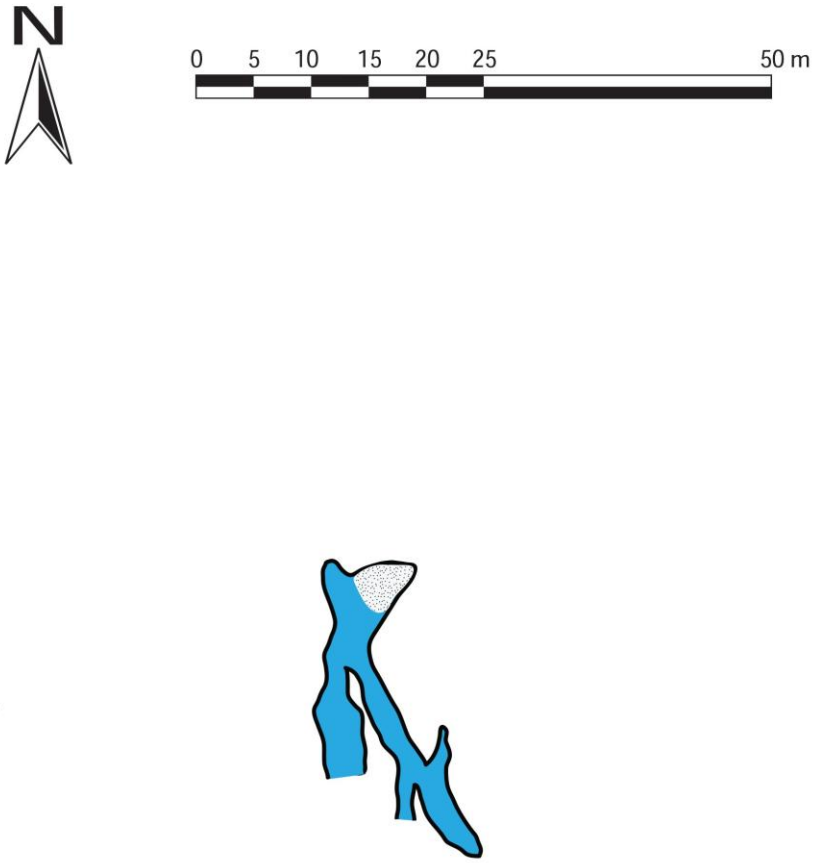
No. 19.	**Location: Pinješ 2**  Foto: Vesna Mačić
Coordinates	N 41º 55’ 13.82’’ E 19º 12’ 39.70’’
Dimensions	Wide 7m x high 2m x long 23,9m
Exposition	South
Morpho-characteristics	The wide opening is continuing with a small narrow channel. On the floor there is fine sand, while from the ceiling there is a fresh water inflow.
Living organisms	Low visibility, some barnacles, *Palaemon serratus,* incrusting red algae
Notes	
Date of survey	31. 08. 2015.
In front of the cave	*Ulvales, Cystoseira compressa, Cymodocea nodosa.*


N
0 5 10 15 20 25 50 m

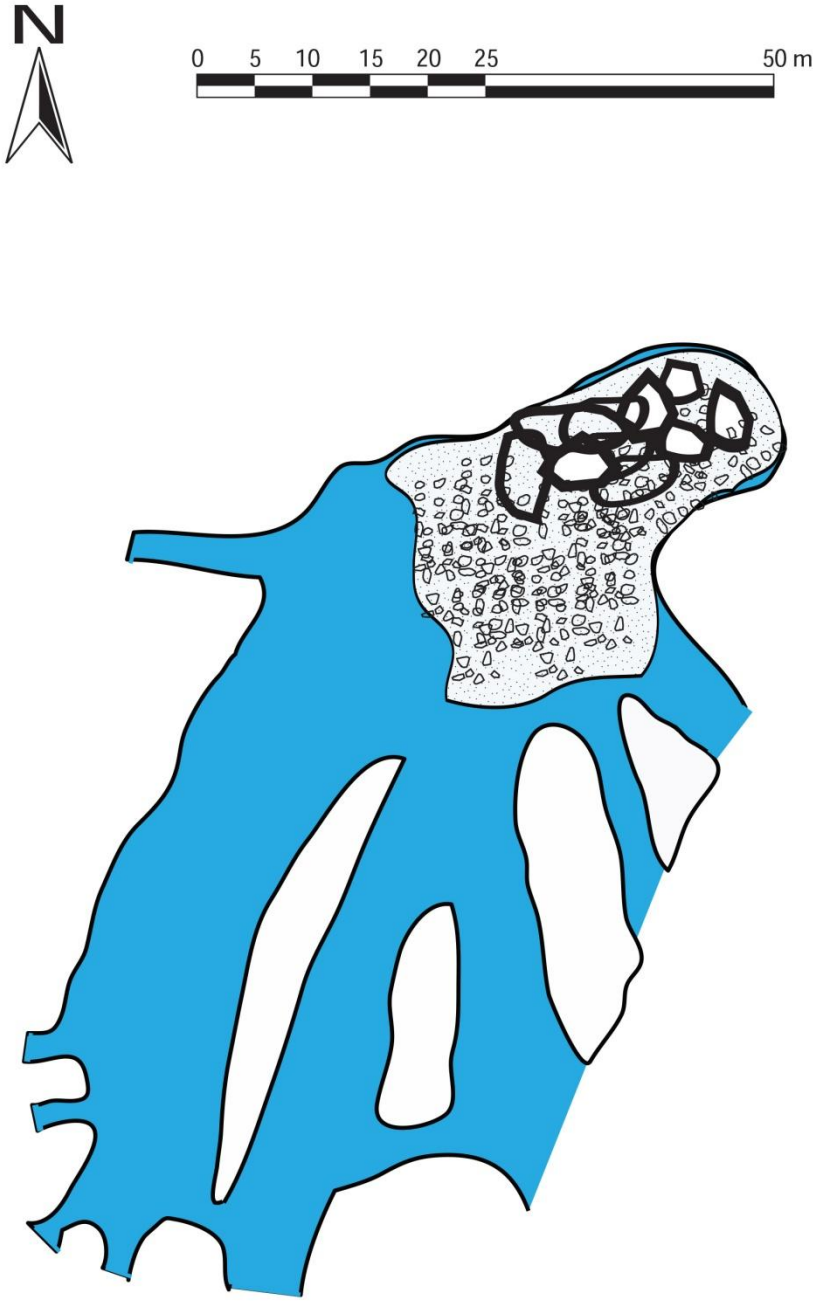
No. 20.	**Location: Pinješ 3**  Foto: Vesna Mačić
Coordinates	N 41º 55’ 13.68’’ E 19º 12’ 39.97’’
Dimensions	Wide 1,8 x high 2m long 30,5m
Exposition	South
Morpho-characteristics	The single cave room is very narrow at the end.
Living organisms	*Palaemon serratus*, barnacles, incrusting red algae.
Notes	
Date of survey	31. 08. 2015.
In front of the cave	*Cystoseira compressa, Ulvales*

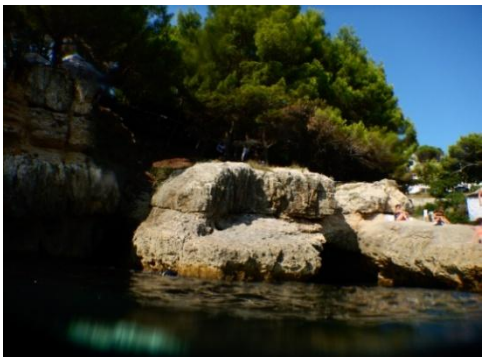

N
0 5 10 15 20 25 50 m

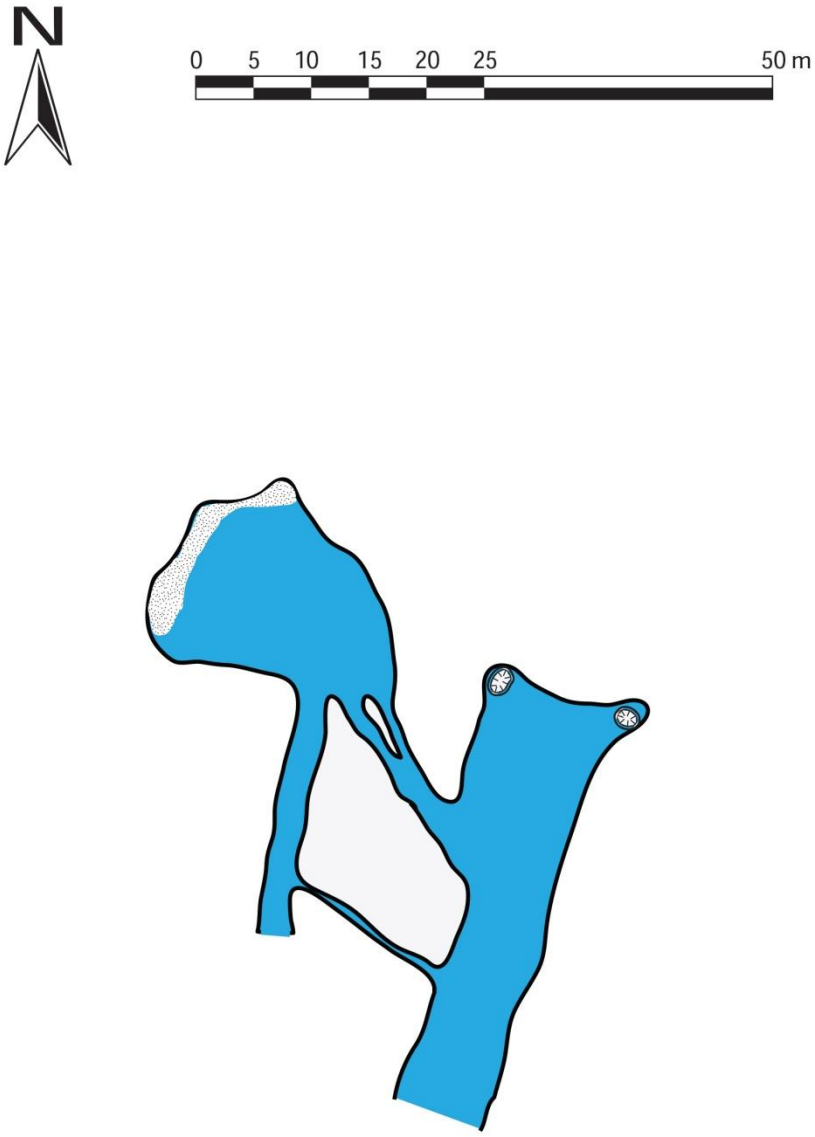
No. 21.	**Location: Pinješ 4**   Foto: Vesna Mačić
Coordinates	N 41º 55’ 13.51’’ E 19º 12’ 39.96’’
Dimensions	Wide 3,4 x high 3,3m x long 37m (pebble beach 6,2m long)
Exposition	South – West
Morpho-characteristics	This cave has two entrances. In one part there is a small pebble beach. A part of the bottom in the cave is sandy but most of it consists of pebbles and rocks.
Living organisms	Scarce, dead seagrass, incrusting algae.
Notes	Just few marine litter items.
Date of survey	31. 08. 2015.
In front of the cave	*Cystoseira compressa, Ulvales*


N
0 5 10 15 20 25 50 m

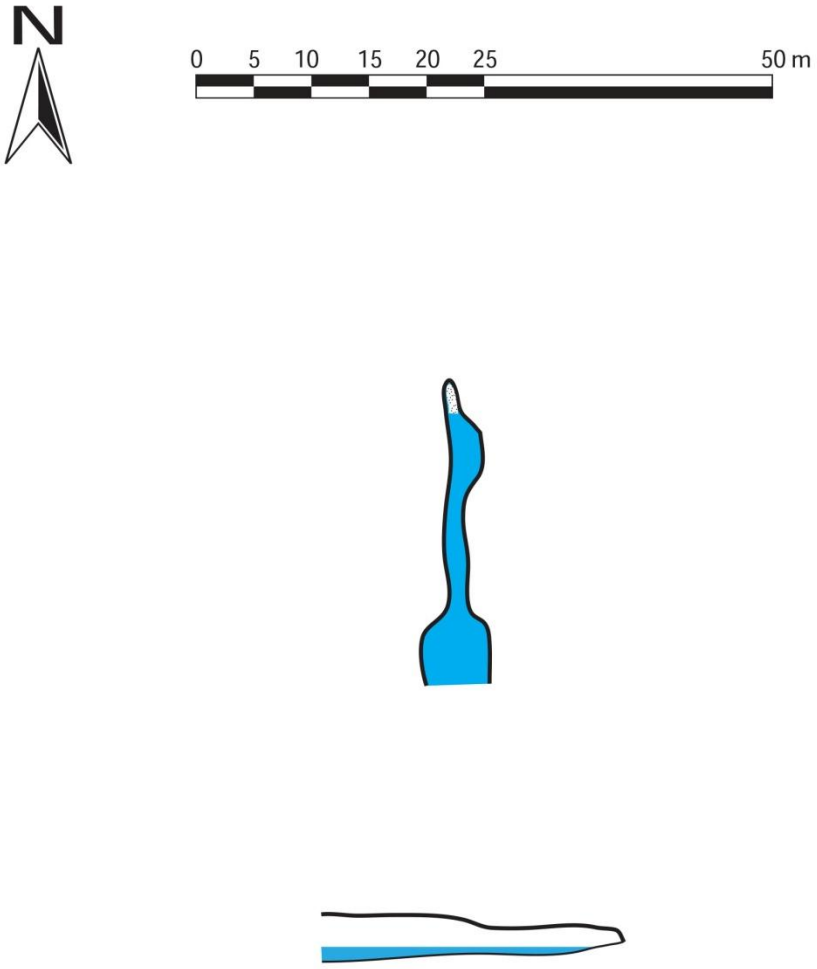
No. 22.	**Location: Sumporna (Ženska) cave -Pinješ 5**    Foto: Vesna Mačić
Coordinates	N 41º 55’ 09.23’’ E 19º 12’ 45.60’’
Dimensions	Wide 1,5m x high 1,24 x long 42m (22m terrestrial part, rocks and pebbles)
Exposition	South
Morpho-characteristics	Some of the channels leading to the interior are connected towards the cave's interior so that the cave has at least 6 entrances .
Living organisms	Marine organisms scarce. On the sea floor sand with white skim is evident, probably because of sulphur. Many bats. Some sponges, many *Palaemon serratus*.
Notes	Strong “sulphur” smell.
Date of survey	31. 08. 2015.
In front of the cave	Sand with white skim, *Cystoseira compressa, Ulvales.*

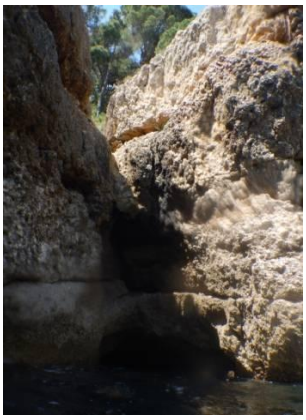

N
0 5 10 15 20 25 50 m

No. 23.	**Location: El Kaminova cave - Pinješ 6**  Foto: Vesna Mačić
Coordinates	N 41º 55’ 06.64’’ E 19º 12. 52.82’’
Dimensions	Wide 8m x high 2m x long 85m (sandy beach 12,5 and rocks 3,4m)
Exposition	South
Morpho-characteristics	The cave has 2 entrances from the sea, but there are also holes on the ceiling on the terrestrial part. Practically two big entrances are continuing into the land and they are connected with 2 transversal smaller channels. There is a fresh water inflow and small cave rock formations on the cave walls.
Living organisms	Many bats. On the sea floor there are some parts with white sand. Few pigeons.
Notes	Strong smell of sulphur. There is a legend of El Kamino who was entering the cave by boat close to Ulcinj and there is a legend of the El Kamino’s treasure. We put this name of the cave because we wanted to make alive this legend and because of the lack of the contact with local people who might have provided the potential local names for this and other caves.
Date of survey	31. 08. 2015.
In front of the cave	*Cystoseira compressa, Ulvales.*

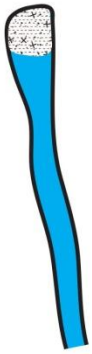

N
0 5 10 15 20 25 50 m

No. 24.	**Location: Nudistička cave - Pinješ 7**   Foto: Vesna Mačić  Foto: Miloš Pavićević
Coordinates	N 41º 54' 04.06" E 19º 12' 56.27"
Dimensions	Wide 1,5m x high 2,2m x long 25,3m (beach is 2,1m long)
Exposition	South
Morpho-characteristics	Single cave room, ending with a small pebble beach. On the floor of the cave are pebbles and small boulders.
Living organisms	Incrusting algae, *Actinia equina*, barnacles, limpets.
Notes	High anthropogenic impact (nudist beach).
Date of survey	14. 05. 2015.
In front of the cave	*Cystoseira compressa,* barnacles, limpets


N
0 5 10 15 20 25 50 m

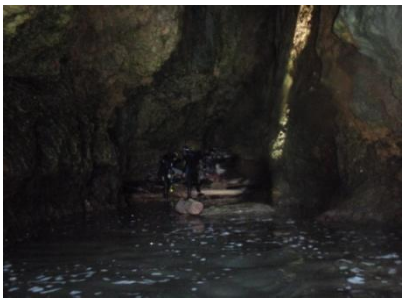
No. 25.	**Location: Pinješ 8**   Foto: Vesna Mačić  Foto: Miloš Pavićević
Coordinates	N 41º 54' 03.11" E 19º 13' 01.89"
Dimensions	Wide 1,8m x high 0,8m x long 29m (beach is 4m long)
Exposition	South
Morpho-characteristics	Single room, ending in two parts. In the bigger part, at the end there is a beach full of remainings of seagrass *Cymodocea nodosa*. Boulders are on the floor of the cave and close to the beach.
Living organisms	Scarce, incrusting algae.
Notes	Taken sample for Isopods.
Date of survey	14. 05. 2015.
In front of the cave	Not observed


N
0 5 10 15 20 25 50 m

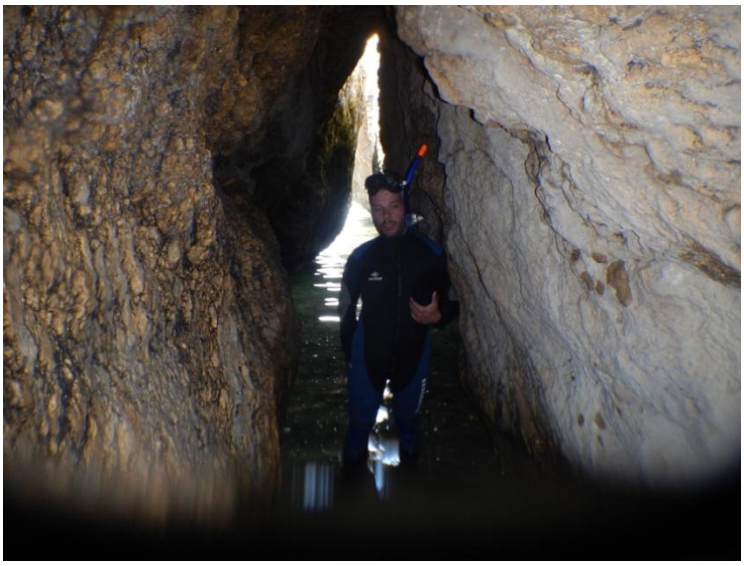


No. 26.	**Location: Papuče cave - Pinješ 9**    Foto: Vesna Mačić
Coordinates	N 41º 54' 02.28" E 19º 13' 04.44"
Dimensions	Wide 1,8m x high 5,4m x long 36m (beach 3,4m long)
Exposition	South-east
Morpho-characteristics	Single room, very narrow throughout the whole cave. It ends with a sandy (pebble) beach. Fresh water inflow is evident as well as the impact of the wind for calcifications on the walls – helictite.
Living organisms	Scarce, *Actinia equina*, barnacles, limpets, *Ulva sp.*
Notes	Many marine litter items specially different types of shoes
Date of survey	14. 05. 2015.
In front of the cave	Barnacles, limpets.


N
0 5 10 15 20 25 50 m

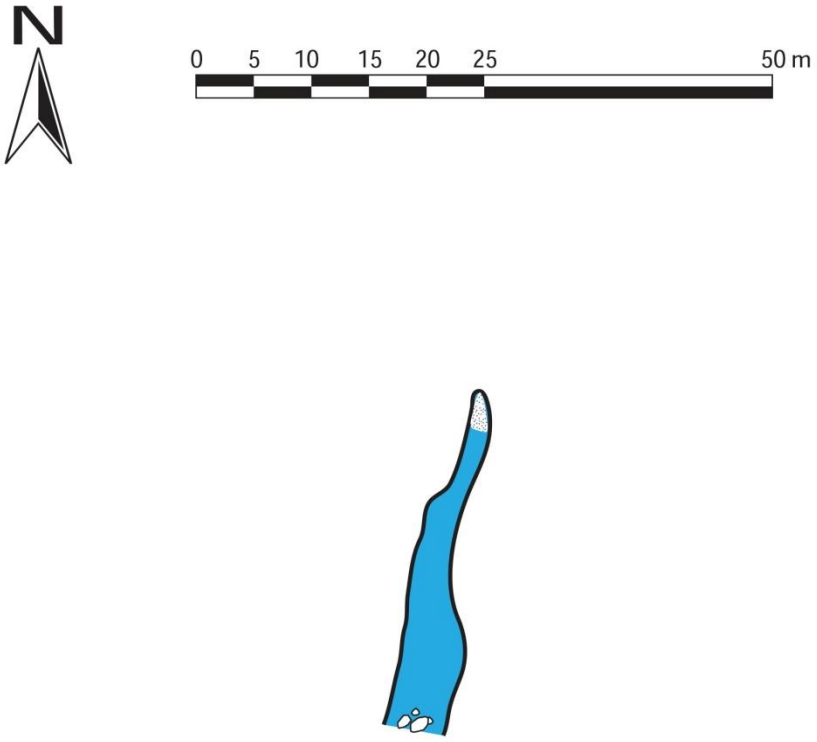
No. 27.	**Location: Pinješ 10**  Foto: Vesna Mačić  Foto: Dušan Varda
Coordinates	N 41º 54' 00.07" E 19º 13' 09.84"
Dimensions	Wide 2m x high 2,5m x long 19m (pebble beach 5m long)
Exposition	South-west
Morpho-characteristics	After the wide opening, the cave room is simple and after 8m of length there is a hole on the ceiling. On the end of the cave there is a beach 5m long. On the floor there are boulders and pebbles.
Living organisms	Scarce, barnacles, limpets, *Actinia equina, Ulva sp.* is close to the entrance together with some other small red algae, *Osilinus turbinatus.*
Notes	Beach in the cave is full of remainings of seagrass *Cymodocea nodosa* and many marine litter items. Samples for Isopods were taken.
Date of survey	14. 05. 2015.
In front of the cave	Many big boulders, *Cystoseira compressa, Ulva sp.* limpets, barnacles.

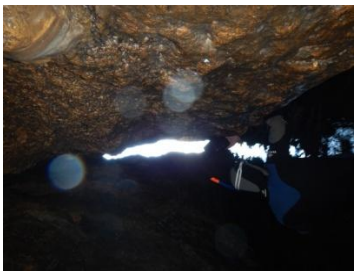

N
0 5 10 15 20 25 50 m

No. 28.	**Location: Pinješ 11**  Foto: Vesna Mačić
Coordinates	N 41º 55' 00.04" E 19º 13' 13.42"
Dimensions	Wide 2,6m x high 2,7m x long 12m (pebble beach 5,4m)
Exposition	South-east
Morpho-characteristics	The slit is going more into the rock and continues as a cave. Close to the end of the cave the single room is narrower. At the end of the cave there is a beach with pebbles andsand.
Living organisms	Scarce, incrusting algae, limpets, *Actina equina,* close to entrance some *Ulva, Osilinus turbinatus.* On the beach remaining of seagrass *Cymodocea nodosa.*
Notes	Some marine litter.
Date of survey	14. 05. 2015.
In front of the cave	Scarce, on rocks some *Cystoseira compressa, Ulva sp.*, limpets.

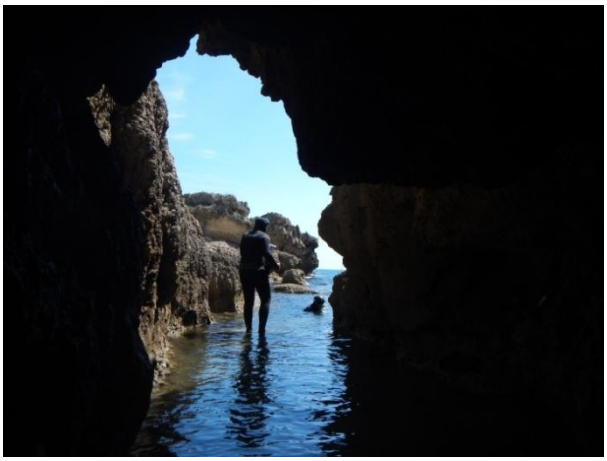

N
0 5 10 15 20 25 50 m

No. 29.	**Location: Pinješ 12**   Foto: Vesna Mačić
Coordinates	N 41º 54' 56.99" E 19º 13' 16.95"
Dimensions	Wide 3,5m x high 2,2m x long 29m (pebble beach 3m)
Exposition	South-west
Morpho-characteristics	Single cave room, on the floor there are boulders and pebbles. In front of the cave there are some bigger boulders, while on the end of cave there is a pebble beach.
Living organisms	Scarce, close to the entrance there are some *Ulva* and red sciafilous algae. Further inside the cave, there are incrusting algae, very few sponges. On the beach there are remaining of seagrass *Cymodocea nodosa.*
Notes	Good habitat for monk seals. Small house above cave. There are some marine litter inside the cave.
Date of survey	14. 05. 2015.
In front of the cave	Sand between rocks and boulders, *Cystoseira compressa*, *Ulva lactuca*, limpets.


N
0 5 10 15 20 25 50 m

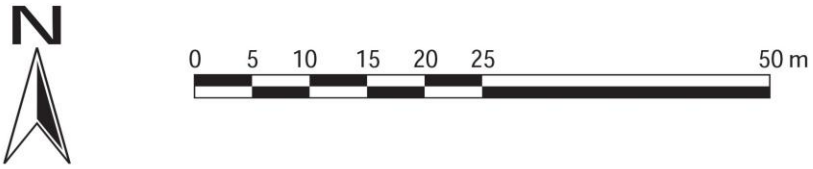
No. 30.	**Location: Pinješ 13**   Foto: Vesna Mačić
Coordinates	N 41º 54' 55.73" E 19º 13' 20.82"
Dimensions	Wide 1,6m x high 2,9m x long 12m (beach 1,6m long)
Exposition	South-east
Morpho-characteristics	The narrow slit is continuing into a narrow cave. At the end there is small sandy beach.
Living organisms	Incrusting algae, *Actinia equina,* limpets, barnacles.
Notes	
Date of survey	13. 05. 2015.
In front of the cave	*Cystoseira compressa, Feldmannia sp., Ulva sp.*, mussels.

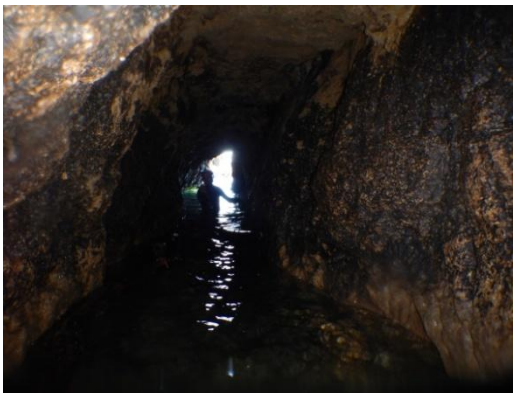

N
0 5 10 15 20 25 50 m

No. 31.	**Location: Pinješ 14**  Foto: Vesna Mačić
Coordinates	N 41º 54' 52.35" E 19º 13' 25.81"
Dimensions	Wide 1,7m x high 1,6m x long 14m (sandy beach is 4m long)
Exposition	South-east
Morpho-characteristics	At the beginning there is a small entrance and after a few meters there is a hole on the ceiling. The cave is simple and ends with a small beach (2 x 2m) which has a 2m long very narrow part.
Living organisms	*Actinia equina, Actinia cari,* limpets, barnacles, incrusting algae.
Notes	
Date of survey	13. 05. 2015.
In front of the cave	Boulders and sand, *Cystoseira compressa,* very few *Cystoseira amentacea, Corallina elongata, Gastroclonium clavatum, Feldmannia sp.*

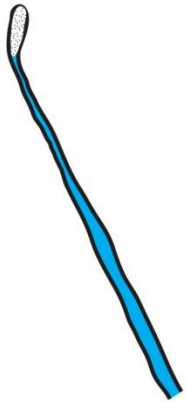

N
0 5 10 15 20 25 50 m

No. 32.	**Location: Pinješ 15**   Foto: Vesna Mačić
Coordinates	N 41º 54' 48.92" E 19º 13' 33.22"
Dimensions	Wide 2m x high 2m x long 6m (beach inside is 3m long)
Exposition	South
Morpho-characteristics	Simple, small hole.
Living organisms	Incrusting algae.
Notes	
Date of survey	13. 05. 2015.
In front of the cave	Boulders and pebbles, *Cystoseira compressa, Ulva sp.*


N
0 5 10 15 20 25 50 m

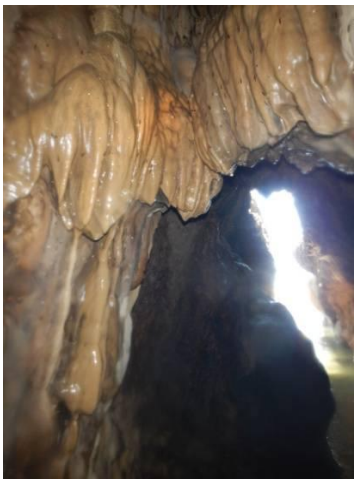
No. 33.	**Location: Pinješ 16**   Foto: Vesna Mačić
Coordinates	N 41º 54' 47.40" E 19º 13' 36.55"
Dimensions	Wide 1,2m x high 1,2m x long 36m (1m long beach)
Exposition	South
Morpho-characteristics	Narrow single, long room with two small holes on the roof close to the entrance. At the end of the cave there is a small pebble beach, 1m long.
Living organisms	Incrusting algae, barnacles, limpets.
Notes	Marine litter on the end of cave. Several fossils of marine mollusks.
Date of survey	13. 05. 2015.
In front of the cave	Rocks with some *Cystoseira barbata, Ulva sp.* and mussels.


N
0 5 10 15 20 25 50 m



No. 34.	**Location: Pinješ 17**  Foto: Vesna Mačić
Coordinates	N 41º 54' 44.62" E 19º 13' 40.15"
Dimensions	Wide 1,3m x high 1,4m x 16m
Exposition	South
Morpho-characteristics	Narrow single room with inflow of fresh water from the walls above the sea.
Living organisms	Incrusting algae, limpets, barnacles, *Palaemon serratus, Actinia equina, barnacles.*
Notes	Some marine litter is on the end of cave.
Date of survey	13. 05. 2015.
In front of the cave	*Cystoseira compressa*, mussels, some algae.

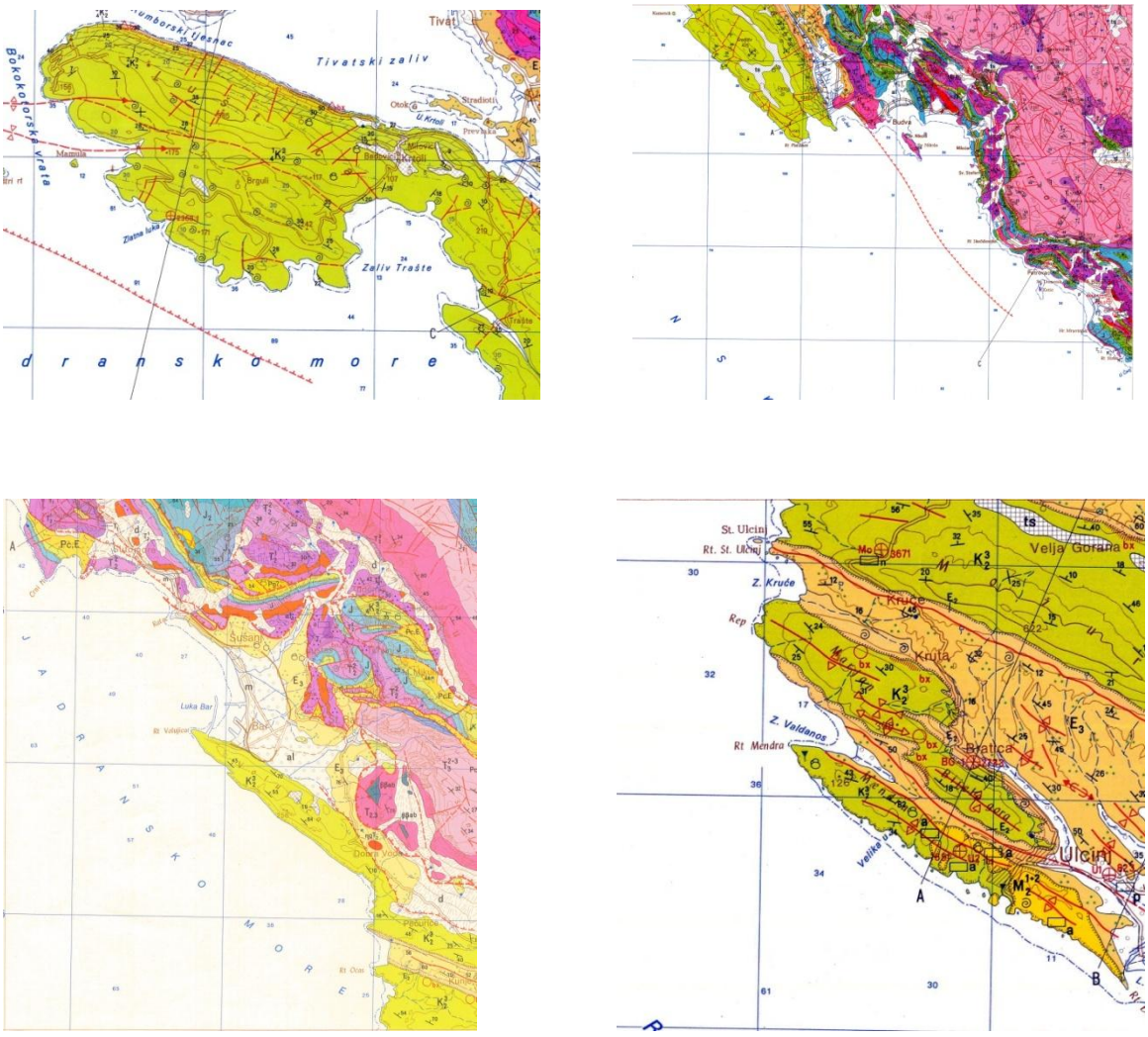

N
0 5 10 15 20 25 50 m

No. 35.	**Location: Pinješ 18**   Foto: Vesna Mačić
Coordinates	N 41º 54' 41.11" E 19º 13' 46.11"
Dimensions	Wide 1,5m x high 3,7m x long 17m (rocky –pebble beach 3m long)
Exposition	South
Morpho-characteristics	Single, narrow room with some cave rock formations, fresh water inflow from the roof of the cave.
Living organisms	Scarce, incrusting algae.
Notes	
Date of survey	13. 05. 2015.
In front of the cave	*Cystoseira compressa*, few *Cystoseira amentacea*, mussels.


N
0 5 10 15 20 25 50 m

No. 36.	**Location: Pinješ 19**  Foto: Vesna Mačić
Coordinates	N 41º 54' 34.65" E 19º 13' 53.54"
Dimensions	Wide 0,5m x high 2m x long 6m
Exposition	South
Morpho-characteristics	Single, narrow room, at the beginning the roof is open over 8m.
Living organisms	Incrusting algae, *Actinia equina*, ballanus.
Notes	
Date of survey	13. 05. 2015.
In front of the cave	*Cystoseira compressa*, few *Cystoseira amentacea* and some red algae.

As we mentioned inprevious reports, there are more than one definitions for marine caves and in some documents there is no precise definition. All these openings are mainly created by the waves' force or by freshwater running into cracks and eroding the rock in millions of years. Sometimes huge caves with stalactites and other beautiful cave rock formations are created. All this is strongly depending on the geological characteristics. Therefore, we addedhere the respective geological maps for the coast of Montenegro (Figure 5).



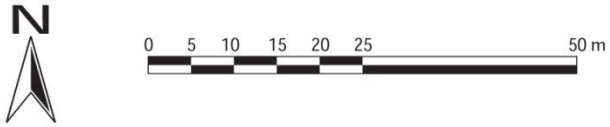
K_2^3 Banked and stratified limeston and dolomite

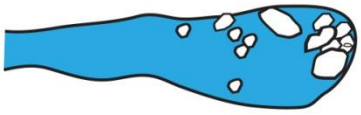
$T_{2,3}$ Banked and massive limestone and dolomite

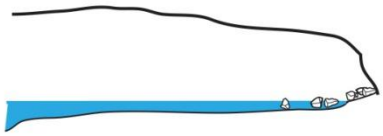
T_2^2 Layered limeston with charts

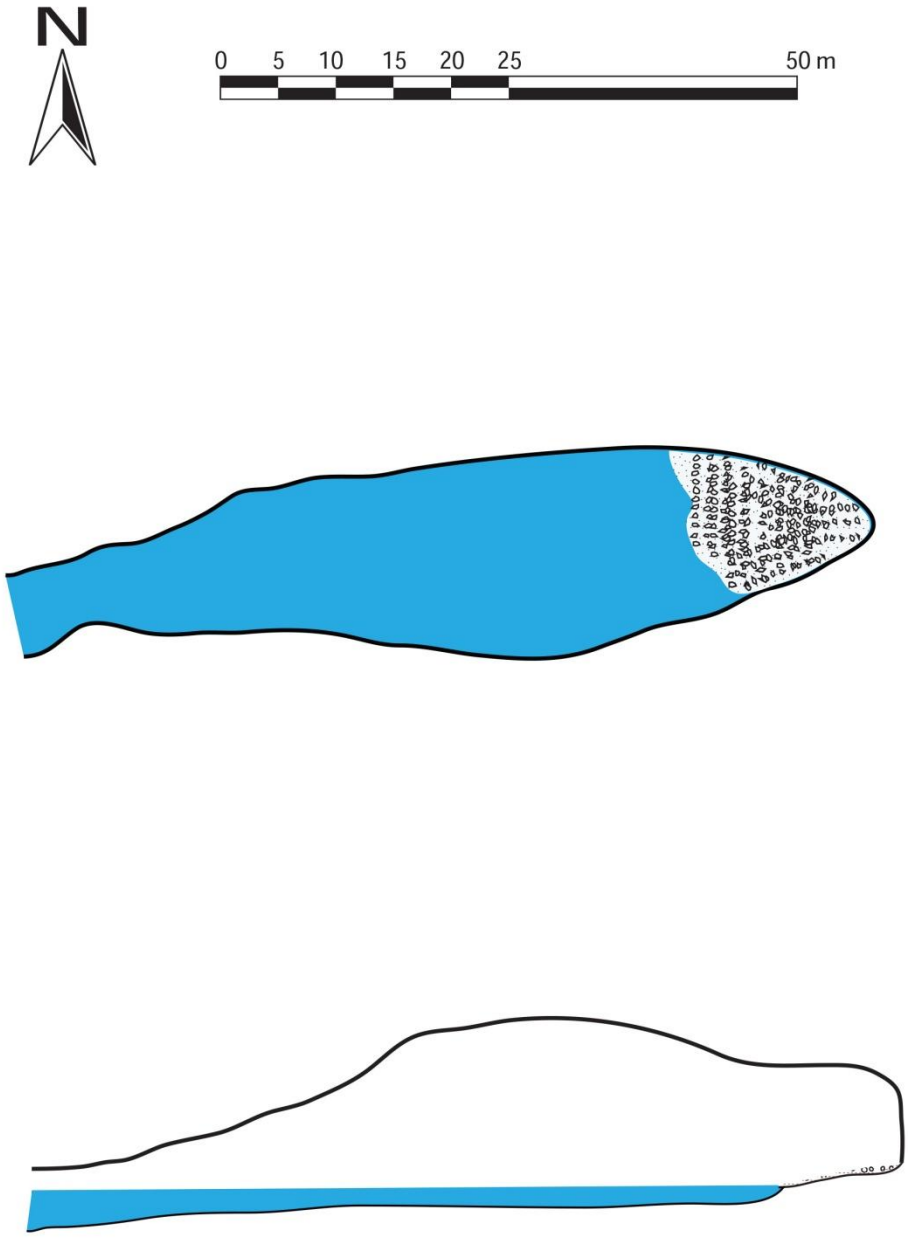
Figure 5. Geological map of the coast of Montenegro

When we started our research in 2013, caves were considered as naturally formed holes in the rock longer than 5 metres (where a person can enter) according to the national Law on nature protection (Sl. list no. 51/08). In the case of marine caves they can be completely or just partially submerged. In the Law on nature protection issued in 2013, no dimensions for the definition of speleological objects are given. In order to avoid confusion, we carried out our survey using the same methodology as before. The sketches of the most important caves surveyed during the first two years of the project are presented below along with the caves's numbers, names , and the year of survey.

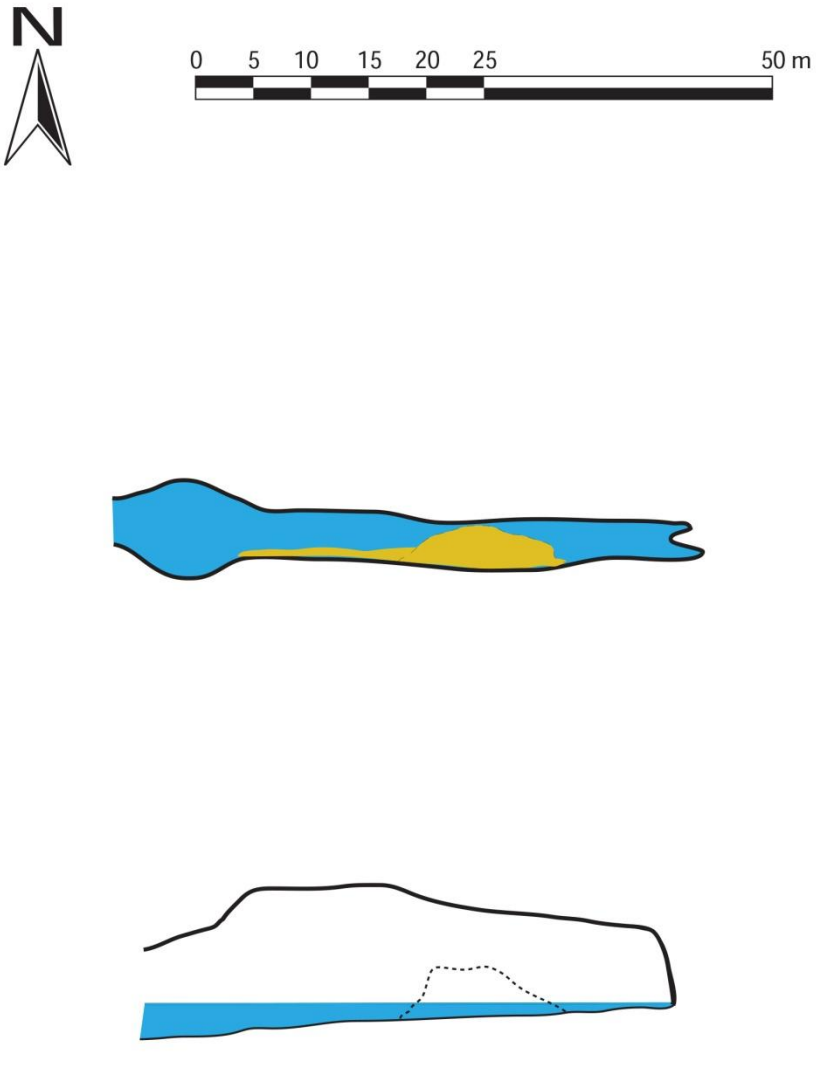

N
0 5 10 15 20 25 50 m

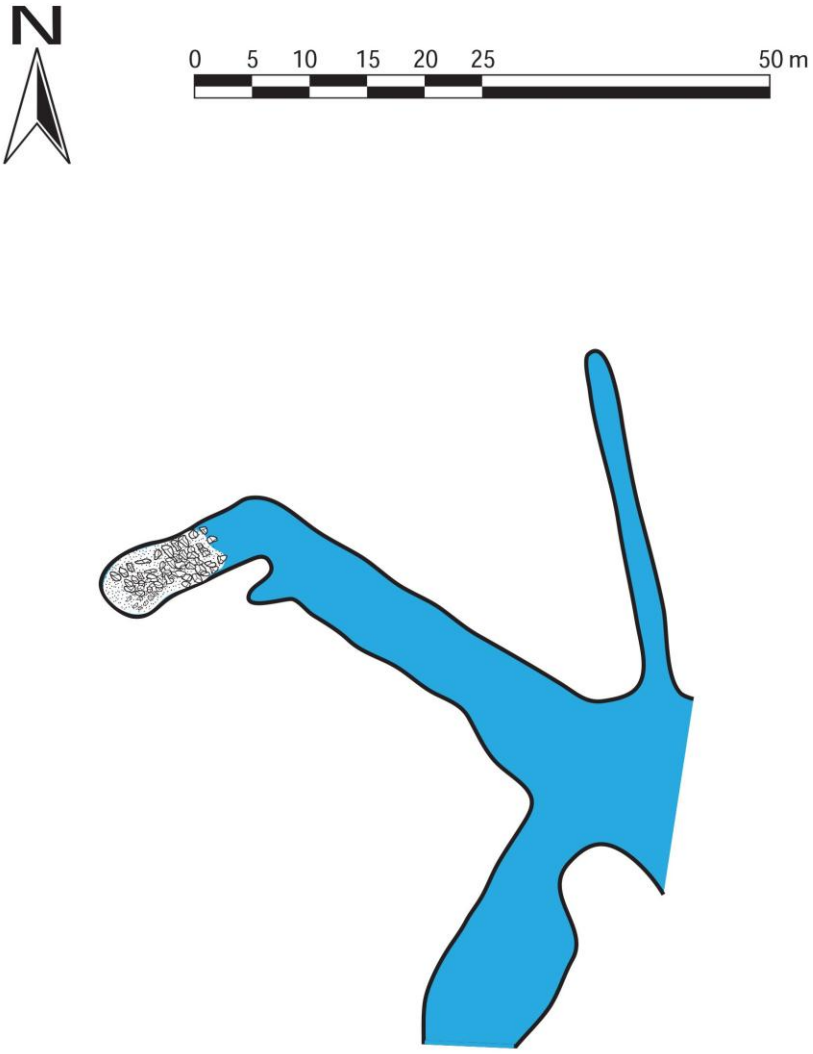


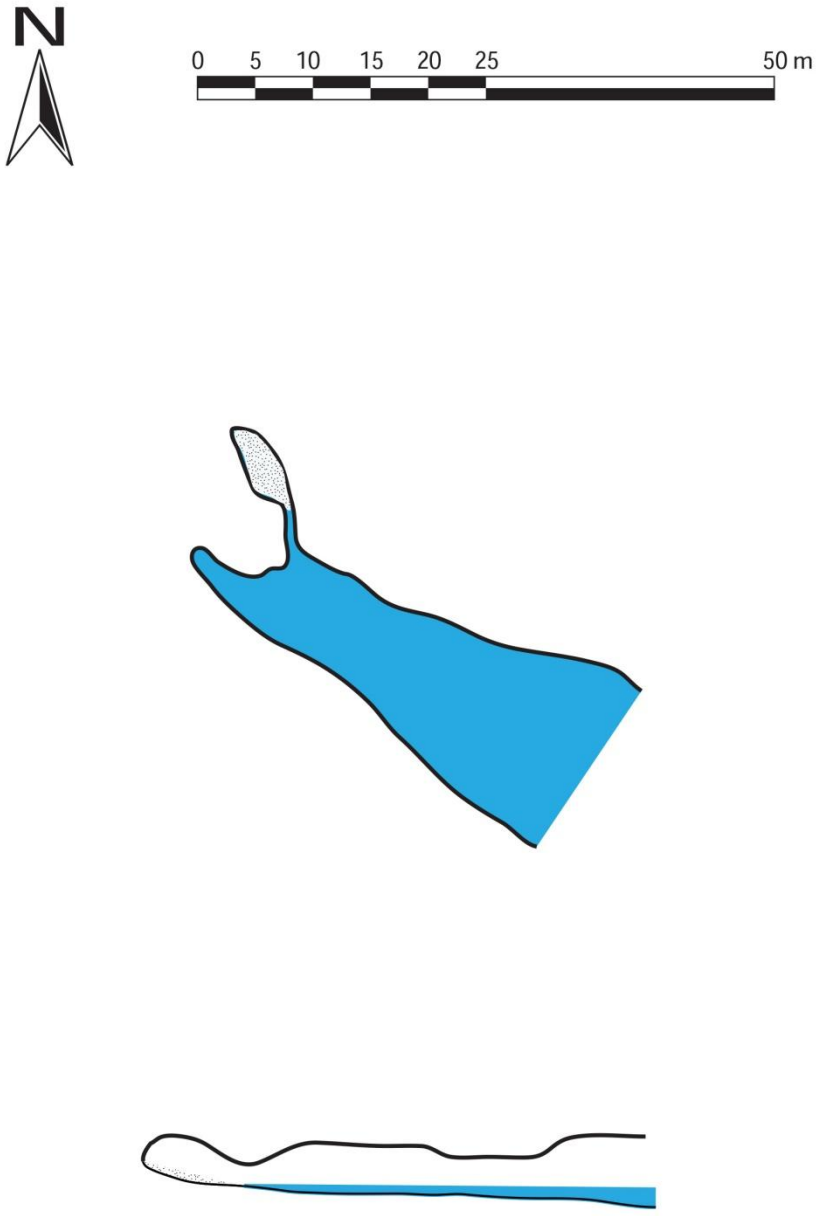



N
0 5 10 15 20 25 50 m

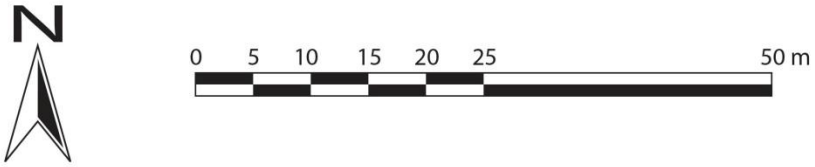
Close to Plava špilja No. 9. 2013

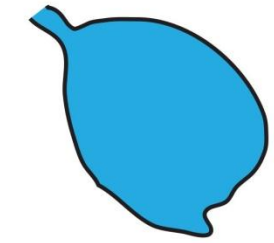


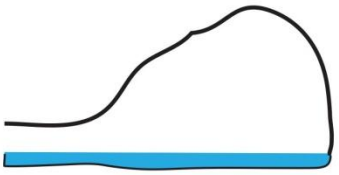

N
0 5 10 15 20 25 50 m

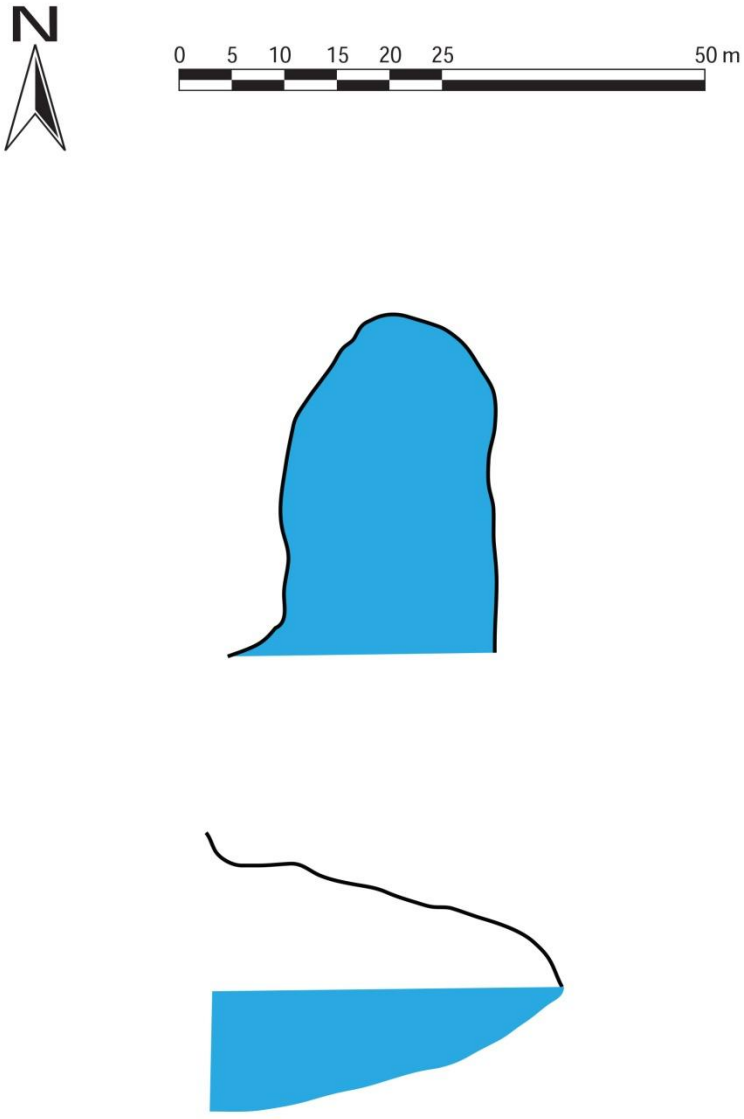

N
0 5 10 15 20 25 50 m

Bigova complex No. 38. 2013.

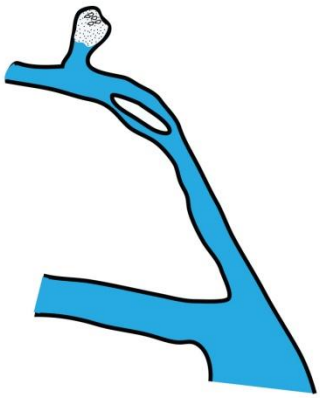


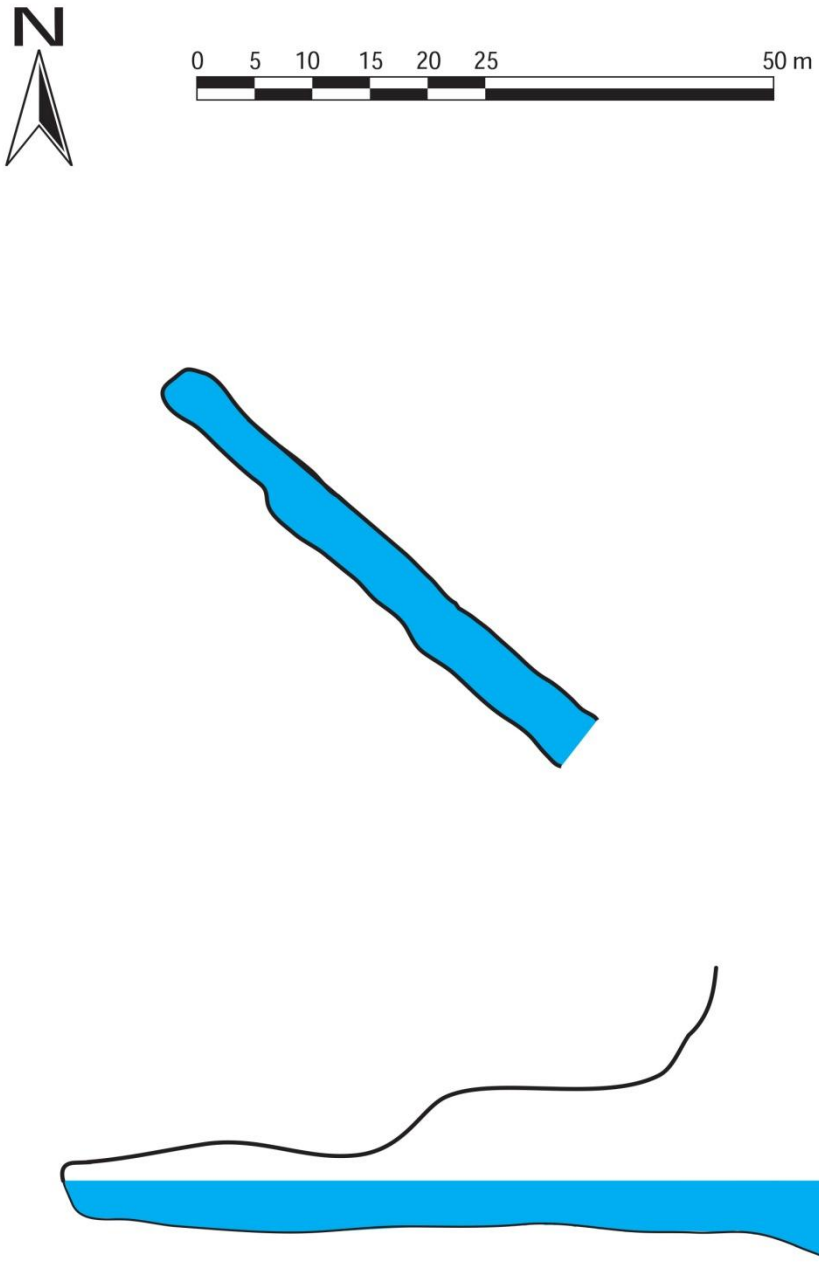


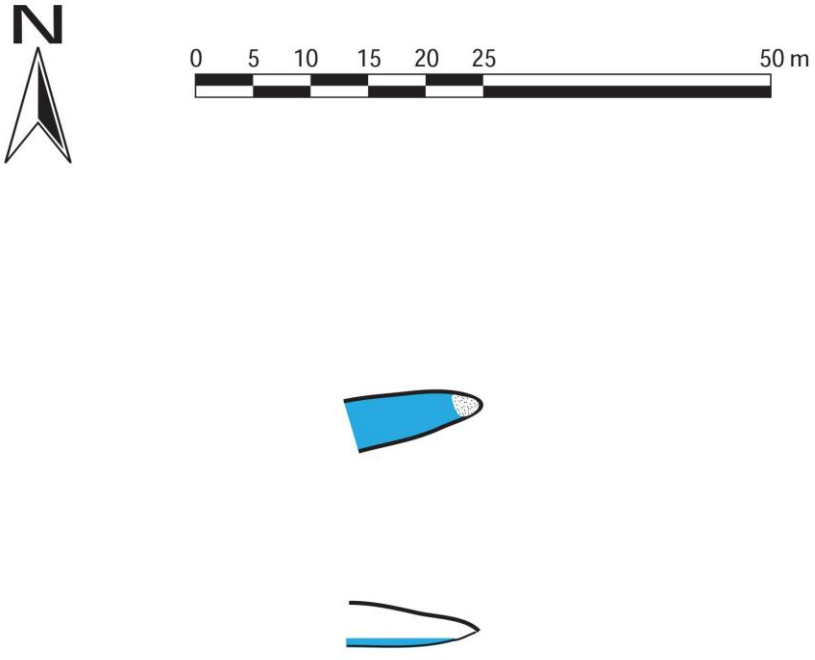


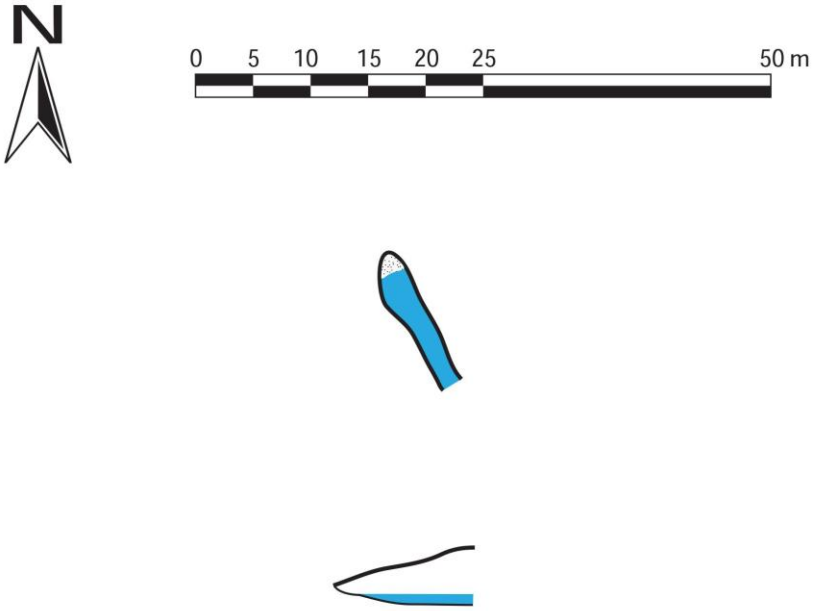

N
0 5 10 15 20 25 50 m

Vrančeva sika No. 28. 2014.

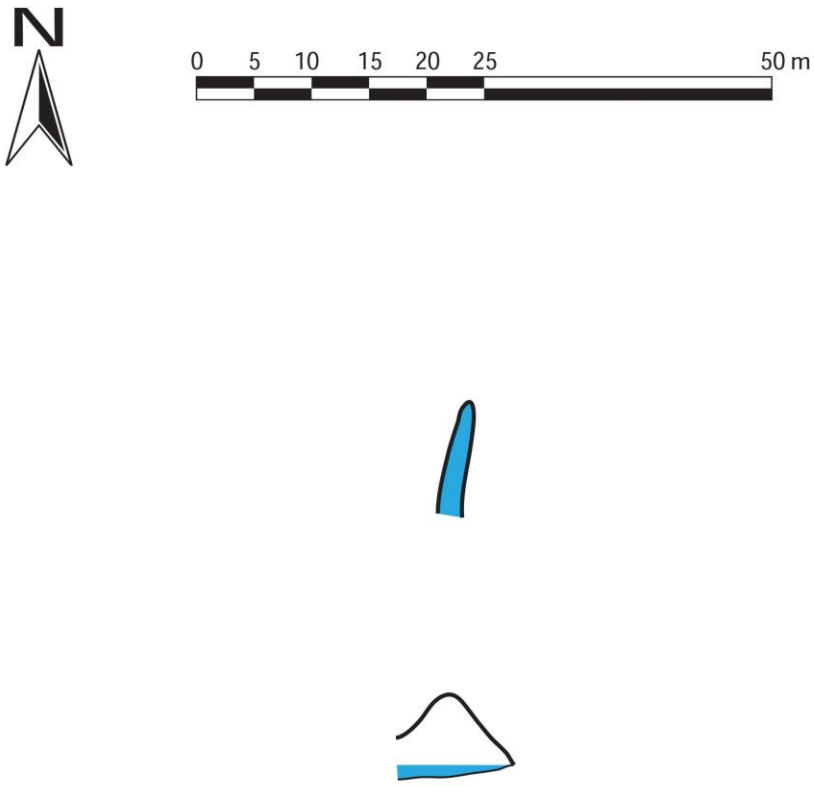



N
0 5 10 15 20 25 50 m


N
0 5 10 15 20 25 50 m


N
0 5 10 15 20 25 50 m

Golo brdo No 2. 2014.



2. Potential monk seal habitats in the area surveyed in 2013-2015 (from cape Arza to cape Đeran)

One part of our project carried out over a period of three years (2013, 2014 and 2015) concerned the survey of potential terrestrial habitats of the critically endangered Mediterranean monk seal, *Monachus monachus*, i.e. marine caves with a beach inside, suitable for resting and reproduction of the species.

The presence of monk seals in Montenegro is certain until at least the 70's: the last known seal was killed in the area of Herceg Novi in the Bay of Kotor in the early 70's (photos archive MedCEM, Dusan Varda). Furthermore, one marine cave very close to Petrovac is generally known as the "Seal Cave" ("Tuljanova pecina") indicating the former presence of seals in the greater area. Since the incident of the killed seal in Herceg Novi however, no further evidence of monk seal presence in Montenegro had been recorded during the last 4 decades.

Although we registered a number of caves potentially suitable for the species during our surveys we did not find any evidence of its actual presence along the coastline of Montenegro. In spite of this fact however, and in response to the broad publicity created through several articles in the local media in each phase of the project and through repeated direct contacts with fishermen and other local persons, we could identify a number of verified seal sightings along Montenegro's coastline during the last 20 years indicating at least a temporal passage of the species: two witnesses responded directly in 2013 to the newspaper Vijesti reporting seal sightings in the area of Traste (2004) and Sutomore (1998) respectively. Furthermore, Branislav Lazarović, captain of the Institute's boat "Nemirna" during our surveys and fisherman from Bigova, registered recent seal sightings by repeatedly discussing the issue with friends and neighbours. According to those reports, a -probably- juvenile seal was sighted twice in the Bay of Kotor in 2005: once near Sveti Stasije/Kotor and once between Stoliv and Perast. One seal was sighted in 2008 along the peninsula of Donji Grbalj and three more sightings, most probably of one single seal, were reported in 2010 by three different persons again along the peninsula of Donji Grbalj.

Dušan Varda, team member on behalf of the NGO MedCEM, reported that his brother had seen a seal a few dozens of metres off Sutomore beach along with several other local people but was not sure about the year of the sighting (1996 or 1998). He reported that there may be even a photograph of that seal and assured that he would try to find this evidence. Later on, in more interviews, there were more sighting of this – probably the same- seal in the same area in 1996. In any case, this fact supports the indication that a monk seal was present in the area for at least one summer if not for more than one year.

It is also worth mentioning that one unverified sighting of a monk seal was reported in the local news from the area off the Bay of Kotor on the 4th of September 2008.

One seal sighting by Ilija Bijelić, fisherman, from the 80's was recorded in repeated discussions with Aliki Panou, team member (NGO Archipelagos – environment and development, Greece): one seal was sighted inside the Blue Cave (Plava Spilja) in 1985. This record proves that the species was still present in the decade after the known killing of the so-called "last seal" in Herceg Novi, at least in the area of northern Montenegro.

The situation is rather unknown in the south of the country where our survey was carried out only in 2015 and contacts with local people are rather scarce. However, a number of marine caves suitable for monk seals were registered in this area as well. Furthermore, in a short discussion, one local inhabitant in Bar reported to the team that he had seen a seal. He promised to report further details. Later on, team member Dusan Varda carried out more interviews and registered a sighting of a dark-black monk seal of over 2 metres in size in Valdanos bay in the years after 2000.

From the above records we conclude that the species should not be considered as definitely extinct in Montenegro even if its presence is recorded only temporarily, indicating at least the transition of animals from neighbouring countries, southern Croatia in particular, where monk seals are definitely present as indicated by the corpse of a dead seal found in 2008 in Lopud/Dubrovnik and several sightings in this area (Bundone *et al*. 2013; Gomercic *et al.* 2011).

Furthermore we conclude that efforts for detecting monk seal sightings, carried out on a more permanent basis through repeated publications in the local media including appeals for the reporting of sightings and through permanent contacts and discussions with local people with respect to this issue, especially fishermen, it will be possible to better cover the area by potential observers and detect the patterns of the presence of this endangered species in Montenegro in more detail.

We should stress here the point that absence of seal sightings from some areas does not necessarily imply the actual absence of the species itself: it may simply indicate the absence of sufficient monitoring efforts. As stated by GFCM (2011), "*seal presence in low density areas is very cryptic and may result unrecorded in absence of scientific surveys*". It is indicative of the situation described above that team member and fisherman Branislav Lazarević has never seen a monk seal in the last 50 years although animals were definitely present in the area.

As a general conclusion, we believe that the species may re-colonize the coastline of Montenegro if adequate conservation measures including the establishment of one or more MPAs are implemented.

The information collected through interviews performed during the last 3 years are presented below in the uniform questionnaire on monk seal observations.

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MONK SEAL OBSERVATION DATA

Observer's name: **Ilija Bijelić**..... Address (optional): **Muo**.....

Occupation: **fisherman** / resident / researcher / tourist / sailor / other .....

Observer's position: land / **vessel** / aquaculture / other / specify: **fishing boat**.....

Date of sighting: **xx/xx/1985** Time **.....** Duration **.....** Number of animals: .....**1**.....

Region's name: **Luštica** ..... (land, island, off shore, etc.)

Precise location or position: **Blue Cave (Plava Špilia)** .... (cape, bay, beach) Closest town/village: **Bigova**.....

ANIMAL No. 1 Photos/videos available? .....**NO**.....(*please send us a copy*)

At sea: approximate distance from observer: ..... From shore: ..... On land: inside cave /beach/rocky coast/other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m **unknown** .....

Colour: black / brown / dark grey / light grey / beige / whitish / **unknown** / other .....

Marks and description: spots / scars / patches / other .....

Behaviour: swimming / diving / foraging / feeding / resting / sleeping / other.....

ANIMAL No. 2 Photos/videos available? .....(*please send us a copy*)

At sea: approximate distance from observer: ..... From shore: ..... On land: inside cave /beach/rocky coast/other.....

State and condition of the animal: normal / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m unknown.....

Colour: black / brown / dark grey / light grey / beige / whitish / unknown / other.....

Marks and description: spots / scars / patches / other .....

Behaviour: swimming / diving / foraging / feeding / resting / sleeping / other.....

REMARKS: **He saw the head inside the cave when he went out for fishing from Dobra Luka**.....

Registration. Date **10.05.2015, Muo & 13.05.2015, via mobile by Sandra Bijelić**...Registered by: **Aliki Panou**.....

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

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Athens: Strofiliou 26 * GR-14561 Kifissia * e-mail: archipelagosgr@yahoo.gr

Data on seals - fisheries interaction:

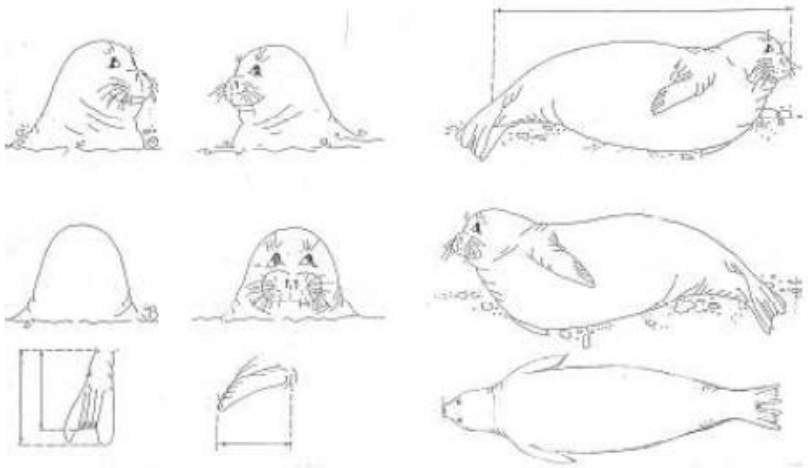
Seal(s) at gear: YES/**NO** Damage: YES / NO / unknown Remarks: .....

Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together

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MONK SEAL OBSERVATION DATA

Observer's name: ..**Zvonko Varda**..... Address (optional): .....**Vojvode Stepe 249, 11000 Belgrade, Sebia**.....

Occupation: fisherman / resident / researcher / **tourist** / sailor / other / specify: **amateur fihermen&diver**

Observer's position: **land** / vessel / aquaculture / other / specify .....

Date of sighting: **?/.August./1996(?).....** Time **.around noon....** Duration **...2-3 min...** Number of animals: ..**1**..

Region's name: .....**Sutomore**..... (land, island, off shore, etc.)

Precise location or position: ... **Mali Ratac, nearby Inex Zlatna obala resort**... (cape, bay, beach) Closest town/village: .....**Sutomore**.....

ANIMAL No. 1 Photos/videos available? .....**YES/NO**...(Photograph lost, searching for film negative)..... (*please send us a copy*)

At sea: approximate distance from observer: ...**15-300 m** From shore: ..**15-100**..**m** On land: inside cave/beach/rocky coast/other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m **2,0 m - 2,5 m** 3,0 m unknown .**over 2 m, about 150 kg**.

Colour: black / **brown** / dark grey / light grey / beige / whitish / unknown / other .....

Marks and description: spots / scars / patches / other .....

Behaviour: **swimming / diving** / foraging / feeding / resting / sleeping / other .....

ANIMAL No. 2 Photos/videos available? .....YES/NO.....(*please send us a copy*)

At sea: approximate distance from observer: ... **m** From shore: ...**m** On land: inside cave/beach/rocky coast/other.....

State and condition of the animal: normal / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m unknown.....

Colour: black / brown / dark grey / light grey / beige / whitish / unknown / other.....

Marks and description: spots / scars / patches / other .....

Behaviour: swimming / diving / foraging / feeding / resting / sleeping / other.....

REMARKS: **Seal was playing with a woman on floating mattress, who was scared from animal. Then she swims around only big rock on the beach. From distance, animal head looks like it was black, but from close distance it was more like brown (color). Previous night Zvonko went with small boat on night fishing (angler) in front of cape Ratac, nearby Inex Zlatna obala resort with kid from neighbourhood (Marko Blanuša) - and something**

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kicked bottom of their small boat for several times. Kid was afraid, so they must return to beach. Next day when he saw a seal nearby same location, he was sure that it was seal bumping into boat on previous night.

Registration, Date: ...**25.07.2015**..... Registered by: ...**Dušan Varda, NGO MedCEM**.....

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

Data on seals - fisheries interaction:

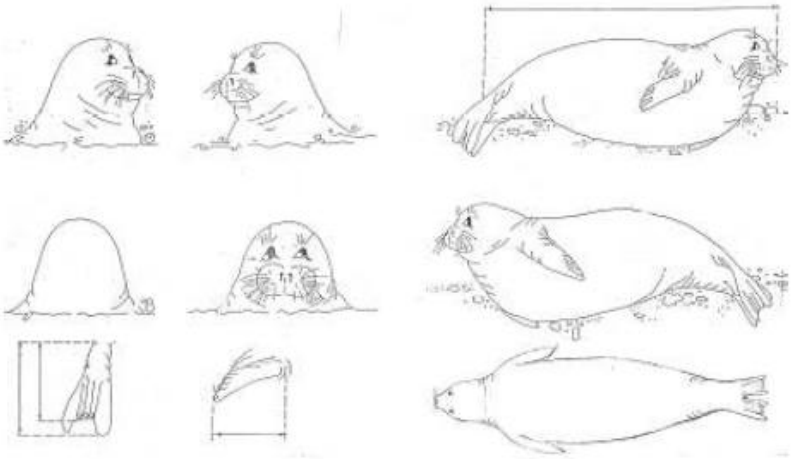
Seal(s) at gear: YES/NO Damage: YES / NO / unknown Remarks: .....

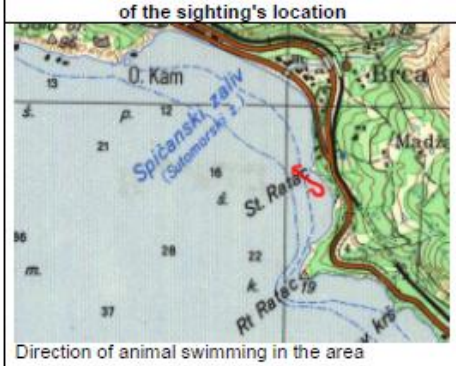
Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together
 Direction of animal swimming in the area	

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MONK SEAL OBSERVATION DATA

Observer's name ...**Rade Komnenović**... Address (optional): ...**Juhorska 5, 11000 Belgrade, Serbia**.....

Occupation: **fisherman** / resident / researcher / tourist / sailor / other / specify: .....

Observer's position: land / **vessel** / aquaculture / other / specify .....

Date of sighting: **end of August /1996.....** Time **.Afternoon** Duration **...5 minutes.....** Number of animals: ..**1**..

Region's name: ...**Bay of Sutomore**..... (land, island, off shore, etc.)

Precise location or position: ...**From Štrbine Bay to Golo brdo**... (cape, bay, beach) Closest town/village: ..**Sutomore.**

ANIMAL No. 1 Photos/videos available? ..YES/**NO...(He do not remember for sure, but he thinks that he made foto or video recording - not available at present time).**.....(*please send us a copy*)

At sea: approximate distance from observer: ...**15-20 m** From shore: ..**200 m** On land: inside cave/beach/rocky coast/other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m **2,0 m** 2,5 m 3,0 m unknown .....

Colour: **black / brown** / dark grey / light grey / beige / whitish / unknown / other .....

Marks and description: spots / scars / patches / other .....**NO**.....

Behaviour: **swimming / diving** / foraging / feeding / resting / sleeping / other .....

ANIMAL No. 2 Photos/videos available? .....YES/NO.....(*please send us a copy*)

At sea: approximate distance from observer: ... **m** From shore: ...**m** On land: inside cave/beach/rocky coast/other.....

State and condition of the animal: normal / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m unknown.....

Colour: black / brown / dark grey / light grey / beige / whitish / unknown / other.....

Marks and description: spots / scars / patches / other .....

Behaviour: swimming / diving / foraging / feeding / resting / sleeping / other.....

REMARKS: **Rade is not professional fisherman, but he is fishing here several months per year for last 30 years. Animal was not afraid of him at all. First he was thinking that it was as diver with a hood. When he saw drowings in this form, he is sure that head was smaller, ant that it was younger seal. He saw it twice more time in next 2-3 days – once more nearby Crni rt (Maljevik Bay), and second time nearby Ratac, in front of nudist**

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beach, nearby Inex Zlatna obala resort. In those days he saw people in area with a rifle on boat crusing and chasing seal for trophy, and he told them not to do that.....

Registration, Date: ...**10.09.2015**..... Registered by: .....**Dušan Varda, NGO MedCEM**.....

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

Data on seals - fisheries interaction:

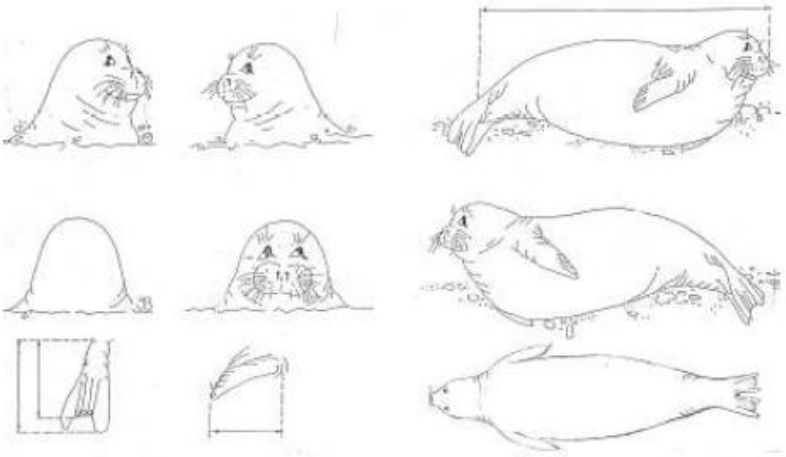
Seal(s) at gear: YES/NO Damage: YES / NO / unknown Remarks: .....

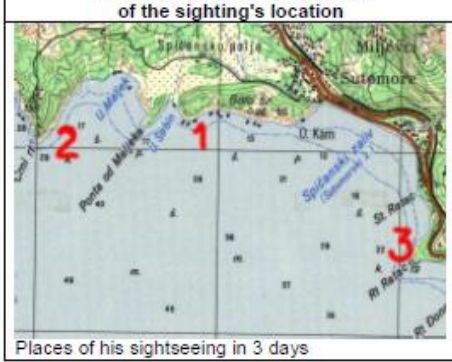
Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together
 Places of his sightseeing in 3 days	

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MONK SEAL OBSERVATION DATA

Observer's name: ..**Đorđina Radivojević**.. Address (optional): ...**Vladimira Gaćinovića 20, 11000 Belgrade, Serbia**...

Occupation: fisherman / resident / researcher / **tourist** / sailor / other / specify: .....

Observer's position: **land** / vessel / aquaculture / other / specify .....

Date of sighting: **.?./.July or August./1996?.....** Time **..Afternoon..** Duration **.about 4 minutes.** Number of animals: .1.

Region's name: .....**Sutomore**..... (land, island, off shore, etc.)

Precise location or position: ...**Mali Ratac, nearby Inex Zlatna obala resort**... (cape, bay, beach) Closest town/village: ..**Sutomore**...

ANIMAL No. 1 Photos/videos available? .....YES/**NO**.....(*please send us a copy*)

At sea: approximate distance from observer: ...**30-50 m** From shore: ..**30 m** On land: inside cave/beach/rocky coast/other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m **1,5 m - 2,0 m** 2,5 m 3,0 m unknown .....

Colour: black / **brown** / dark grey / light grey / beige / whitish / unknown / other .....

Marks and description: spots / scars / patches / other .....**No**.....

Behaviour: **swimming** / **diving** / foraging / feeding / resting / sleeping / other .....

ANIMAL No. 2 Photos/videos available? .....YES/NO.....(*please send us a copy*)

At sea: approximate distance from observer: ... **m** From shore: ...**m** On land: inside cave/beach/rocky coast/other.....

State and condition of the animal: normal / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m unknown.....

Colour: black / brown / dark grey / light grey / beige / whitish / unknown / other.....

Marks and description: spots / scars / patches / other .....

Behaviour: swimming / diving / foraging / feeding / resting / sleeping / other.....

REMARKS: **Djordjina is owner of the house on Cape Mali Ratac, and spot it from her terrace. Animal was looking cute and cheerful, slowly swimming and observing arround towards Big Sutomore Beach. She remembers that she clearly saw that animal had a had huge, cute and shiny eyes..... Same day when Zvonko Varda saw animal.**

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Athens: Strofiliou 26 * GR-14561 Kifissia * e-mail: archipelagosgr@yahoo.gr

Archipelagos

Registration, Date: .....**20.08.2015**..... Registered by: .....**Dušan Varda, NGO MedCEM**.....

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

Data on seals - fisheries interaction:

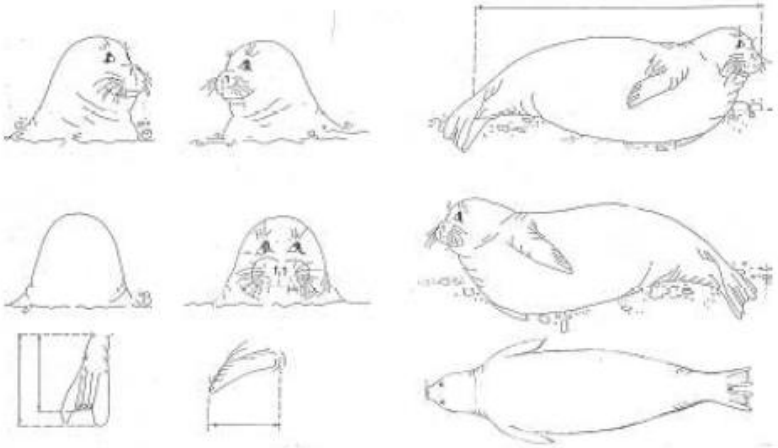
Seal(s) at gear: YES/NO Damage: YES / NO / unknown Remarks: .....

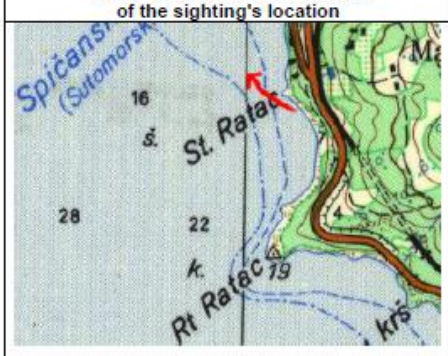
Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together
 Direction of animal swimming by description	

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MONK SEAL OBSERVATION DATA

Observer's name: **"traper", via mail in Vijesti 08.10.2013 upon article of 07.10.2013** Address (optional): .....

Occupation: fisherman / **resident** / researcher / tourist / sailor / other / specify: .....

Observer's position: land / **vessel** / aquaculture / other / specify: .....

Date of sighting: **Summer 1998** Time **...?.....** Duration **30 minutes altogether** Number of animals: ..**1**.....

Region's name: **Sutomore**..... (land, island, off shore, etc.)

Precise location/position:**off Sutomore, following the boat to Maljevik bay** Closest town/village: **Sutomore**

ANIMAL No. 1 Photos/videos available? .....**NO**.....(*please send us a copy*)

At sea: approximate distance from observer: **few metres** From shore: **?** On land: inside cave /beach/rocky coast/other.

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m **unknown**.....

Colour: black / brown / dark grey / light grey / beige / whitish / **unknown** / other .....

Marks and description: spots / scars / patches / other .....

Behaviour: **swimming** / diving / foraging / feeding / resting / sleeping / other **following the boat ca. one mile, very curious and not afraid of them. When they anchored, the seal stayed or some time.**

"I was delighted because I knew it is a rare animal"

REMARKS: .....

Registration, Date **08.10.2013, IBM Kotor**..... Registered by: **Vesna Mačić**.....

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

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Data on seals - fisheries interaction:

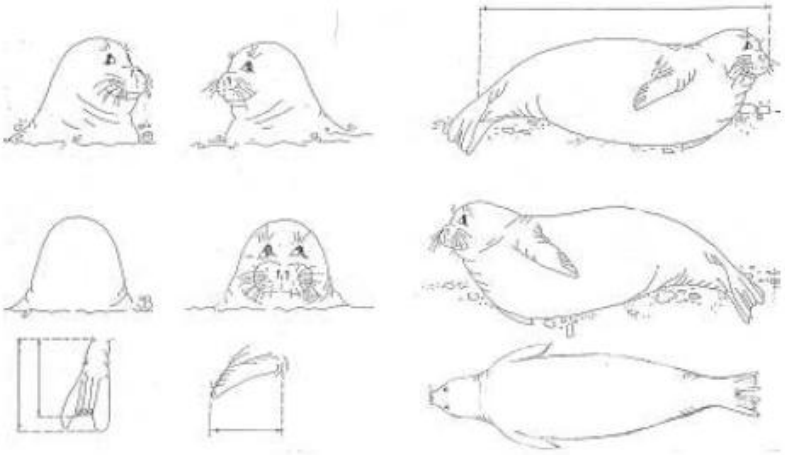
Seal(s) at gear: YES/**NO** Damage: YES / NO / unknown Remarks: .....

Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together

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MONK SEAL OBSERVATION DATA

Observer's name: .....Valerije Ljubičić... Address (optional): ...Dr Ivana Ribara 54, Belgrade, Serbia.....

Occupation: fisherman / resident / researcher / tourist / sailor / other / specify: **Military Diving Instructor**

Observer's position: land / vessel / aquaculture / other / specify .....Underwater, deepth 15-17 m.....

Date of sighting: **late July or August../1996...** Time **12.00** Duration **2x5 sec, than 1min** Number of animals:.1....

Region's name: ...Valdanos Bay, Ulcinj Municipality..... (land, island, off shore, etc.)

Precise location or position: .In the middle of Valdanos Bay, nearby Cape Mendra. Closest town/village: Ulcinj

ANIMAL No. 1 Photos/videos available? .....NO.....(*please send us a copy*)

At sea: approximate distance from observer: ...1 **m** From shore: ..**m** On land: inside cave/beach/rocky coast/other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m **2,0 m** **2,5 m** 3,0 m unknown ..(it was longer than him with a flippers). It was much more "slim" than this one on the illustration on the next page.....

Colour: **black** / brown / dark grey / light grey / beige / whitish / unknown / other **.(not 100% black, but it was dark colour)**

Marks and description: spots / scars / patches / other ....Do not remember any specific marks or spots.....

Behaviour: swimming / **diving** / foraging / feeding / resting / sleeping / other .....

REMARKS: Valerije was diving on the bottom, with diving course attendants waiting him on the RIB boat. It was day after unusualy strong southwind storm, and visibility was poor, but better in the middle of the Bay. He vas digging something at the bottom ("čeprkao nešto"), wen he was suprised with huge dark body that aproaches him about 2 m from left. He was scared, so he started to shout and scream underwater, and the animal run away. Soon as he calmed himself, he starting to regret that he was shouting and scaring animal, realising that he saw unique and rare creature, foca. After that, he vas standing verticaly at the sea bottom, turning arround for about 5 minutes, trying to spot it somewhere around, without succes. When he started to dig again, immediately foca suddenly appeared tight above his left shoulder (overshoulder), almost touching his mask and face with moustashes. He was suprised, so he scream again, and animal run away. Again he was regreting, and trying to spot it arround, without succes. But soon as he started to dig again, it appeared from behind. Animal was interesting what he was doing and digging. He did not shout anymore, so animal stands in front of him. They where watching each other in the eyes from distance about 1 m. He remembers that it had very long (and scary canine teeth), and he was fascinated with moustashes. He clearly could see small air bubbles in the fur of animal. He started to speak softly (underwater, through 2nd stage diving regullator), petting it. Than he tried to touch its fur, but animal do not allowed it – it was retreating genly with invisibly moves, allowed him to came close up to 1 cm near fur, but not to touch it. Encounter between them lasted about 1 minute, and then animal left him.
When he surfaced, all diving course attendants on the boat (that was closer to Cape Mendra - they where from Pirot / town in Serbia) was applauding and forging to him like focas – they also saw it because animal swimmed closer on surface to their boat. They refused to enter a water for a dive, afraiding from the huge animal. Later they choose foca as their diving club icon (emblem).

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Archipelagos

Later, he heard story from his friend (who read it as news in some MNE newspapers) that sometimes after this encounter, some Albanians on the border between MNE and ALB shooted monk seal with a rifle and put it into refrigerator in order to sell it to the Italians. He rememers that he felt very sorry, guessing it was the seal he saw.

Registration, Date: ...24.10.2015. Registered by: .....Dušan Varda.....

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

Data on seals - fisheries interaction:

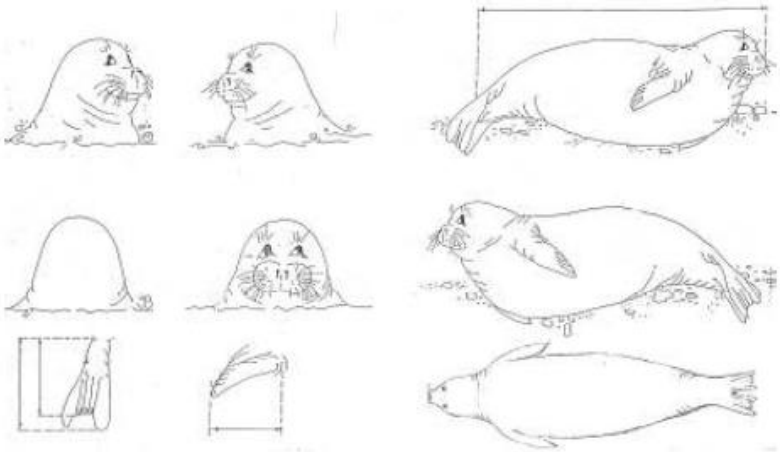
Seal(s) at gear: YES/NO Damage: YES / NO / unknown Remarks: .....

Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together
	

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MONK SEAL OBSERVATION DATA

Observer's name: **"HeNO2" via email in Vijesti 15.10.2013 upon article of 07.10.2013** Address (optional): .....

Occupation: fisherman / **resident** / researcher / tourist / sailor / other / specify: .....

Observer's position: land / **vessel** / aquaculture / other / specify: (**Rem: probably vessel**) .....

Date of sighting: **Autumn 2004** Time **..?.....** Duration **.....?.....** Number of animals: .....**1**.....

Region's name: **Traste**..... (land, island, off shore, etc.)

Precise location or position: **South of rt Macka, Dobra Luka** (cape, bay, beach) Closest town/village: **Budva**.....

ANIMAL No. 1 Photos/videos available? .....**NO**.....(*please send us a copy*)

At sea: approximate distance from observer: ..... From shore: ..... On land: inside cave /beach/rocky coast/other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m **unknown** .....

Colour: black / brown / dark grey / light grey / beige / whitish / **unknown** / other .....

Marks and description: spots / scars / patches / other .....

Behaviour: swimming / diving / foraging / feeding / resting / sleeping / other **probably swimming**.....

REMARKS: Two sightings were recorded by the same observer in this period of time (**"I saw it two times"**)

Registration, Date: **15.10.2013, IBM Kotor** ..... Registered by: **Vesna Mačić** .....

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

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Athens: Strofiliou 26 * GR-14561 Kifissia * e-mail: archipelagosgr@yahoo.gr

Data on seals - fisheries interaction:

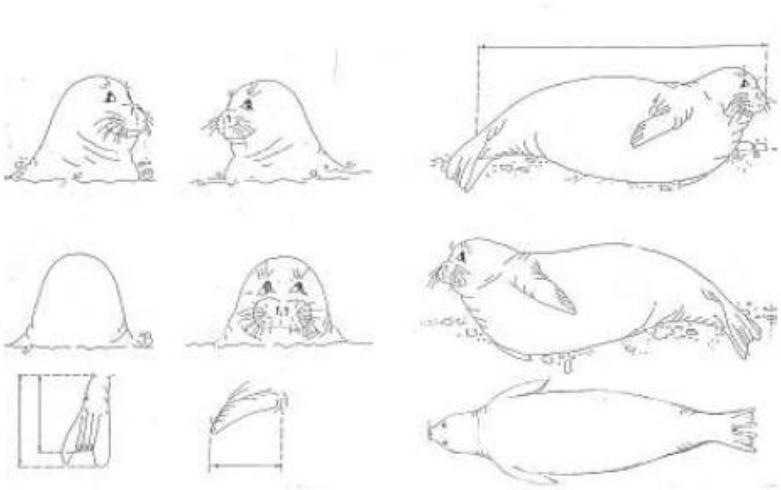
Seal(s) at gear: YES/**NO** Damage: YES/NO /unknown Remarks: .....

Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together

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MONK SEAL OBSERVATION DATA

Observer's name: **Dmitry Ryadnov & Natalia Soloveva** Address: **Bigova, Montenegro**

Occupation: fisherman / **resident** / researcher / tourist / sailor / other / specify: .....

Observer's position: land / **vessel** / aquaculture / other / specify: **small leisure boat**.....

Date of sighting: about **09/09/2005** Time **22:00 - 23:00** Duration **few minutes** Number of animals: .....**1**.....

Region's name: **Boka Kotorska (Bay of Kotor)** ..... (land, island, off shore, etc.)

Precise location or position: **Sveti Stasije, between Orahovac and Kotor** ..... (cape, bay, beach)

Closest town/village: **Sveti Stasije / Kotor**

ANIMAL No. 1 Photos/videos available? ...**NO**.....(*please send us a copy*)

At sea: approximate distance from observer: **5-7 m** From shore: ...m On land: inside cave/beach/rocky coast/other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m **1,5 m** 2,0 m 2,5 m 3,0 m Their statement: **1,2 m but full length was not seen, it was in the water and it was dark**

Colour: black / brown / dark grey / light grey / beige / whitish/unknown / other **grey with whitish neck and chest**

Marks and description: spots / scars / patches / other .....**nothing seen, seemed without marks**

Behaviour: swimming / diving / foraging / feeding / resting / sleeping / other: **the seal's round head appeared out of the water (he saw the whiskers). It appeared, looked at them and disappeared. It did not eat the sardines they were throwing into the water in order to attrackt fish for fishing with a line from the boat.**

REMARKS: both, Dmitry and Natalia were very precise about the coloration of the animal

Registration, Date: **15.5.2015, Bigova** Registered by: **A. Panou, L. Bundone, D. Varda and V. Macić after preliminary inquiries by B. Lazarević**

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

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Data on seals - fisheries interaction:

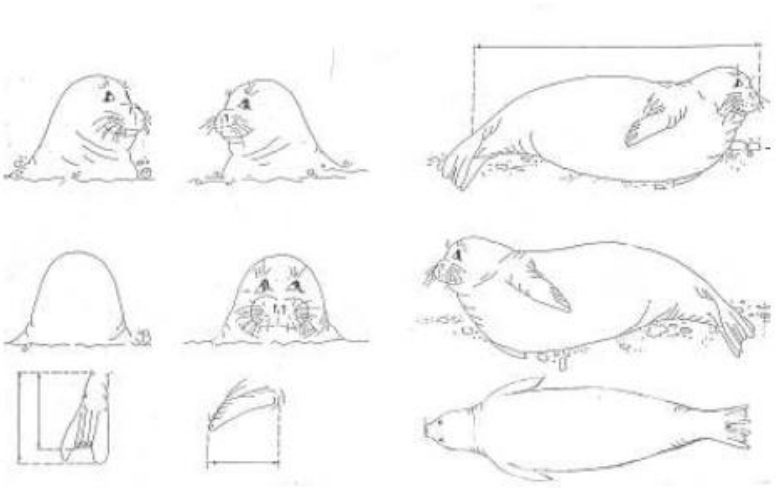
Seal(s) at gear: **YES**/NO Damage: YES / **NO** / unknown Remarks: ...**no catch at all**.....

Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other: .....
Dmitry was fishing with a line from the boat and throwing sardines into the water in order to attract fish. No fish was present, possibly scared away through the seal.

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together
	

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MONK SEAL OBSERVATION DATA

Observer's name: **Dmitry Ryadnov** Address: **Bigova, Montenegro**

Occupation: fisherman / **resident** / researcher / tourist / sailor / other / specify: .....
Observer's position: land / **vessel** / aquaculture / other / specify: **small leisure boat, coming from Tivat to Kotor**

Date of sighting: about **15/09/2005** Time **15:00 - 16:00** Duration **a few minutes** Number of animals: **1**

Region's name: **Bay of Kotor** (land, island, off shore, etc.)

Precise location or position: **between Perast and Stoliv** (cape, bay, beach) Closest town/village: **Stoliv**

ANIMAL No. 1 Photos/videos available? **NO** (*please send us a copy*)

At sea: approximate distance from observer: **20-30 m** From shore: ...m On land: inside cave/beach/rocky coast/other…

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m **1,5 m** 2,0 m 2,5 m 3,0 m unknown.....

Colour: black / brown / dark grey / light grey / beige / whitish / unknown / other **grey with whitish neck and chest**

Marks and description: spots / scars / patches / other **not seen**

Behaviour: **swimming** / diving / foraging / feeding / resting / sleeping / other **It emerged the head out of the water several times**

REMARKS: **Dmitry was very precise about the coloration of the animal**

Registration, Date: **15.5.2015, Bigova** Registered by: **A. Panou, L. Bundone, D. Varda and V. Mačić after preliminary inquiries by B. Lazarević**

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

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Data on seals - fisheries interaction:

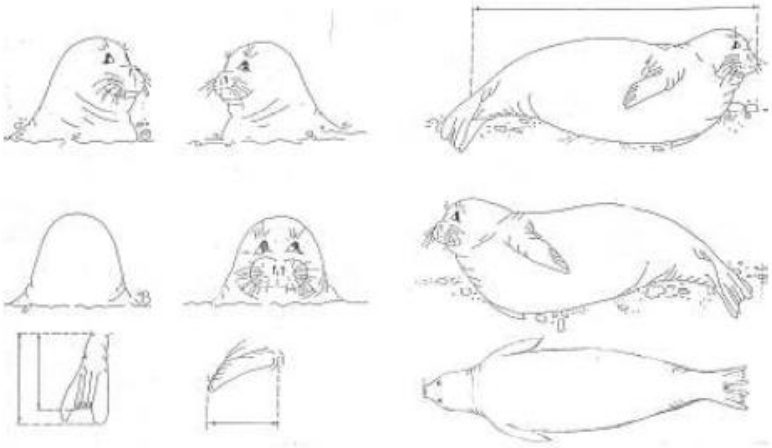
Seal(s) at gear: YES/**NO** Damage: YES / NO / unknown Remarks: .....

Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other .....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together

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MONK SEAL OBSERVATION DATA

Observer's name: **Marko Pima, fisherman from Bigova** Address (optional): **Bigova, Montenegro**

Occupation: fisherman / **resident** / researcher / tourist / sailor / other / specify: .....

Observer's position: land / **vessel** / aquaculture / other / specify: . **fishing tuna**.....

Date of sighting: **May 2008** Time **morning (while fishing)** Duration **a few seconds** Number of animals: **1**

Region's name: **Peninsula of Platamuni** (land, island, off shore, etc.)

Precise location or position: **between Krekavica and Sv. Nikola** (cape, bay, beach) Closest town/village: **Budva**

ANIMAL No. 1 Photos/videos available? **No** (*please send us a copy*)

At sea: approximate distance from observer: **unknown** From the coast: **close, about 20 metres**

On land: inside cave / beach / rocky coast / other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m **unknown**.....

Colour: black / brown / dark grey / light grey / beige / whitish / unknown / other **"grey"**

Marks and description: spots / scars / patches / other **not seen**

Behaviour: **swimming** / diving / foraging / feeding / resting / sleeping / other **Remark: close to the coast**

REMARKS: **they saw the head (and moustache), then it disappeared.**

Registration, Date: **18.5.2015, IBM Kotor** Registered by: **Brano Lazarević, A. Panou and V. Mačić after preliminary inquiries by B. Lazarević in Bigova.**

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

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Data on seals - fisheries interaction:

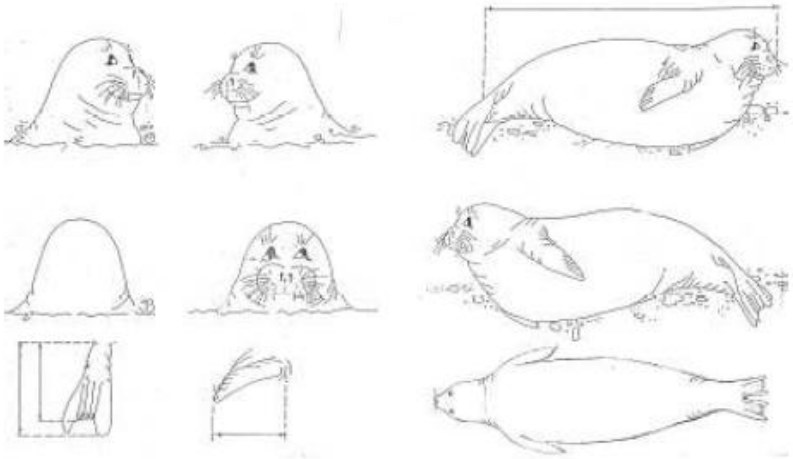
Seal(s) at gear: YES/NO Damage: YES / NO / unknown Remarks: .....

Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together

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MONK SEAL OBSERVATION DATA

Observer's name: **Milan, cousin of Brano Lazarević** Address: **Bigova, Montenegro**

Occupation: fisherman / **resident** / researcher / tourist / sailor / other / specify: .....

Observer's position: land / **vessel** / aquaculture / other / specify: **in boat, bringing tourists to Sv. Nikola**

Date of sighting: **June to August 2010** Time **15:00 - 16:00** Duration **a few seconds** Number of animals: **1**

Region's name: **Peninsula of Platamuni** (land, island, off shore, etc.)

Precise location or position: **close to Sv. Nikola** (cape, bay, beach) Closest town/village: **Budva**

ANIMAL No. 1 Photos/videos available? **NO** (*please send us a copy*)

At sea: approximate distance from observer: **unknown** From shore: **approximately 20 metres**
On land: inside cave / beach / rocky coast / other.....

State and condition of the animal: **normal** / injured / ill / dead (corpse fresh / decaying) / unknown

Size class of the animal: up to 1,0 m 1,5 m 2,0 m 2,5 m 3,0 m **unknown**.....

Colour: black / brown / dark grey / light grey / beige / whitish / **unknown** / other

Marks and description: spots / scars / patches / other **not seen**

Behaviour: **swimming** / diving / foraging / feeding / resting / sleeping / other **It emerged the head out of the water once**

REMARKS: **Milan first thought it was a diver – the seal was about 20 m away from the shore. It dived and disappeared.**

According to B. Lazarević, more people from Bigova had seen one seal in the same area in 2010.

Registration, Date: **18.5.2015, IBM Kotor** Registered by: **B. Lazarević, V. Mačić and A. Panou after preliminary inquiries by B. Lazarević**

In case you observed more than two animals together, for more details, for seals-fisheries interaction and for any other comments please use the space on the second page.

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Data on seals - fisheries interaction:

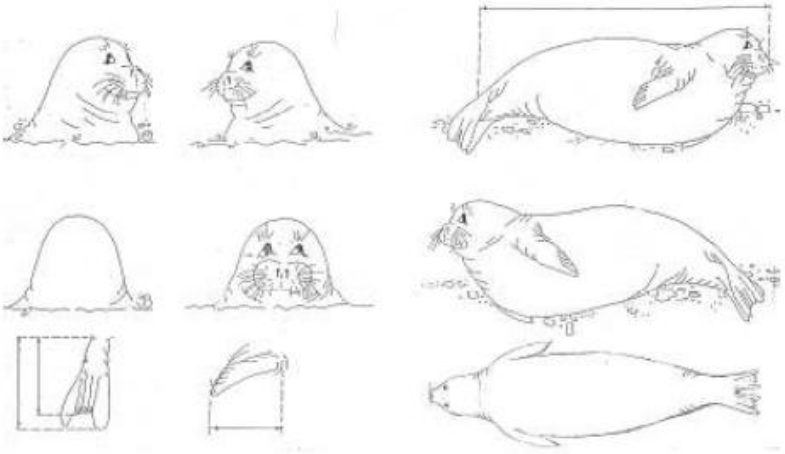
Seal(s) at gear: YES/**NO** Damage: YES / NO / unknown Remarks: .....

Type of gear: trammel nets / gill nets / bottom long lines / trawler / purse seines / other.....

Fish eaten (species): .....

Gear damaged: .....

Please indicate detailed characteristics in the sketches by UNEP (size/colour/marks)



If possible, please draw a map of the sighting's location	Space for data about more animals sighted together

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Athens: Strofiliou 26 * GR-145 61 Kifissia * e-mail: archipelagosgr@yahoo.gr

3. Mapping of algae and evaluation of the ecological status of sea water using the CARLIT method

Algal communities in the mediolittoral part of the coast from Cape Voluica, towards south to the island Stari Ulcinj (Figure 6), were mapped in the survey of 2014 and were included in the calculation of the Ecological quality index (EQI) for the municipality of Bar. It was decided to do so because of the different hydrological conditions in the south of the Montenegrin coast, caused by the river Bojana. Because of this river salinity in the entire area of the municipality of Ulcinj is lower than expected for the Adriatic Sea and that is the main reason why this area will, most probably, be defined as a "transitional water body". Anyhow, the CARLIT method for the Adriatic Sea was adjusted and implemented for the areas of "open water body" and could not be calculated in the same way as is done for "transitional water bodies" without additional adjustments.

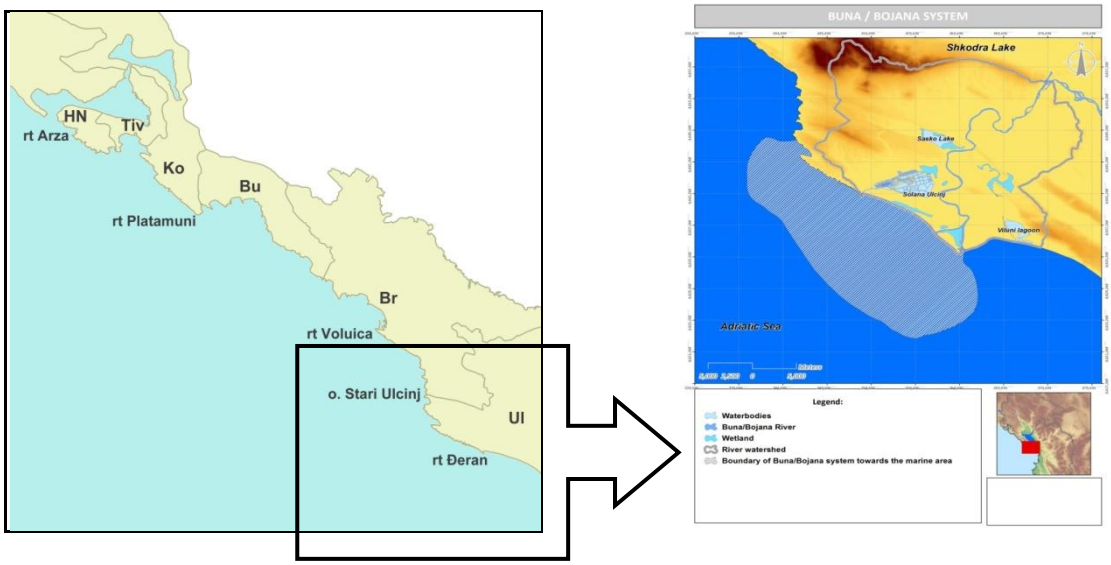


Figure 6. Coastal and marine area with direct influence of the Bojana River (from the Bojana/Buna transboundary project)

This survey was organized first of all for the registration of marine caves and potential habitats for the monk seals along the coastline. Therefore, we didn't have enough time for a more detailedanalysis of algal communities in order to estalish the referent situation for the "transitional water bodies" necessary for calculation of the EQI. Because of that reason, the EQI wasnot calculated for the municipality of Ulcinj. Nevertheless, we mapped the algal communities and they are presented below.

The *Cystoseira* assemblages in the surveyed area are very abundant, mostly in the areas of cape Mavrijan, the inlet Valdanos and cape Mendra (Figure 7). In this area, also small assemblages of *Lithophyllum byssoides* were found: together with a continuous belt of *Cystoseira amentacea* - this is the indicator for clean sea water and for a good ecological status. On the most southern-east part of the Valdanos inlet there is a slight degradation of the ecological quality of the water represented through the presence of *Cystoseira compressa* and photophilic algae. This situation is more common close to the town of Ulcinj and going to the south toward cape Đeran (Figure 8). The worst situation was registered in the close surroundings of Ulcinj town (Figure 9). The area from cape Kraljeve skalice toward the south was the worst part of the coast, not only within the municipality of Ulcinj, but it was also the worst parts in the whole surveyed area from cape Arza to cape Đeran. High presence of Ulvales and cyanobacteria in this area are caused by the waste water which is directly flowing into the sea in some locations. The transparency of the water was just 2-3m in August. Moreover, in the locations of the potential caves No. 16, 17 and 18 we couldn't enter the caves and carry out our work because of the very strong smell of the waste water and the potential threat to our health.

In summary, more than half of the coast in the municipality of Ulcinj is in good ecological quality condition, and that is the northern part. Although CARLIT EQI was not calculated for this area it is evident from our observations that the southern part of the surveyed coast, around Ulcinj town, the sea water is in poor condition.

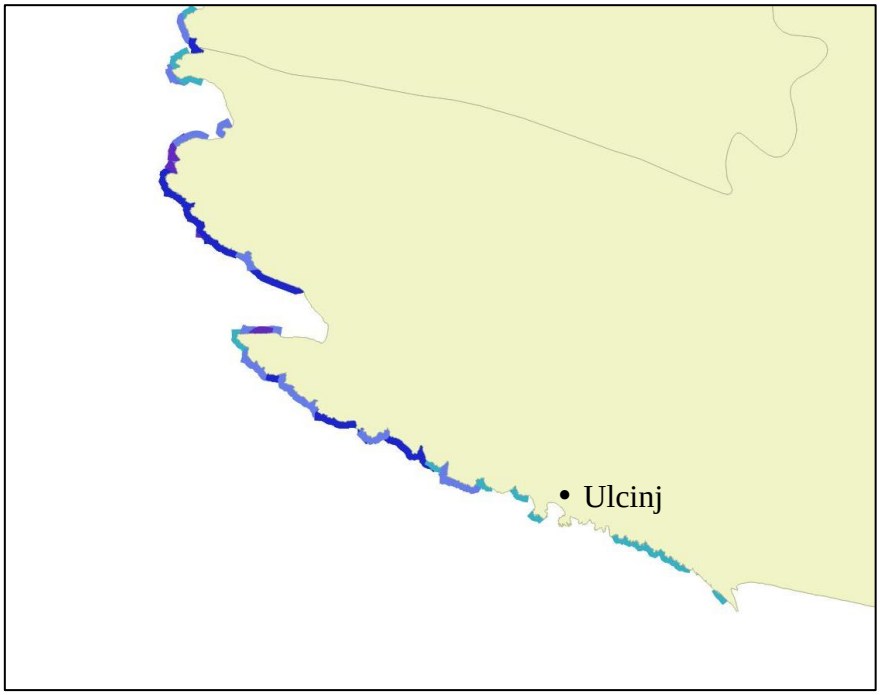


Figure 7. Distribution of the alga *Cystoseira amanetacea* (• continuous belt and and *Lithophyllum byssoiudes*; • abundant patches; • rare scattered plants)

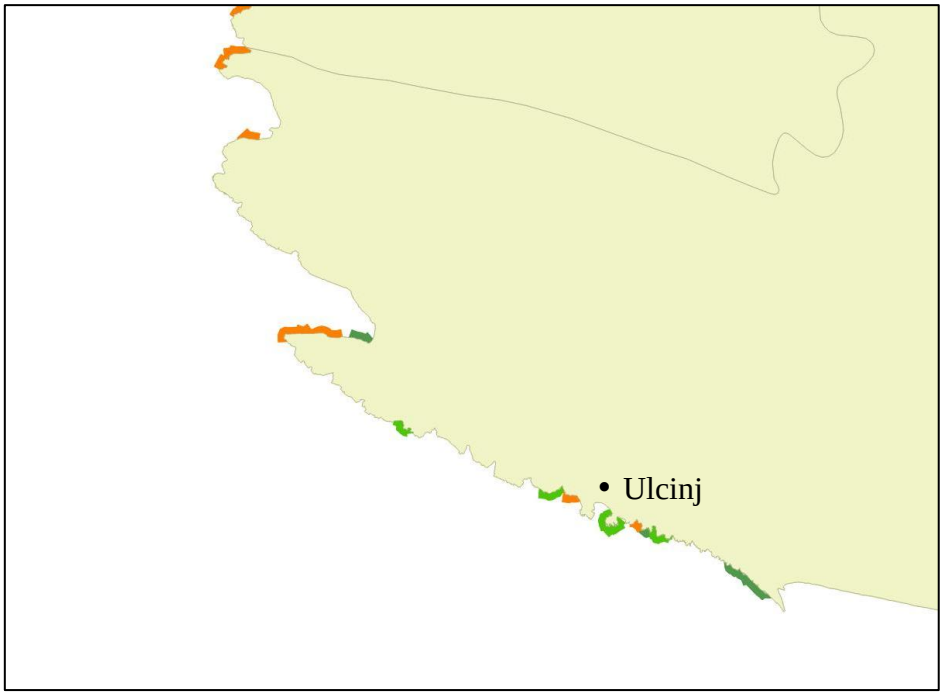


Figure 8 . Distribution of the • *Cystoseira compressa;* • *Padina pavonica* and • *Corallina elongata*

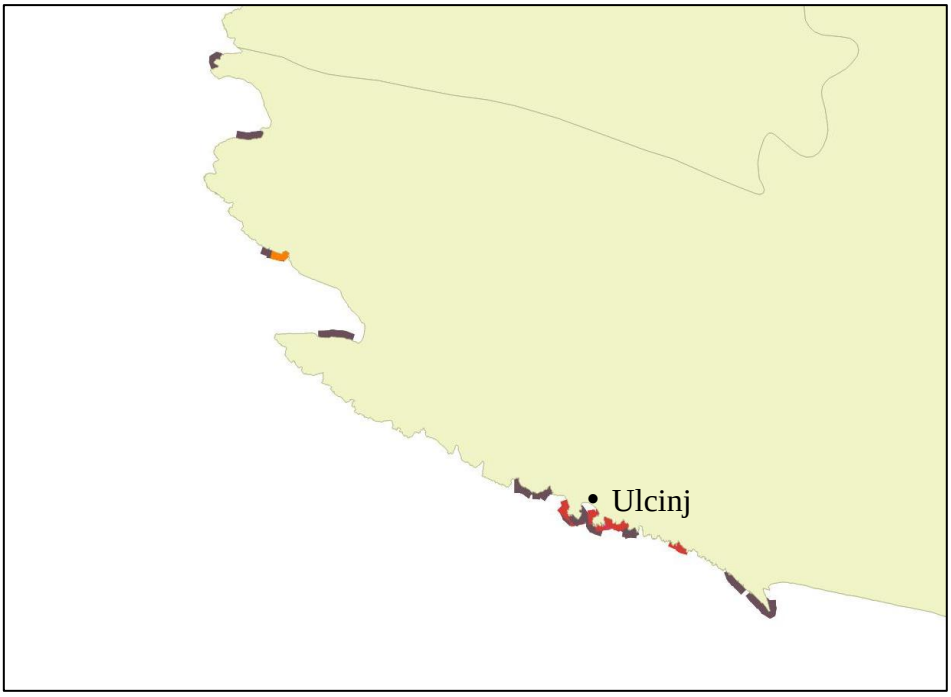


Figure 9. Distribution of • mussels; • green alage and • cyanobacteria

CONCLUSIONS

In the surveyed area from cape Voluica to cape Djeran we registered 33 caves and 3 “potential caves". These “potential caves” are practically holes in the vicinity of Ulcinj town, that we didn’t surveyed because of the evident waste water discharge. From all 33 caves described above only 7 are up to 10m long , while 14 caves are longer than 20m. Furthermore, in 18 caves some kind of rocky or mostly pebble beaches was registered while in 4 caves we found sandy beaches. In total we registered 8 very good locations as potential habitats for monk seals although, as in previous years, recent evidence of monk seal presence was not found.

During this survey, we also encountered several protected species, and our notes about their distribution are contributing to the general knowledge and underlining the ecological importance of this area. Of all species found inside the caves or close to the entrance we may underline the presence of the following protected species:

(a) Bats *(Miniopterus schreibersii)*

(b) Molluscs: *Lithophaga lithophaga*

(c) Algae and seagrass: *Lithophyllum byssoides, Cystoseira amentacea, Cymodocea nodosa.*

(d) {The herons at cape Deran??} Larus michahellis

The bat species *Miniopterus schreibersii* was registered in the interior of several caves and in some of them the species was present in high numbers. Furthermore, this species was also registered in some of the caves already known from our survey in 2013 (Plava pećina, Niska, Bigova komplex).

Furthermore, we mapped in detail 12 caves already known from the surveys in the years 2013 and 2014.

The CARLIT method for the Adriatic Sea was adjusted and implemented for the areas of “open waters body” and could not be calculated in the same way for “transitional water bodies” withouth additional adjustments. This survey was organized first of all for the registration of marine caves and potential habitats for the monk seals. In this occasion we didn’t have enough time for more detail analysis of algal communities and the calculation of a referent situation for the “transitional water bodyes” necessary for the calculation of EQI. Because of that reason, the EQI was not calculated for the area of the municipality of Ulcinj. However, we mapped the present algal communities and we may say that more than half of the coast of the municipality of Ulcinj is in good ecological quality condition, and that is the northern part. Although CARLIT EQI was not calculated we may also say that the southern part of the surveyed coast around Ulcinj town is in poor condition.

After our survey in May 2015 and in August 2015, we communicated to the public media some preliminary results. These media reports are listed in Annex I.

Furthermore, we intend to publish the results of our surveys of marine caves in a scientific journal and, in this way, to justify once more the confidence of Jugopetrol AD in our work.

Once again, we would like to thank Jugopetrol AD hoping that our cooperation will be continued in the future.

ANNEX I Summary of the three-year project

The coastline of Montenegro was surveyed from cape Arza in the north of the country) to cape Đeran in the south in the years 2013, 2014 and 2015. The aim of our work was to register the marine caves present in the area and also potential habitats of the endangered Mediterranean monk seal contributing to the establishment of the future MPA Platamuni and MPA Katič and to the elaboration of a Cave Kataster of Montenegro.

Marine caves are an important and endangered habitat listed in Annex I of the EU Habitat Directive (92/43/EEZ) and they are widely acknowledged for their unique biodiversity. In our national Law on nature protection (Sl. list 51/08), when we started our work it was indicated that speleological objects are naturally formed holes in the rock longer than 5m, where man can enter and the entrance is smaller than the length or depth. Unfortunately, when we started our work there were no further adequate regulations neither a Marine Cave Kataster. Thus, we evaluated our findings with the aim to help towards the creation of an appropriate marine cave Kataster and the improvement of the new legislative documents.

During the 3 years we registered 70 caves and 38 holes or slits (holes and slits are less than 5m long). During the first year, in the area from cape Arza to cape Platamuni we registered 21 caves and 24 holes/slits. In the second year, from cape Platamuni to cape Voluica, we registered 16 caves and 14 holes, while in third year, from cape Voluica to cape Đeran, we registered 33 caves. For all these locations we noted basic characteristics and organized the findings in tables. For the caves surveyed in the third year, and for 12 important caves registered in the previous two years, we also provided the caves'diagrams according to the measurements we took during this final survey. All these data should be considered as a basic overview of the marine caves on the Montenegrian coast and as a starting point for further research and protection measures.

In these surveys we didn’t find any sign of monk seal presence, but more than 20 suitable caves for the species were registered. The presence of monk seals in Montenegro was certain until the 70's when the last known seal was killed in the area of Herceg Novi. However, no further evidence of monk seal presence in Montenegro had been recorded during the last 4 decades. As a response to the broad publicity created through several articles in the local media in each phase of the three years project and through repeated direct contacts with

fishermen and other local persons, we could identify at least 11 seal sightings along Montenegro's coastline during the last 20 years, indicating at least a temporal passage of the species.

From the above records we conclude that the monk seal should not be considered as definitely extinct in Montenegro even if its presence is recorded only temporarily, indicating at least the transition of animals from neighbouring countries. Furthermore, we conclude that efforts for detecting monk seal sightings, carried out on a more permanent basis through repeated publications in the local media and through permanent contacts and discussions with local people, including the establishment of one or more MPAs could provide more data.

Besides the data that we collected on caves, potential monk seal habitats and seal sightings along Montenegro's coastline we also collected data on protected species that we noticed during our research. Here, only the names of these species are presented:

(a) Algae and seagrass: *Lithophyllum byssoides, Cystoseira amentacea, Cymodocea nodosa* and *Posidonia oceanica*

(b) Plants*: Euphorbia dendroides* and *Limonium angustifolium*

(c) Invertebrates: *Cladocora cespitosa, Lithophaga lithophaga, Pinna nobilis* and *Geodia cydonium*

(d) Birds: *Ardeola ralloides, Alcedo athis, Phalacrocorax aristotelis* and *Acciptier gentilis {the herons at cape Deran?}* Larus michahellis

(e) Bats**:** *Miniopterus schreibersii*

Furthermore, for the analysis of ecological status of the water body we mapped algal communities at the sea level along the coast from cape Arza to cape Đeran. The calculation of environmental status of the water body using the CARLIT method indicated a good sea water quality for the municipality of Budva, while for the parts of the surveyed coast of the municipality of Herceg Novi, Kotor, Tivat and the entire area of the municipality of Bar the evaluated ecological quality index was very good. For the municipality of Ulcinj the EQI index was not calculated because this area belongs to the area of transitional water bodies and some additional surveys and adjustments are needed. But, as a preliminary impression, we may say that area in the northern part of the municipality of Ulcinj is good while close to the

town of Ulcinj the ecological quality conditions are rather poor.

Last but not least, aiming at raising public awareness, we printed brochures on marine caves and monk seals in the first year of the project and distributed them in the schools of Kotor, Tivat and Herceg Novi. So far we participated in two international scientific congresses and we published one scientific paper. We also communicated our preliminary and annually results several times (25 articles in total). All three annual reports were delivered in English and Serbian language to Jugopetrol AD as the sponsor of the project as also to the following public authorities: Ministry of sustainable development and tourism, Ministry of agriculture and rural development, Ministry of science, Agency for environment and the public enterprise Morsko dobro.

We believe that the 3 consecutive donations of Jugopetrol AD to the Institute of Marine Biology are an excellent example for investing in science and the protection of our environment. Once again we would like to thank Jugopetrol AD, hoping that our cooperation will be continued and be a source of inspiration also for other donors.

ANNEX II Articles in the media in 2015

http://www.radiokotor.info/radio/index.php/78-lokalne-vijesti/4460-nastavljeno-istrazivanje-morskih-pecina

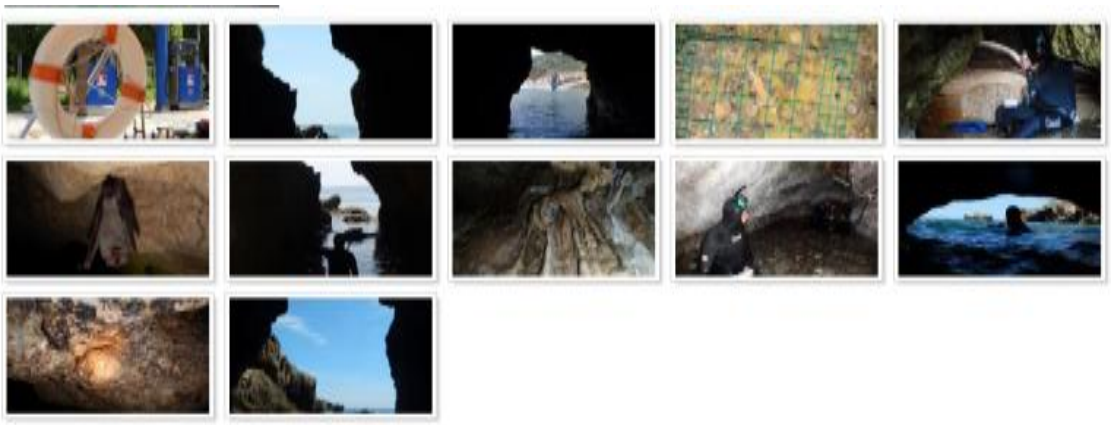
Kategorija: Vijesti

NASTAVLJENO ISTRAŽIVANJE MORSKIH PEĆINA

Objavljeno 18 05 2015

inShare

Ove godine je Jugopetrol AD po treći put donirao grant Institutu za biologiju mora u cilju istraživanja morskih pećina. Pom riječima dr Vesne Mačić sa Instituta u toku 2013. istraživan je dio obale od rta Arza do rta Platamuni. „Zatim je u 2014.g. istraživan dio obale od rta Platamuni do rta Volujica, a ove godine, tačnije prošle sedmice, nastavili smo istraživanje od rta Volujica do rta Đeran. Kao i ranijih godina uz Institut za biologiju mora (Branislav Lazarević i Vesna Mačić) u ovom istraživanju su učestvovali eksperti iz NVO Archipelagos iz Grčke, Aliki Panou i njihovog ogranka iz Italije, Luigi Bundone - eksperti za morske medvedice. Sa nama je bio i predstavnik crnogorske NVO Dušan Varda, a po prvi put smo uključili i NVO Biospeleološko društvo i Miloša Pavićevića.



Kao i prethodnih godina cilj nam je bio da evidentiramo sve morske pećine koje imaju ulaz na površini mora ili je on djelimično potopljen. Razlog za to je činjenica da su pećine zaštićeno stanište prema Zakonu o zaštiti prirode, a takođe su prioritetno stanište prema EU Direktivi o staništima. U morskim pećinama vladaju mnogo drugačiji uslovi spoljašnje sredine u odnosu na otvoreno more i zato imaju specifičan živi svijet, često puta okarakterisan i sa nekim zaštićenim i endemičnim vrstama. U morskim pećinama se odmaraju i razmnožavaju morske medvedice (tuljani) koji su jedna od najugroženijih vrsta morskih sisara, pa nam je zato važno da posebno markiramo pećine koje mogu biti njihovo potencijalno stanište. Osim toga, ponovo smo obišli neke od pećina koje su u prethodnim periodima označene kao važna pećinska staništa.
Međutim, prošle sedmice nismo baš imali sreće sa vremenskim uslovima jer nismo mogli raditi zbog velikih talasa. Ipak, na području od rta Voluica (Bar) do rta Đeran (Ulcinj) do sada smo evidentirali i izmjerili 23 morske pećine, a u blizini Ulcinja je ostao još jedan dio obale koji je neistražen i gdje ćemo nastaviti istraživanje kasnije, tokom ljeta. Osim toga u predstojećem terenskom radu planiramo da ponovo obiđemo neke od pećina koje su poznate iz ranijih istraživanja i da uradimo detaljnije fotografisanje živog svijeta u njima. Nakon završetka istraživanja nadležne institucije i šira javnost će biti upoznati sa rezultatima ovogodišnjeg istraživanja i na taj način će se kompletirati prvi inventar površinskih morskih pećina na otovorenom dijelu obale Crne Gore, a njihovo dalje istraživanje i adekvatna zaštita tek prdstoje.Koristimo i ovu priliku da se još jednom najljepše zahvalimo Jugopetrolu AD na donaciji i podršci koju nam pruža", poručila je dr Vesna Mačić.

http://www.vijesti.me/vijesti/tajne-morskih-pecina-u-njima-zive-zasticene-i-endemicne-vrste-834061

Tajne morskih pećina: U njima žive zaštićene i endemične vrste

U morskim pećinama se odmaraju i razmnožavaju morske medvedice koji su jedna od najugroženijih vrsta morskih sisara, pa nam je zato važno da posebno markiramo pećine koje mogu biti njihovo potencijalno stanište"

1132PREGLEDA

2KOMENTARA

FOTO: INSTITUT ZA BIOLOGIJU MORA**AUTOR:** Siniša Luković

Sljedeća

Projekat istarživanja morskih pećina na Crnogorskom primorju koji finasira podgorički “Jugopetrol” a sprovodi Instituit za biologiju mora iz Kotora (IBMK), nastavljen je prošle sedmice.

Ekipa naučnika predvođenih dr Vesnom Mačić sa IBMK, obavila je istraživnje morskih pećina na potezu od rta Volujica u Baru do rta Đeran u Ulcinju.

“I u ovom istraživanju su učestvovali eksperti iz NVO “Archipelagos iz Grčke”, Aliki Panou i njihovog ogranka iz Italije, Luigi Bundone koji su eksperti za morske medvedice. Sa nama je bio predstavnik crnogorske NVO Dušan Varda, a po prvi put smo uključili i NVO “Biospeleološko društvo” čiji je predstavnik bio Miloš Pavićević", kazaa je novinarima dr Mačić.

Ona je podsjetila da su uz finansijsku podršku “Jugopetrola” u protekle dvije godine istraivane morske pećine na djelovima obale od rta Arza na ulazu u Boku dorta Platamuni u Donjem Grblju, odnosno od Platamuna do Volujice, a sve u potrazi za dokazima da se i na našem primorju makar povremeno zadržava izuzetno rijetka i zaštićena vrsta morskog tuljana – sredozemna medvjedica.

Ta istraživanja produkovala su i nova vrijedna saznanja o drugom biljnom i životinjskom svijetu koji živi u specifičnim uslovima ovih staništa, a koja su i na međunarodnom nivou označena kao prioritetna zaštićena staništa.

“U istraživanjima što smo ih sproveli prošle nedjelje, cilj nam je, kao i prethodnih godina, bio da evidentiramo sve morske pećine koje imaju ulaz na površini mora ili je on djelimično potopljen. Razlog za to je činjenica da su pećine zaštićeno stanište prema Zakonu o zaštiti prirode, a takođe su prioritetno stanište prema EU Direktivi o staništima. U morskim pećinama vladaju mnogo drugačiji uslovi spoljašnje sredine u odnosu na otvoreno more i zato imaju specifičan živi svijet, često puta okarakterisan i sa nekim zaštićenim i endemičnim vrstama. U morskim pećinama se odmaraju i razmnožavaju morske medvedice koji su jedna od najugroženijih vrsta morskih sisara, pa nam je zato važno da posebno markiramo pećine koje mogu biti njihovo potencijalno stanište. Osim toga, ponovo smo obišli neke od pećina koje su u prethodnim periodima označene kao važna pećinska staništa", objasnila je dr Mačić.

Iako su naučnicma prethodnih dana loše vrijeme i veliki talasi na moru otežavali posao, na

potezu od Volujice do Đerana evidentirali su i premjerili 23 morske pećine. U blizini Ulcinja je ostao još jedan dio obale koji je neistražen i gdje će se istraživanja nastaviti kasnije, tokom predstojećeg ljeta.

“Osim toga, u sledećem terenskom radu planiramo da ponovo obiđemo neke od pećina koje su poznate iz ranijih istraživanja i da uradimo detaljnije fotografisanje živog svijeta u njima. Nakon završetka terenskog posla i obrade podataka, nadležne institucije i šira javnost će biti upoznati sa rezultatima ovogodišnjeg istraživanja i na taj način će se kompletirati prvi inventar površinskih morskih pećina na otovorenom dijelu obale Crne Gore, a njihovo dalje istraživanje i adekvatna zaštita tek predstoje", kazala je dr Vesna Mačić, zahvalivši se kompaniji “Jugopetrol” koja je podržala rad naučnika i ovaj značajan projekat za proučavanje i zaštitu dijela morskog ekosistema u Crnoj Gori.

http://www.bokanews.me/vijesti/nastavljen-projekat-istrazivanje-morskih-pecina/

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Nastavljen projekat istraživanja morskih pećina

Vijesti

18/05/2015 12:12

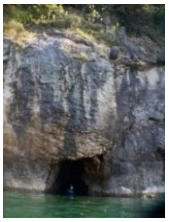

Istražene još 23 pećine između Bara i Ulcinja









Projekat istarživanja morskih pećina na Crnogorskom primorju koji finasira podgorički "Jugopetrol" a sprovodi Instituit za biologiju mora iz Kotora (IBMK), nastavljen je prošle sedmice. Ekipa naučnika predvođenih dr Vesnom Mačić sa IBMK, obavila je istraživnje morskih pećina na potezu od rta Volujica u Baru do rta Đeran u Ulcinju.

“I u ovom istraživanju su učestvovali eksperti iz NVO “Archipelagos iz Grčke”, Aliki Panou i njihovog ogranka iz Italije, Luigi Bundone koji su eksperti za morske medvedice. Sa nama je bio predstavnik crnogorske NVO Dušan Varda, a po prvi put smo uključili i NVO “Biospeleološko društvo” čiji je predstavnik bio Miloš Pavićević.”- kazala je danas novinarima dr Mačić.

Ona je podsjetila da su uz finansijku podršku “Jugopetrola” u protekle dvije godine istraživanje morske pećine na djelovima obale od rta Arza na ulazu u Boku dorta Platamuni u Donjem Grblju, odnosno od Platamuna do Volujice, a sve u potrazi za dokazima da se i na našem primorju makar povremeno zadržava izuzetno rijetka i zaštićena vrsta morskog tuljana – sredozemna medvjedica. Ta istraživanja produkovala su i nova vrijedna saznanja o drugom biljnom i životinjskom svijetu koji živi u specifičnim uslovima ovih staništa, a koja su i na međunarodnom nivou označena kao prioritetna zaštićena staništa.

“U istraživanjima što smo ih sproveli prošle nedjelje, cilj nam je, kao i prethodnih godina, bio da evidentiramo sve morske pećine koje imaju ulaz na površini mora ili je on djelimično potopljen. Razlog za to je činjenica da su pećine zaštićeno stanište prema Zakonu o zaštiti prirode, a takođe su prioritetno stanište prema EU Direktivi o staništima. U morskim pećinama vladaju mnogo drugačiji uslovi spoljašnje sredine u odnosu na otvoreno more i zato imaju specifičan živi svijet, često puta okarakterisan i sa nekim zaštićenim i endemičnim vrstama. U morskim pećinama se odmaraju i razmnožavaju morske medvedice koji su jedna od najugroženijih vrsta morskih sisara, pa nam je zato važno da posebno markiramo pećine koje mogu biti njihovo potencijalno stanište. Osim toga, ponovo smo obišli neke od pećina koje su u prethodnim periodima označene kao važna pećinska staništa.”- objasnila je dr Mačić.

Istraživanje morskih pećina

Iako su naučnicma prethodnih dana loše vrijeme i veliki valovi na moru otežavali posao, na potezu od Volujice do Đerana evidentirali su i premjerili 23 morske pećine. U blizini Ulcinja je ostao još jedan dio obale koji je neistražen i gdje će se istraživanja nastaviti kasnije, tokom predstojećeg ljeta.

“Osim toga, u sledećem terenskom radu planiramo da ponovo obiđemo neke od pećina koje su poznate iz ranijih istraživanja i da uradimo detaljnije fotografisanje živog svijeta u njima. Nakon završetka terenskog posla i obrade podataka, nadležne institucije i šira javnost će biti upoznati sa rezultatima ovogodišnjeg istraživanja i na taj način će se kompletirati prvi inventar površinskih morskih pećina na otovorenom dijelu obale Crne Gore, a njihovo dalje istraživanje i adekvatna zaštita tek predstoje.”- kazala je dr Vesna Mačić, zahvalivši se kompaniji “Jugopetrol” koja je podržala rad naučnika i ovaj značajan projekat za proučavanje i zaštitu dijela morskog ekosistema u Crnoj Gori.

http://radiotivat.com/index.php/ekologija/16573-istrazivanje-morskih-pecina.html

Radio Tivat

Istraživanje morskih pećina

Detalji

Kategorija: Ekologija

Objavljeno 18 maj 2015

Pogodaka: 39

U cilju istraživanja morskih pećina Institut za biologiju mora i ove godien realizuje istraživanje morskih pećina. Ta istraživanja su vršena i protekle dvije godine, a ovogodišnje je omogućio Jugopetrol doniranjem sredstava u te svrhe, stoji u saopštenju Instituta za biologiju mora iz Kotora, koje je potpisala dr Vesna Mačić.
Te aktivnosti su nastavljene prošle sedmice od rta Volica do rta Đeran.

Kao i prethodnih godina, "cilj nam je bio da evidentiramo sve morske pećine koje imaju ulaz na površini mora ili je on djelimično potopljen. Razlog je što su pećine zaštićeno stanište prema Zakonu o zaštiti prirode, a takođe su prioritetno stanište prema EU Direktivi o staništima", navela je dr Mačić.
U morskim pećinama vladaju mnogo drugačiji uslovi spoljašnje sredine u odnosu na otvoreno more i zato imaju specifičan živi svijet, često okarakterisan i sa nekim zaštićenim i endemičnim vrstama. U morskim pećinama se odmaraju i razmnožavaju morske medvedice (tuljani) koji su jedna od najugroženijih vrsta morskih sisara, pa je važno da se posebno markiraju pećine koje mogu biti njihovo potencijalno stanište.

Pored toga stručnjaci iz Instituta su ponovo obišli neke od pećina koje su u ranije označene kao važna pećinska staništa. Iako vremenmski uslovi protekle sedmice , zbog talasa nisu bili najbolji, ipak su uspjeli da na području od rta Voluica u Baru do rta Đeran u Ulcinju do sada evidentiraju i izmjere 23 morske pećine, a u blizini Ulcinja je ostao još jedan dio obale koji je neistražen i gdje će istraživanje nastaviti kasnije, tokom ljeta.
U saopštenju ese navodi da su u sledećem terenskom radu planirali ponovni obilazak nekih od pećina koje su poznate iz ranijih istraživanja i da urade detaljnije fotografisanje živog svijeta u njima o čemu će javnost biti obavještena i na taj način će se kompletirati prvi inventar površinskih morskih pećina na otovorenom dijelu obale Crne Gore, a njihovo dalje istraživanje i adekvatna zaštita tek predstoje, navela je dr Vesna Mačić.

http://www.radiojadran.com/index.php?option=com_content&view=article&id=4721:foto-istrazivanje-od-rta-voluica-do-rta-deran-izmjerene-23-morske-pecine&catid=73:more-i-obala&Itemid=518

FOTO ISTRAŽIVANJE: OD RTA VOLUICA DO RTA ĐERAN IZMJERENE 23 MORSKE PEĆINE

Datum kreiranja petak, 22 Maj 2015 10:55

Font:

Institut za biologiju mora iz Kotora, nastavio je istraživanje morskih pećina duž crnogorskog primorja, koje je započeo još 2013. na dijelu obale od rta Arza do rta Platamuni.

U toku je istraživanje od rta Voluica do rta Đeran, zahvaljujući grantu od 4000 eura Jugopetrola AD, kaže za Radio Jadran, saradnica Instituta i učesnica u projektu dr Vesna Mačić.
"Cilj nam je bio da evidentiramo sve morske pećine koje imaju ulaz na površini mora ili je on djelimično potopljen. Jer, pećine su zaštićeno stanište prema Zakonu o zaštiti prirode, a takođe su prioritetno stanište prema EU Direktivi o staništima. U morskim pećinama vladaju drugačiji uslovi spoljašnje sredine u odnosu na otvoreno more i zato imaju specifičan živi svijet, često okarakterisan i sa nekim zaštićenim i endemičnim vrstama" - priča dr Mačić.

U morskim pećinama se odmaraju i razmnožavaju morske medvjedice (tuljani) koji su jedna od najugroženijih vrsta morskih sisara, pa je zato važno da se posebno markiraju pećine koje

mogu biti njihovo potencijalno stanište. Istraživački tim ponovo je obišao neke od pećina koje su u prethodnim periodima označene kao važna pećinska staništa.
"Nismo proteklih dana baš imali sreće sa vremenskim uslovima zbog velikih valova. Ipak, na području od rta Voluica (Bar) do rta Đeran (Ulcinj) do sada smo evidentirali i izmjerili 23 morske pećine, a u blizini Ulcinja je ostao još jedan dio obale koji je neistražen i gdje ćemo nastaviti tokom ljeta", kaže Mačićka.
U sljedećem terenskom radu u planu je obilazak nekih od pećina koje su poznate iz ranijih istraživanja kako bi se uradilo detaljnije fotografisanje živog svijeta u njima.
Kada Institut završi projekat nadležne institucije i javnost će biti upoznati sa rezultatima i kompletiranjem prvog "inventara" površinskih morskih pećina na otovorenom dijelu obale Crne Gore. Međutim, njihovo dalje istraživanje i adekvatna zaštita tek prdstoje.
Kao i ranijih godina, uz Institut za biologiju mora (Branislav Lazarević i Vesna Mačić) u ovom istraživanju učestvuju eksperti iz NVO Archipelagos iz Grčke, Aliki Panou i njihovog ogranka iz Italije, Luigi Bundone koji su eksperti za morske medvjedice. Istraživanju prisustvuje predstavnik crnogorske NVO Dušan Varda, a prvi put uključena je i NVO Biospeleološko društvo, odnosno Miloš Pavićević.


http://www.bokanews.me/vijesti/trazili-sredozemnu-medvjedicu-od-boke-do-ulcinja/

Petak, 4/9/ 2015. 18:37

BokaNews

Tražili sredozemnu medvjedicu od Boke do Ulcinja

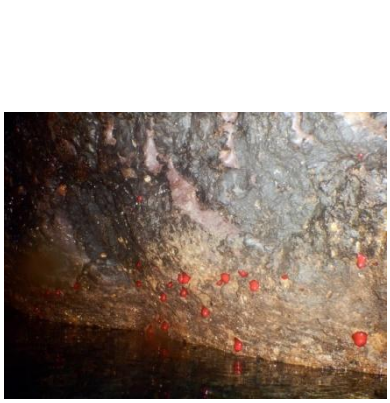
Završeno istraživanje morskih pećina u ulcinjskom akvatorijumu

04/09/2015 18:24

Tražili sredozemnu medvjedicu od Boke do Ulcinja

1 od 14

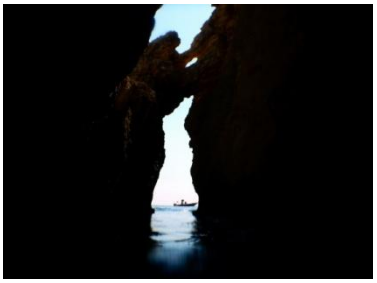
Tražili sredozemnu medvjedicu od Boke do Ulcinja



Morska pećina


Morska pećina - otpad


Tražili sredozemnu medvjedicu od Boke do Ulcinja



Morska pećina

Morska pećina - otpad

Morska pećina -slijepi miševi

Stručnjaci Instituta za biologiju mora iz Kotora (IBMK) završili su proteklih nekoliko dana, istraživanje morskih pećina u blizini Ulcinja. Zahvaljujući donaciji kompanije "Jugopetrol" tokom maja su obavljena istraživanja na potezu od rta Voluica u Baru do rta Đeran u ulcinjskoj opštini, a od 31.avgusta do 2.septembra odrađen je i dio ulcinjske obale kojeg na proljeće zbog nepovoljnih meteo-uslova, stručnjaci nisu mogli ispitati.

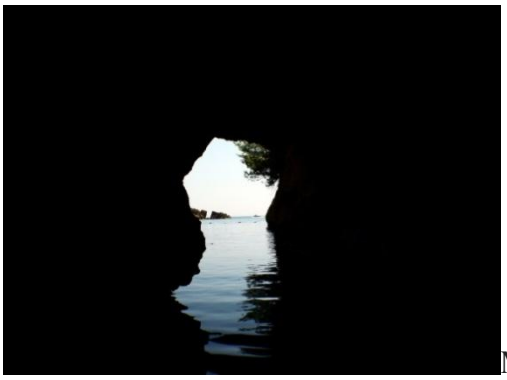
U istraživanju su učestvovali Branislav Lazarević i Vesna Mačić iz IBMK u saradnji sa Milošem Pavićevićem NVO "Biospeleološko društvo" i Dušanom Vardom iz NVO MedCEM.

"U neposrednoj blizini Ulcinja smo registrovali još 8 pećina, a detaljnija mjerenja smo uradili u nekim već poznatim pećinama na Luštici. Od pećina koje su registrovane kod Ulcinja izdvajaju se dvije koje se sastoje od nekoliko manjih i većih kanala koji su međusobno povezani tako da ima više ulaza/izlaza za te pećine. Dubina morske vode u ovim pećinama je mala i uglavnom najveća na samim ulazima, ali ne više od par metara. Do sada u njima nisu konstatovane neke zaštićene vrste morskih organizama, ali je u nekoliko pećina konstatovano prisustvo slijepih miševa."- kazala je za naš portal dr Vesna Mačić.

Ona je istakla da se u ovim pećinama kao negativna karakteristika izdvaja značajna količina čvrstog otpada koja je pronađena u njima, "a na nekim mjestima se i cijevi otpadnih voda završavaju neposredno iznad nivoa mora što izaziva dodatno zagađenje tog dijela akvatorije."

Nakon završetka obrade podataka nadležne institucije i šira javnost će biti upoznati sa rezultatima ovogodišnjeg istraživanja i na taj način će se kompletirati prvi inventar površinskih morskih pećina na otovorenom dijelu obale Crne Gore, a njihovo dalje istraživanje i adekvatna zaštita tek predstoje.

Inače, istraživanja morskih pećina na Crnogorskom primorju IBMK u saradnji sa svojim partnerima i uz finansijsku podršku "Jugopetrola" obavlja još od 2013. U prvoj godini istražen je dio obale od rta Arza na ulazu u Boku, južno do rta Platamuni u Donjem Grblju. Naredne godine istraživana je obala od Platamuna do rta Voluica, a sve to rađeno je u potrazi za dokazima da se i na našoj obali makar privremeno, zadržava zaštićena vrsta morskog tuljana – sredozemna medvjedica.

 Morska pećina

“Cilj nam je bio da evidentiramo sve morske pećine koje imaju ulaz na površini mora ili je on djelimično potopljen. Razlog za to je činjenica da su pećine zaštićeno stanište prema Zakonu o zaštiti prirode, a takođe su prioritetno stanište prema EU Direktivi o staništima. U morskim pećinama vladaju mnogo drugačiji uslovi spoljašnje sredine u odnosu na otvoreno more i zato imaju specifičan živi svijet, često puta okarakterisan i sa nekim zaštićenim i endemičnim vrstama. U morskim pećinama se odmaraju i razmnožavaju morske medvedice (tuljani) koji su jedna od najugroženijih vrsta morskih sisara, pa nam je zato važno da posebno markiramo pećine koje mogu biti njihovo potencijalno stanište.”- pojasnila je dr Mačić.

http://www.radiokotor.info/radio/index.php/78-lokalne-vijesti/5927-zavrseno-istrazivanje-morskih-pecina

LOKALNI JAVNI EMITER RADIO KOTOR
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Kategorija: Vijesti

ZAVRŠENO ISTRAŽIVANJE MORSKIH PEĆINA

Objavljeno 04 09 2015

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Proteklih dana završeno je istraživanje morskih pećina u blizini Ulcinja koje je Institut za biologiju mora sprovodio zahvaljujući donaciji Jugopetrola AD. Dr Vesna Mačić sa Instituta podsjeća da je u maju rađen dio istraživanja skoncentrisan na potezu od rta Voluica do rta Đeran o čemu je šira javnost bila informisana. „Zbog talasa i nemogućnosti da u maju završimo ovo istraživanje je završeno proteklih dana u saradnji Instituta za biologiju mora (Branislav Lazarević i Vesna Mačić) i predstavnika crnogorske NVO Biospeleološko društvo (Miloš Pavićević) i NVO MedCEM Dušan Varda. U neposrednoj blizini Ulcinja smo registrovali još osam pećina, a detaljnija mjerenja smo uradili u nekim već poznatim pećinama na Luštici. Od pećina koje su registrovane kod Ulcinja izdvajaju se dvije koje se sastoje od nekoliko manjih i većih kanala koji su međusobno povezani tako da imaju više ulaza/izlaza. Dubina morske vode u ovim pećinama je mala I uglavnom najveća na samim ulazima, ali ne više od par metara. Do sada nisu konstatovane neke zaštićene vrste morskih organizama, ali je u nekoliko pećina konstatovano prisustvo slijepih miševa. Ono što se izdvaja kao negativna karakteristika je da je u svim pećinama, a i ispred njih, konstatovana značajna količina čvrstog otpada, a na nekim mjestima se i cijevi otpadnih voda završavaju neposredno iznad nivoa mora što izaziva

dodatno zagađenje tog dijela akvatorije.

Nakon završetka obrade podataka nadležne institucije i šira javnost će biti upoznati sa rezultatima ovogodišnjeg istraživanja i na taj način će se kompletirati prvi inventar površinskih morskih pećina na otovorenom dijelu obale Crne Gore, a njihovo dalje istraživanje i adekvatna zaštita tek predstoje. Koristimo i ovu priliku da se još jednom najljepše zahvalimo Jugopetrolu AD na donaciji i podršci koju nam pruža", saopštila je za Radio Kotor dr Vesna Mačić.

http://www.vijesti.me/vijesti/u-moru-kod-ulcinja-otkriveno-osam-novih-pecina-850336#

U moru kod Ulcinja otkriveno osam novih pećina

"Od pećina kod Ulcinja izdvajaju se dvije koje se sastoje od nekoliko manjih i većih kanala međusobno povezanih tako da ima više ulaza/izlaza za te pećine"

1117PREGLEDA

0KOMENTARA

 **U pećinama otkriveno i dosta čvrstog otpada**

 **FOTO:** PRIVATNA ARHIVA**AUTOR:** Siniša Luković

Stručnjaci Instituta za biologiju mora iz Kotora (IBMK) završili su istraživanje morskih pećina u blizini Ulcinja.

Zahvaljujući donaciji kompanije “Jugopetrol” tokom maja su obavljena istraživanja na potezu od rta Voluica u Baru do rta Đeran u ulcinjskoj opštini, a od 31. avgusta do drugog septembra

odrađen je i dio ulcinjske obale.

U istraživanju su učestvovali Branislav Lazarević i Vesna Mačić iz IBMK u saradnji sa Milošem Pavićevićem NVO "Biospeleološko društvo" i Dušanom Vardom iz NVO MedCEM.

"U blizini Ulcinja smo registrovali još osam pećina, a detaljnija mjerenja smo uradili u nekim već poznatim na Luštici. Od pećina kod Ulcinja izdvajaju se dvije koje se sastoje od nekoliko manjih i većih kanala međusobno povezanih tako da ima više ulaza/izlaza za te pećine. Do sada u njima nisu konstatovane neke zaštićene vrste morskih organizama, ali u nekoliko njih ima slijepih miševa", kazala je dr Vesna Mačić.

Istakla je da se u ovim pećinama ima dosta čvrstog otpada, "a na nekim mjestima i cijevi otpadnih voda završavaju neposredno iznad nivoa mora što izaziva dodatno zagađenje tog dijela akvatorije." Nakon završetka obrade podataka nadležne institucije i šira javnost će biti upoznati sa rezultatima ovogodišnjeg istraživanja i na taj način će se kompletirati prvi inventar površinskih morskih pećina na otvorenom dijelu obale Crne Gore, a njihovo dalje istraživanje i adekvatna zaštita tek predstoje. Inače, istraživanja morskih pećina na Crnogorskom primorju IBMK u saradnji sa svojim partnerima i uz finansijsku podršku "Jugopetrola" obavlja još od 2013.

U prvoj godini istražen je dio obale od rta Arza na ulazu u Boku, južno do rta Platamuni u Donjem Grblju. Naredne godine istraživana je obala od Platamuna do rta Voluica, a sve to rađeno je u potrazi za dokazima da se i na našoj obali makar privremeno, zadržava zaštićena vrsta morskog tuljana - sredozemna medvjedica.

http://www.kolektiv.me/53099/od-ulcinja-do-bara-31-morska-peina

.me

POČETNA VIJESTI **Društvo**

Od Ulcinja do Bara 31 morska pećina

2015-09-05 16:58:48 | IZVOR:Ul-info

Stručnjaci Instituta za biologiju mora iz Kotora evidentirali su tokom svog istraživanja ovog ljeta 31 morsku pećinu na potezu od rta Đerane do rta Volujica u Baru.

Kako se navodi, neke od njih su posebno interesantne, jer se sastoje od nekoliko manjih i većih kanala koji su međusobno povezani tako da ima više ulaza/izlaza za te pećine, prenosi portal Ul-info.

"Dubina morske vode u ovim pećinama je mala i uglavnom najveća na samim ulazima, ali ne više od par metara", rekla je učesnica u istraživanju dr Vesna Mačić.

Prema njenim riječima, u nekim pećinama se kao negativna karakteristika izdvaja značajna količina čvrstog otpada koja je tu pronađena.

Inače, morske pećine su zaštićena staništa prema Zakonu o zaštiti prirode, a takođe su prioritetno stanište prema EU Direktivi o staništima.

http://mne.ul-info.com/istrazivanje-od-ulcinja-do-bara-31-morska-pecina/

Istrazivanje: OD ULCINJA DO BARA 31 MORSKA PECINA

Posted by: Admin on September 5, 2015 in Društvo Leave a comment

Stručnjaci instituta za biologiju mora iz Kotora evidentirali su tokom svog istraživanja ovog ljeta 31 morsku pećinu na potezu od rta Đerane do rta Volujica u Baru.

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http://spiritus-movens.me/drustvo/09/07/porazavajuca-statistika-bijela-kuga-u-16-opstina/

SpiritusMovens

Časopis za savremenu duhovnost, društvo i ljude

U moru kod Ulcinja otkriveno osam novih pećina

BY SPRITUS MOVENS · 7. SEPTEMBAR 2015.

Stručnjaci Instituta za biologiju mora iz Kotora (IBMK) završili su istraživanje morskih pećina u blizini Ulcinja.

Zahvaljujući donaciji kompanije "Jugopetrol" tokom maja su obavljena istraživanja na potezu od rta Voluica u Baru do rta Đeran u ulcinjskoj opštini, a od 31. avgusta do drugog septembra odrađen je i dio ulcinjske obale.

U istraživanju su učestvovali Branislav Lazarević i Vesna Mačić iz IBMK u saradnji sa Milošem Pavićevićem NVO "Biospeleološko društvo" i Dušanom Vardom iz NVO MedCEM.

"U blizini Ulcinja smo registrovali još osam pećina, a detaljnija mjerenja smo uradili u nekim već poznatim na Luštici. Od pećina kod Ulcinja izdvajaju se dvije koje se sastoje od nekoliko manjih i većih kanala međusobno povezanih tako da ima više ulaza/izlaza za te pećine. Do sada u njima nisu konstatovane neke zaštićene vrste morskih organizama, ali u nekoliko njih ima slijepih miševa", kazala je dr Vesna Mačić.

Istakla je da se u ovim pećinama ima dosta čvrstog otpada, "a na nekim mjestima i cijevi otpadnih voda završavaju neposredno iznad nivoa mora što izaziva dodatno zagađenje tog dijela akvatorije." Nakon završetka obrade podataka nadležne institucije i šira javnost će biti upoznati sa rezultatima ovogodišnjeg istraživanja i na taj način će se kompletirati prvi inventar površinskih morskih pećina na otvorenom dijelu obale Crne Gore, a njihovo dalje istraživanje i adekvatna zaštita tek predstoje. Inače, istraživanja morskih pećina na Crnogorskom primorju IBMK u saradnji sa svojim partnerima i uz finansijsku podršku "Jugopetrola" obavlja još od 2013.

U prvoj godini istražen je dio obale od rta Arza na ulazu u Boku, južno do rta Platamuni u Donjem Grblju. Naredne godine istraživana je obala od Platamuna do rta Voluica, a sve to rađeno je u potrazi za dokazima da se i na našoj obali makar privremeno, zadržava zaštićena vrsta morskog tuljana – sredozemna medvjedica.

Autor: Siniša Luković

Izvor: Vijes