

HIPPOCAMPUS MARINE INSTITUTE «HMI»

ANNUAL REPORT FOR THE YEAR 2019 & ACTION PLAN FOR THE YEAR 2020

INTRODUCTION

The year that just passed was a landmark year for us, since our efforts from all previous years have formally acquired their own unique status, with the establishment of the “Hippocampus Marine Institute” - HMI.

HMI has “inherited” all the results from the many years of effort, the know-how and experiences gained throughout this period and is now continuing its institutional endeavor to highlight the unique phenomenon of the seahorse colony in Stratoni, Chalkidiki, and its protection by all means possible.

The institute is made up of the same people who started this effort and have been working systematically for the last twelve (12) years. In addition, it has acquired additional associates, thus forming a group consisting of all the necessary specialties who operate harmoniously, methodically and effectively.

We would like to thank our sponsors as well as all the friends who have supported us in every way and with whatever means they have.

(Details of sponsors and ways of support are listed on the institute's website.)

The support, recognition and trust bestowed upon us, are the core and whole existence of the institute.

Environmental measurements and autopsies (year 2019)

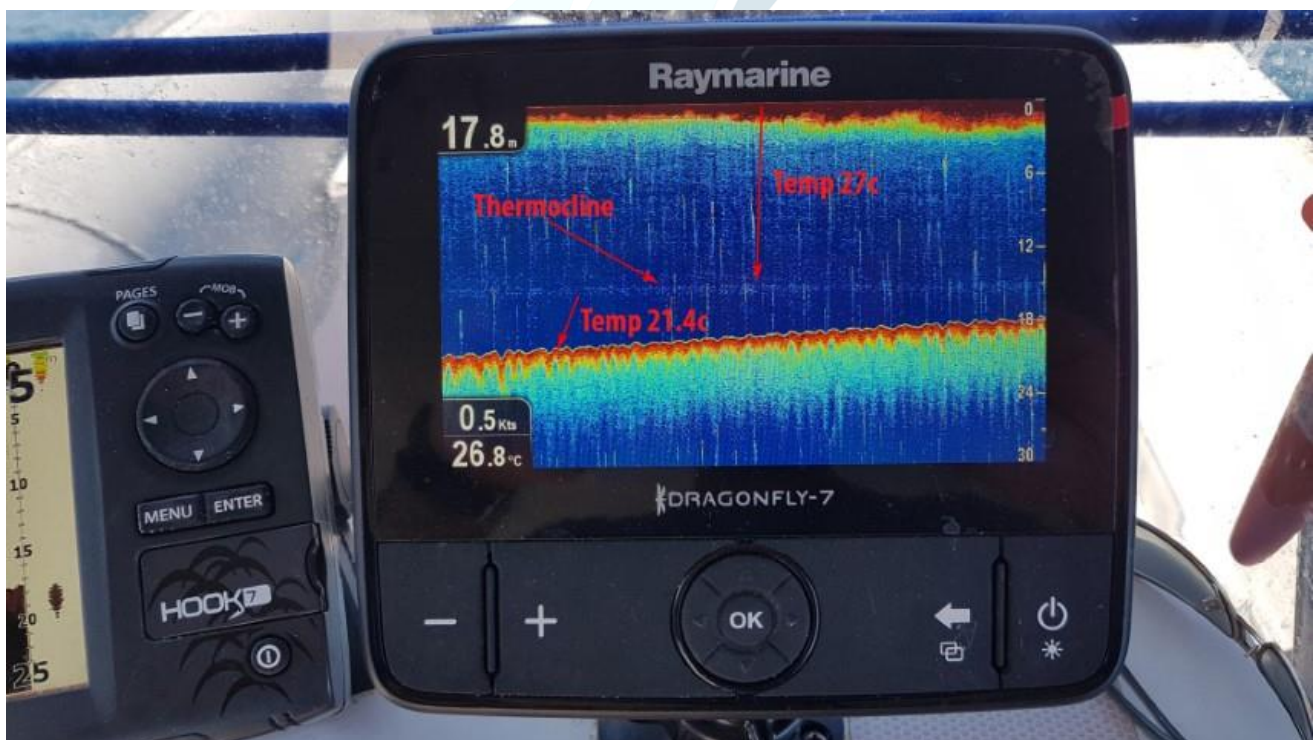
It is a known fact that in recent years the environment has been under strong pressure due to climatic change, which is now visible to all of us. Warnings from the science community are no longer useful, since rising temperatures, unprecedented extreme weather, the decline and the extinction of flora and fauna species are on the rise.

So in the same context, this tiny seahorse population which we have been monitoring in the Stratoní coastal area since 2007, has depicted great variations throughout this year.

We do not wish to promote a pessimistic view, but by systematically monitoring their population, we are able to assess as well as compare their population numbers.

Since April 2019, there has been a decline in the numbers of seahorses commonly encountered in the same area we have been following for the past 10 years.

On May 27th, the water temperature was 17° C, when suddenly within a week the water temperature reached almost 27° C - 28° C, down to a depth of -17 meters. In the core area of the population, the temperature was constant, at 28° C, throughout the water column.



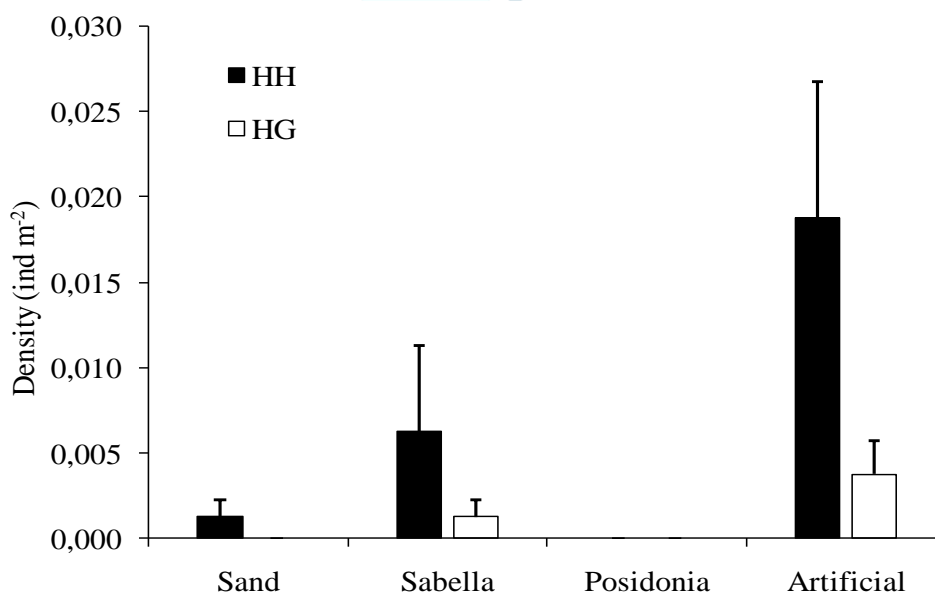
May 27th 2019, extreme sea temperature rise with the thermoclines being visible on the instrument.

On the 21st and 22nd of June, 2019 the Institute was visited by a well-known TV series from the TV Channel "SKAI", in order to visit and see the seahorses. During the accompanying dive by the institute, only one seahorse was detected!



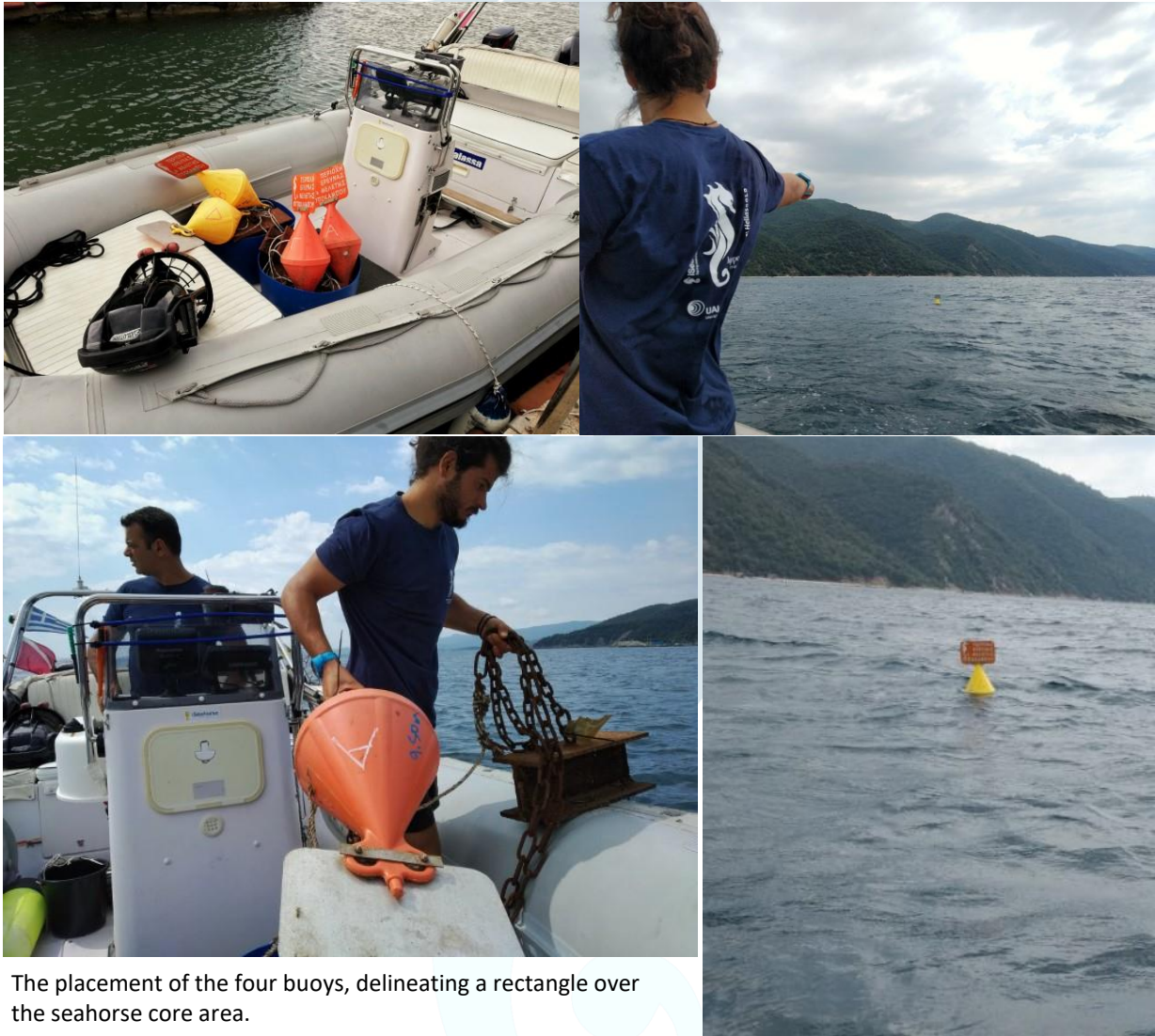
This fact, along with various other factors, was of great concern. In the past, the population did fluctuate but never in the core area and never during the summer months.

Our concern was confirmed by repeated diving inside and around the core area. The population has either shrunk significantly or, at least, we could not locate them. Only three to seven seahorses were repeatedly found, at - 12 meters, on a single point inside our artificial habitats (ropes). (More information and details are provided in the [seahorse diaries](#)).



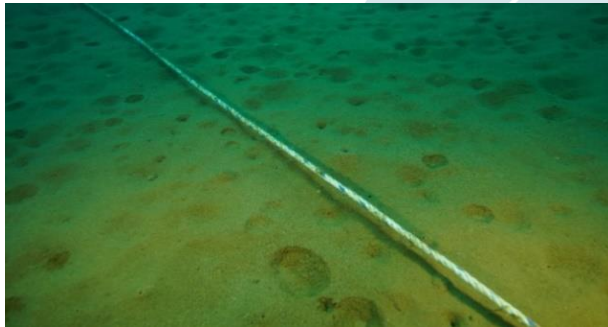
Quantitative diagram of the presence of seahorses in the sand, polychaete worm, Posidonia and artificial rope habitats.

After informing all the members of HMI, and in particular the biologists in Greece and abroad, we decided to immediately place informative buoys with signs around the area. By delineating this small maritime zone, we hoped to prevent accidental deaths of seahorses from fishing and fishing gear being entangled in the artificial habitats.



The placement of the four buoys, delineating a rectangle over the seahorse core area.

The buoys were put in place on the 28th of June, 2019. Subsequently, the following days, additional ropes were placed on the sea floor at a slightly deeper depth and with a more dispersed shape. The old ones were repaired and excavated, while the location of the new ones were pinpointed and photographed.



Four lines of 10 meter rope were placed and each of them were pinned down by a 30cm metal rod, every 2 meters.

On one of the rope lines, experimental artificial "plants" consisting of twine were also placed.

Diving continued throughout the summer while the temperature dropped by about two degrees Celsius by the end of June. By mid-September the temperature was stabilized at 25c to 26c. The seahorse population density stabilized at four to seven individuals.

The **reasons for the decline of the population**, at least until today, cannot be known for certain, therefore we can only make some assumptions. The sharp rise in temperature, the observation of many, large weaver fish, as well as information on large, predatory fish that were caught with seahorses in their stomachs from the surrounding area, further raised our concern.



Four seahorses were found in the stomach of a four kilo "dolphin fish". One of them was almost entirely digested.

Two more seahorses were found in the stomachs of large fish from the Dentex family, one being two kilos and the other 1.5 kilos.

Sampling of micro organisms

On the 29th of August, 2019, under the guidance and presence of our marine biologists, we performed samplings of microorganisms, the seahorses' main source of food.



Microorganism samplings for the determination of species that contribute to the main food source of the seahorses.



September 2019 – «Hotels» for seahorses

After coming upon a study in which aluminum cages were built and placed underwater to recover seahorse populations in Port Stephens, Australia, we contacted and consulted the creator of the idea himself, Dr. David Harasti. We then decided to build three special cages of roughly the same idea. The purpose of the cages is to create a seahorse-friendly environment, with enough ropes for them to attach on with their tails, to provide camouflage and protection from predators. The cage is surrounded by a 5-by-5-inch knitted wire, which allows the seahorses to pass through, but prohibits the entry of larger predators.

For the construction of the rectangular frame, "L" type iron bars were used with a 2x2cm angle, having a dimension of 100cm x 50cm x 60cm in total. A galvanized fence wire with a 5x5cm opening was then welded onto the frame (all welds were made with argon). Finally, ropes were inserted inside the frame, at a vertical and horizontal arrangement and at various heights of the construction, creating various places for the seahorses to attach onto or hide. The structures were finally mounted with four, 20cm extended edges in order to be placed and fixed on the sea floor

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The "hotels" were named K1, K2 and K3 respectively. The density and the arrangement of the ropes within each "hotel" are different and by doing so we may observe differences in the preference of the seahorses to each arrangement.



The cages were placed parallel to our mooring line, facing East and at different depths, i.e K1 at 8.8m, K2 at 10m and K3 at 11.3m.

November 2019 – Autopsy dive for the seahorse “hotels”

On the 31st of November, we performed another dive in coastal Stratoni, after heavy rainfall with very limited visibility and a water temperature of 19 °C. During this dive we found our first occupant, while the constructions had begun to be colonized by various sediments and organisms, harmonizing them with the surrounding marine environment.



December 2019 – Additional dives and autopsies

By the end of 2019, we performed two more visits with approximately the same results.

Maintaining our reservations, we conclude that the placement of the artificial rope habitats, a short distance from the sea floor might have been a life-saving tool for the presence and perseverance of the seahorses in the same area we have been encountering them for so many years. The ropes (artificial habitats), are simple in their construction and installation, are quickly covered by marine sediments and other organisms. Their fast colonization provides cover / camouflage and protection to the seahorses, but they also enable the seahorses to stay attached to the sea bottom without being dragged by the surface currents, which can create intense swirls and oscillations, even down to - 13 meters depth. Since 2016, we have deployed many rope habitats, 90% of which are the same places where one can locate the seahorses now. This is also evidenced by a wealth of audiovisual documentation. One unconfirmed assumption is that without the ropes, we might have lost their tracks a long time ago.



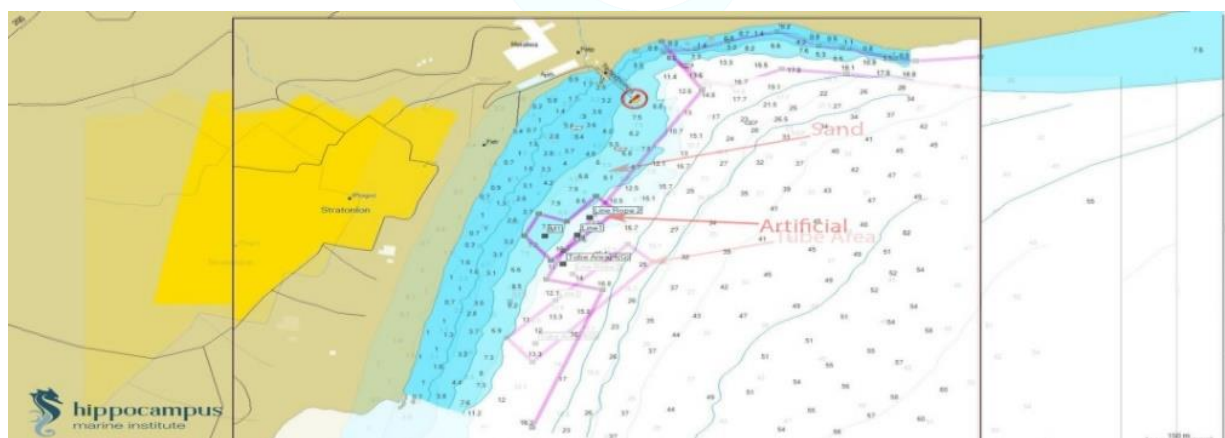
The artificial rope habitats are highly effective at gathering the seahorses.



Artificial rope habitats that almost always harbor seahorses.

All of the above assumptions and observations do not, of course, prove why their population has declined and is possibly at risk of disappearing. They may move to another location that we are not aware of or they may migrate to other cooler areas, or other scenarios that go beyond our imagination and our technical knowledge. However, we are confident that since 2007, when we first dove in this particular area, we have always encountered a number of seahorses. The only exception was the year 2010 when a natural disaster occurred, where tons of material from the mountain ended up in the sea, covering the entire natural habitat the seahorses had at their disposal (mussels, ringworms, seagrass etc.).

It is a UNIQUE, small population of seahorses that we always encounter ONLY in this small, core area. We have carried out dozens of dives and autopsies in all neighboring areas. In the Posidonia meadows, nearby beaches and bays, in the reefs of Eleftherides Isles, but we have NEVER met any, outside the core area. We do not think that they are not there. We maintain regular contact with the local fishermen who provide us with information. Statistically their dispersion is quite large and their density is sparse, making their detection extremely difficult.



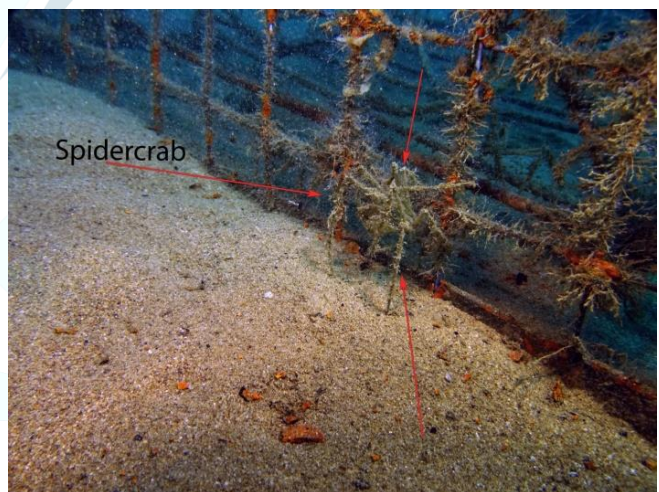
February 2020 – Additional dives and autopsies

In February 2020, we returned to the area for the inspection and evaluation of the seahorse "cage-hotels". One of the cages was found upside down, probably due to fishing gear entanglement. Our observations were impressive. The cages were colonized by a young female seahorse hiding safely inside one of them.



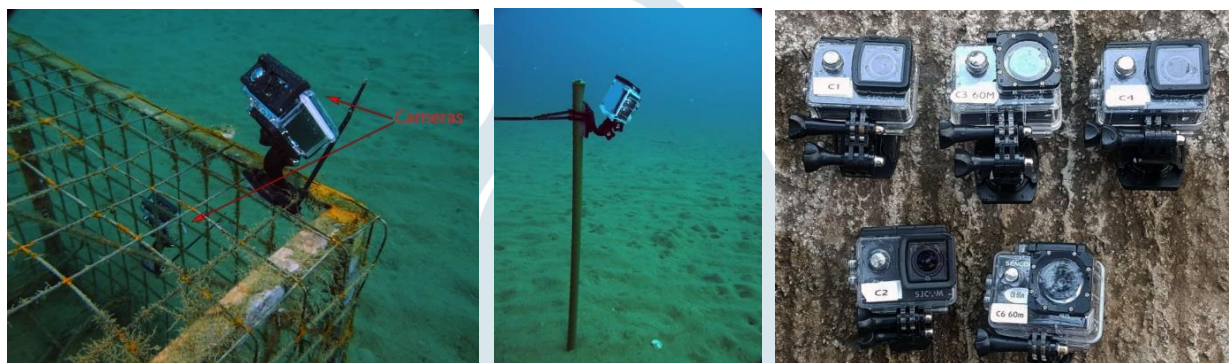
The upside-down seahorse "hotel" and a young female seahorse who found shelter within the "cage-hotel".

Cuttlefish eggs, cuttlefish, squids and various other species have found shelter within the "cage-hotels". We were astonished by the concentration of a plethora of spider crabs within the cages.



It is the first time we have encountered so many spider crabs within such a small area.

In order to collect further biological and technical data, 5 underwater cameras were installed for continuous, time lapse recording. Four of them were placed around the perimeter of one of the three cages and one in front of a rope.



The five underwater surveillance cameras and their placements underwater.

The cameras remained underwater for more than ten hours and the resulting footage was enlightening. The experiment will be repeated soon, with some adjustments that will increase the length of the recordings and their sensitivity.



Still frames taken from the recordings of the underwater cameras

We then carried out indicative sampling of the micro-organisms that make up the main food source of the seahorses.

We also manufactured and installed new artificial habitats.

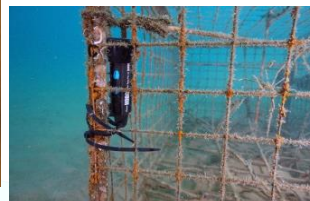
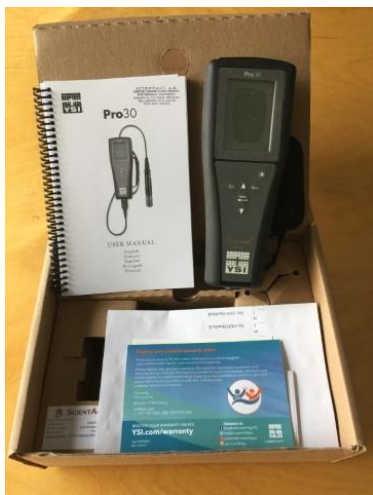
We collected systematic, physicochemical measurements of the water column and installed permanent underwater sensors (Hobo) to record temperature fluctuations.

The ultimate goal is to collect all the data necessary to create the technical conditions for breeding the seahorses in order to implement their population.



Left: microorganism samples for species identification.

Below: the instrument used for collecting physicochemical parameters of the seawater

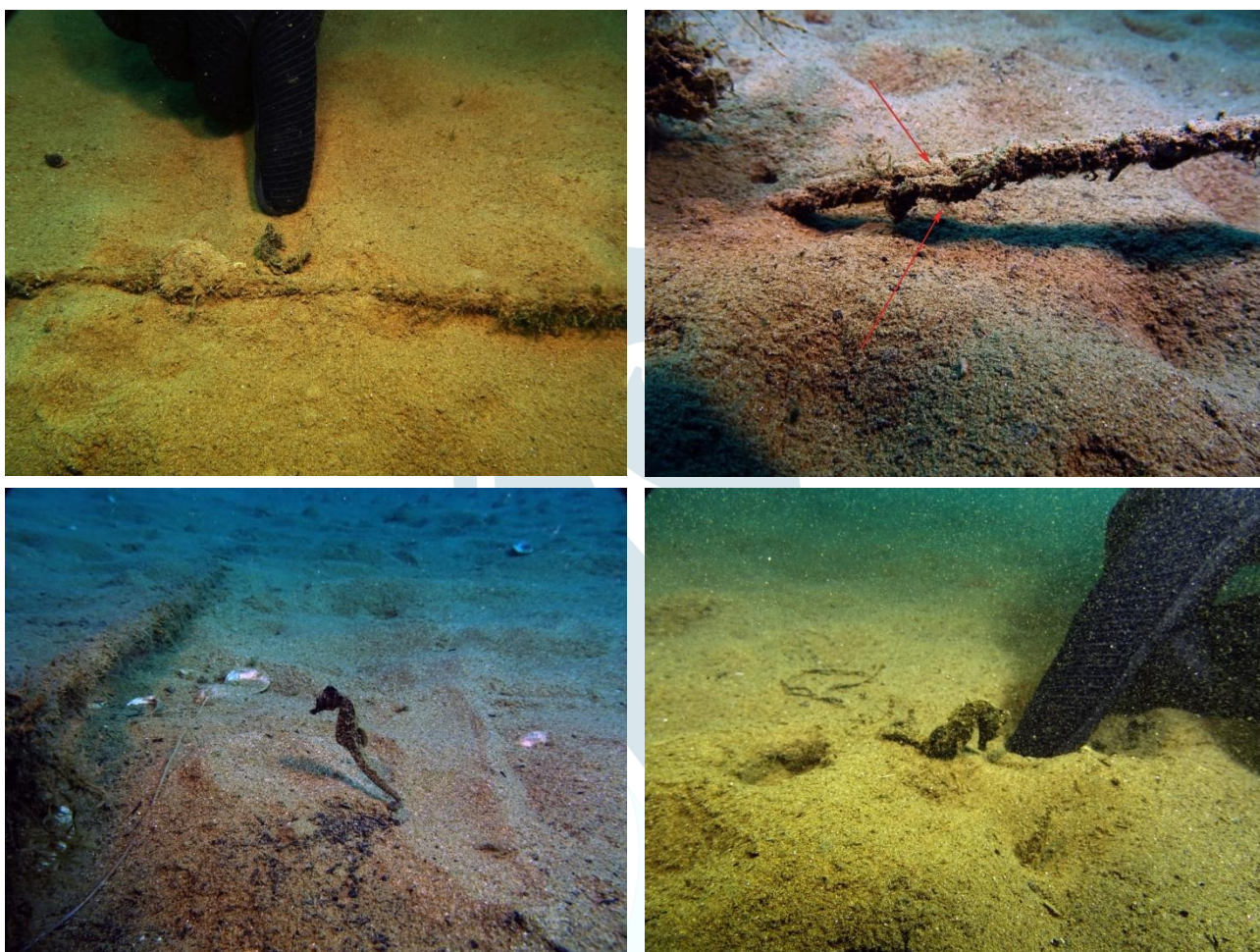


Top right: Hydrostatic test performed upon a prototype device.



Above: Placement of the underwater temperature sensors.

Above: New equipment purchased, composed of the underwater temperature, multi-parameter sensor for conductivity/salinity/temperature measurements and the software and optical interface required for their settings.



Pictured above: Juvenile seahorses finding shelter on the artificial rope habitats.

Since our last visit in February 2020, it is important to note that approximately 8 to 10 juvenile seahorses were identified. We only saw one medium-sized individual attached in one of the three cages and found no adult seahorses. It is worth noting that all the juveniles were found taking refuge on the ropes or seahorse “hotels”.

Concluding, our mission and first priority is to preserve and safeguard the remaining seahorse population in the area.

Contact with the Ministry of Rural Development & the Ministry of Environment

Having contacted the Ministry of Rural Development & Food along with the Office of the Deputy Minister of Environment and Energy, we came up with the best solution. The design, construction and operation of a diving park!

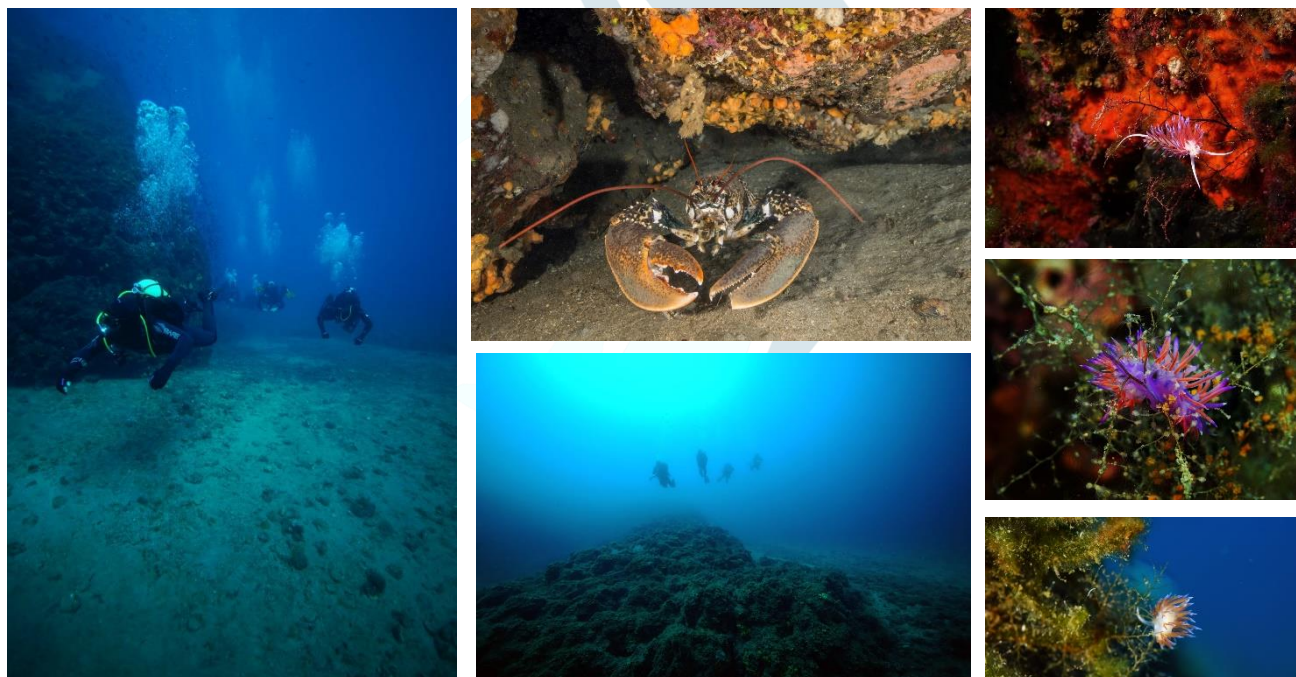
The creation of a diving park is the fastest thing to do. It is a project that boosts tourism so it will be supported by the local community, promotes environmental awareness, provides field research, Citizen Science and creates a haven for seahorses and many other species.

The creation of diving parks that also act as marine protected areas (MPAs) is perhaps the only hope for rescuing our seas.

Beyond the European directive, it is perhaps the only immediate global strategy to save some core areas, until we are able to directly deal with the pressures posed upon the atmosphere and the seas universally.

The proposed Diving Park will include a marine section on the Stratoni coast, at the core of the seahorse colony, and another section on a reef in the area of Brostomnitsa Wildlife Refuge.

The reef we propose was one of those that were cleaned by the removal of the ghost nets, and has now become alive again. Our frequent visits to the reef and audio-visual material can substantiate this.



Pictures from our last dive on the reef.

Contact with the Regional Prefecture of Central Macedonia & the Region of Halkidiki

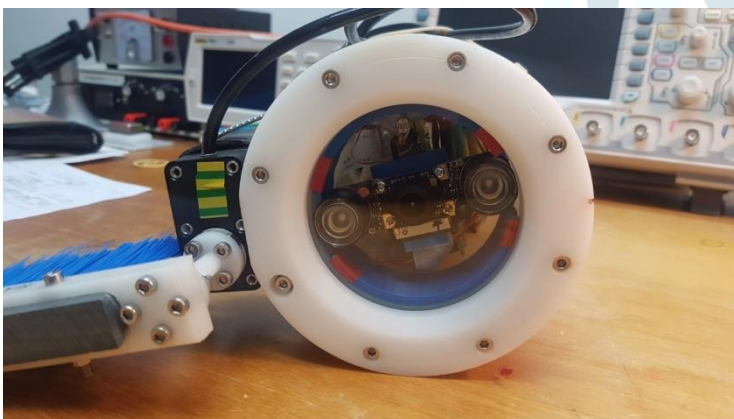
The Region of Central Macedonia, the deputy Regional Governor of Tourism Alexander Thanos, Chalkidiki's deputy Regional Governor Mr. Ioannis Giorgos, the Mayor of Aristotle Municipality Mr. Stelios Valianos and all the inhabitants of the village have already stated that they support us and are willing to contribute to and participate in our efforts.

Our priorities are:

- Raising funds for the preparation of deliverables in accordance with the laws governing the establishment and operation of diving parks / protected areas 3409/2005 and 4296/2014, for their submission to the Ministry of Environment (YPEKA).
- Creating infrastructure for the construction of 'aquariums' where pregnant males can give birth to their offspring. Every male incubates about 1,500 to 2,000 babies! If we are able to maintain a survival rate of at least 10% of the newborns and return them back to the sea, we will have escaped the danger of losing this population.

A brief overview of important actions performed in 2019, until now:

- Installation of an experimental, pilot submarine device for monitoring the seahorse population, by the [National Technical University of Athens \(NTUA\)](#) on March 4th, 2019.



The system has an embedded windscreen cleaner for the removal of debris that may settle on the screen along with the possibility of Infra-Red, night vision.

- Environmental education about the seahorses, for the children of the 8th elementary school of Pallini, Attica. The presentation was made sequentially for all six classes of the elementary school on the 18th of April, 2019.



- The [International Summer School of Marine Biology](#) with the sole purpose of studying the seahorse population in Stratoni, was organized on the 10th of May, 2019.



- An extensive ghost fishing removal expedition (consisting of the removal of abandoned fishing nets from the reef and their consequent cleaning and recycling) was performed with the presence of the administration of the Dutch Organization [Ghost Fishing](#), on the 21st of February and on the 30th of May, 2019.



- The TV series “Seawolves” (Thalassolikoi) from Channel SKAI, dived with us on the seahorse colony in Stratoni, Chalkidiki on the 21st of June, 2019.



- Presentation by the Hippocampus Marine Institute “The Seahorse of Strimonik Gulf” during the European Maritime Day event in Thessaloniki, entitled “One Sea. A Common Culture. A Great Future”, on June 26th, 2019, at the NOISIS Museum of Science & Technology Center.



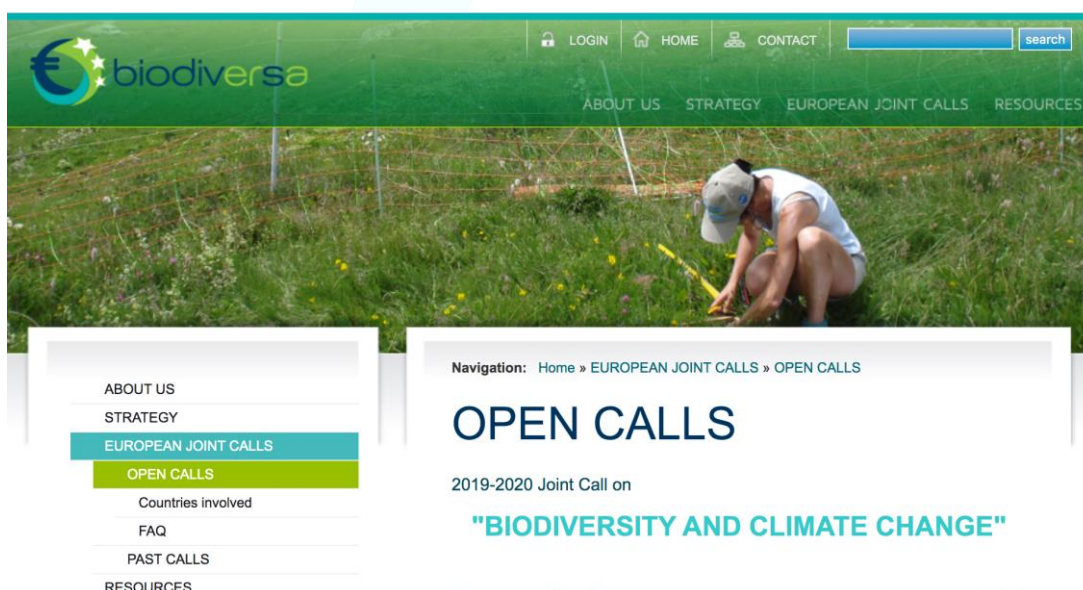
- Presentation by the Hippocampus Marine Institute “Seahorse species in a semi-closed north-eastern Mediterranean marine area (Stratoni, north Aegean Sea)” during the International Conference on Management of Accessible Underwater Cultural and Natural Heritage Sites: “Dive in Blue Growth”. Athens, Acropolis Museum, October 17th, 2019.



- Environmental education to the children of the 87th Elementary School of Thessaloniki about the seahorses, on the 14th of January, 2020.



- Application to the European Project BiodivERsA 2019-2020 Call (Agence Nationale de la Recherche Paris/France), for the possibility of funding.



- Completion and assigned with number JFB-MS-20-0165, to the Journal of Fish Biology for the publishing of the scientific paper titled : ***Assessing population density and habitat use of Hippocampus species in a semi-closed north-eastern Mediterranean marine area (Stratoni, north Aegean Sea)***

Correia^{a,b,*}, M., Paulo, D.^a, Samara, E.^c, Koulouri P. ^d , Mentogiannis, V.^c and Dounas, C.^d
^a CCMAR, Universidade do Algarve, FCT, Campus de Gambelas, Faro, 8005-139, Portugal.

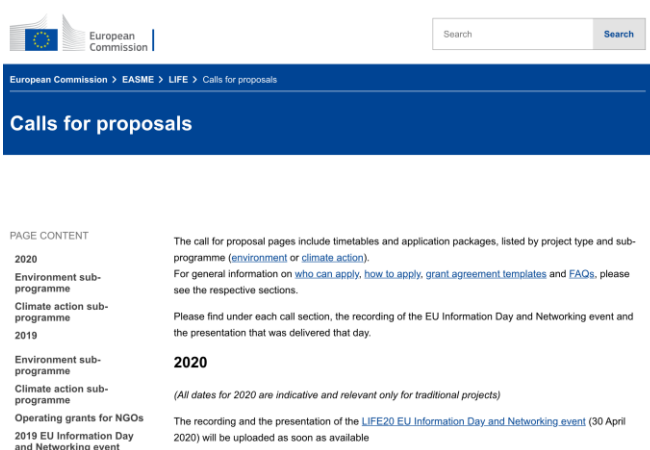
^b Project Seahorse, Fisheries Centre, The University of British Columbia, 2202 Main Mall, Vancouver, British Columbia V6T 1Z4, Canada.

^c Hippocampus Marine Institute, Etolias 2-4, Gerakas, Attiki – 15344 – Greece.

^d Hellenic Centre for Marine Research, Institute of Marine Biology, Biotechnology and Aquaculture, Gournes Padiados, P.O. Box 2214, 71003, Heraklion, Crete, Greece.

*Corresponding author: tel: +351 289 800900; fax: +351 289 818353; e-mail: mtcorreia@ualg.pt

- Application for funding to National Geographic funding program: [RECOVERY OF SPECIES ON THE BRINK OF EXTINCTION](#)/IUCN & Species Survival Commission (SSC)
- Application to the European “LIFE20 EU” project for a five-year funding program for the creation of “Aquariums”, the construction and installation of a prototype monitoring system, citizen science, diving park infrastructure etc. Raising public awareness is a major concern and priority for us.



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Calls for proposals

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2020	The call for proposal pages include timetables and application packages, listed by project type and sub-programme (environment or climate action).
Environment sub-programme	For general information on who can apply , how to apply , grant agreement templates and FAQs , please see the respective sections.
Climate action sub-programme	Please find under each call section, the recording of the EU Information Day and Networking event and the presentation that was delivered that day.
2019	
Environment sub-programme	2020
Climate action sub-programme	(All dates for 2020 are indicative and relevant only for traditional projects)
Operating grants for NGOs	The recording and the presentation of the LIFE20 EU Information Day and Networking event (30 April 2020) will be uploaded as soon as available
2019 EU Information Day and Networking event	

On behalf of the Board of “Hippocampus Marine Institute”,

Vasilis Mentogiannis

Vice-president of the Board of “Hippocampus Marine Institute”