Università di Corsica Pasquale Paoli | Laboratoire Stella Mare UAR 3514 | cnrs

STELLA MARE PLATFORM

Press Kit

GIANT LIMPET, *PATELLA FERRUGINEA* : THE STELLA MARE RESEARCH CENTER (UNIVERSITY OF CORSICA / CNRS) MASTERS THE REPRODUCTION OF AN ENDANGERED MARINE SPECIES AND PAVES THE WAY FOR A LARGE-SCALE ECOLOGICAL RESTORATION IN THE MEDITERRANEAN.

A 60 days-old giant limpet Patella ferruginea juvenile on-grown in the STELLA MARE hatchery

With more than 10 years working on the reproduction of vulnerable marine species, the engineers and scientists of the STELLA MARE research center obtained giant limpet juveniles in the end of 2022. This result confirms the scientific quality of the research carried out at the University of Corsica, in close collaboration with the field managers involved.

This protected species is currently one of the most endangered marine species in the Mediterranean. The primary objective of the research project is to use hatchery-reared juveniles for the restoration of depleted or extirpated populations.

The first larval rearing experiments initiated in 2022 were successful. Indeed, the hatchery team managed to overcome the artificial reproduction of this species and obtained 72 juveniles. Those are currently on-grown inside the Corsican labs (see pictures attached). To date, only two research teams in the world (led by the same scientist) have managed to obtain a few juveniles with very limited survival. The main difficulty of this operation lies in the collection of healthy and mature spawners from the natural environment, even though the species has almost completely disappeared from the Mediterranean coasts. Moreover, the difficulty to induce a spawning in captivity, as well as the feeding method at the juvenile stage, are technical aspects that complexify the success of the reproduction.

The giant limpet is currently the most endangered marine invertebrate on the rocky shores of the Western Mediterranean*.
Present in ancient times all around the Mediterranean, this protected marine species is now only represented by a very limited number of isolated populations on the coast of Andalusia and Northern Africa, as well as some hotspots in Corsica and Sardinia.

In Corsica, the species shows an increase in its population**. Thus, the island has a large stock of healthy spawners which has been used in the experiment and can, in the long term, brighten the future of the species in the Mediterranean by improving knowledge of its biology.
The translocation of adult individuals has proved to be difficult to manage (more than 50% mortality). The natural dissemination of larvae is also very limited due to the short larval duration. For these reasons, **international scientists now recommend the reproduction under controlled conditions and the transfer of young individuals to ecological restoration areas** (these being less sensitive to transport) ***.

The **issues in terms of biodiversity preservation** have strongly rallied scientists from the University of Corsica and the French National Center for Scientific Research (CNRS). Regarding the nearly entire disappearance of the species in the Mediterranean, there is a **real expectation for the artificial reproduction of the giant limpet coming from the managers of the Mediterranean marine protected areas**. This scientific breakthrough could ensure **the restoration of the species on a Mediterranean scale**. In this study, the availability of healthy spawners has been made possible by the management measures applied within the marine protected areas of Corsica (Natural Reserve of the Strait of Bonifacio, Marine Natural Park of Agriate and Cap Corse, etc...).

This scientific success of international significance materializes the purpose of the Corsican research center: turn research and innovation into common wealth. For the giant limpet, the goal is clear: **saving a heritage species and thus contributing to the preservation of the global biodiversity**.

**Espinosa, F., Bazairi, H. 2008. Étude biologique des populations de Patella ferruginea dans l'archipel de Zembra. Rapport final de l'initiative PIM. Conservatoire de l'espace littoral et des rivages lacustres. 34p.*

***Fortier, C. 2012. Suivi des effectifs et de la structure démographique de Patella ferruginea (Gmelin, 1791) aux Îles Lavezzi (Corse) – Rapport de Master. Office de l'Environnement de la Corse. Département Stratégies et Sciences de la mer. 43p.*

****Ferranti, M.P., Guallart, J., Cortella, V., Terenziani, G., Chiantore, M. 2021. Are there life-history constraints on restoration of the endangered limpet Patella ferruginea (Mollusca, Gastropoda) in the northern Mediterranean Sea? Aquatic Conserv: Mar Freshw Ecosyst. 1-6. https://doi. org/10.1002/aqc.3571*

Three 60 days-old giant limpet Patella ferruginea juveniles on-grown in the STELLA MARE hatchery

CALL FOR DONATIONS
Public research carried out in Corsica at the service of the Mediterranean

The foundation of the University of Corsica launches its first fundraising campaign for the benefit of scientific research!

Institutions, companies, organizations and citizens can now support a project with a strong impact for the Mediterranean and the conservation of our common heritage.

In order to capitalize on the scientific results obtained at the end of 2022, the Stella Mare research center of the University of Corsica and the CNRS is already planning a first experimental restoration which will begin next year.

This operation will take place along the Dragon Mole on the breakwater of the port of Bastia, in Northern Corsica. This site, which historically showed populations of giant limpets, will serve both as a demonstrator model and an ecological awareness location. The giant limpet juveniles produced by Stella Mare will be reintroduced on the dike and the operation will be monitored for at least a year. The goal of the operation will be presented to the public with the help of information panels and educational trails for schoolchildren. The donations collected will enable the replication of the experiment in other areas of the Mediterranean.

The artificial reproduction of the giant limpet and the following ecological restorations are a major scientific breakthrough and will have a large impact in Corsica and beyond.

Thus, convinced of the need to share our knowledge and skills in order to preserve our common heritage, the Stella Mare research center calls on institutions and scientists from the Mediterranean so that other locations can benefit from these experimental ecological restorations.

- **For any information on the research project or to discuss a restoration operation in your area**, please contact :
  Stella Mare research center (University of Corsica / CNRS)
  stellamare@univ-corse.fr | tel :+33 (0)4 20 20 22 86

- **For any information on the donation procedure**, contact :
  the foundation of the University of Corsica
  fondation@univ-corse.fr | tel: +33 (0)4 20 20 21 55

HTTPS://STELLAMARE.UNIVERSITA.CORSICA
WWW.UNIVERSITA.CORSICA/EN
WWW.CNRS.FR/EN

SUMMARY

PRESS CONTACTS

Sylvia FLORE - Head of the Communication Department of the University of Corsica
+33 (0)6 26 91 95 35 - +33 (0)4 95 45 02 71 – flore_s@univ-corse.fr

Camille RAPOLANI – Press Officer - Communication Service of the University of Corsica
+33 (0)7 77 28 95 76 - +33 (0)4 20 20 21 95 - rapolani_c@univ-corse.fr

Pierre-Mathieu NICOLAI - Executive Officer - Stella Mare
+33 (0)4 95 45 06 97 – nicolai_p@univ-corse.fr

PHOTO LIBRARY
University of Corsica
CNRS Pictures

https://stellamare.universita.corsica

"Stella Mare's approach can serve as a model in Europe."

Henri MALOSSE, member of the European Economic and Social Committee (EESC), former president of the EESC from 2013 to 2015

The Stella Mare platform (University of Corsica/CNRS) is located in Corsica, an island in the heart of the Mediterranean, in Europe.

"This laboratory has been developed as a real 21st century marine platform. Nowadays, all those located in Europe are over a century old. The Stella Mare initiative is a sign of a renewed vision of the marine environment. "

Françoise GAILL, Emeritus Research Director at the CNRS and former INEE Director and scientific advisor to the INEE, (INEE: the CNRS's Institute of Ecology and the Environment)

STELLA MARE: A BEACON FOR THE BLUE ECONOMY IN THE MEDITERRANEAN

Created in 2011 under the aegis of the University of Corsica, the Stella Mare scientific platform, based near Bastia, in Corsica, an island at the heart of the Mediterranean, specialises in marine and coastal ecological engineering.
By bringing together researchers and professionals from the marine discipline for the sustainable management of fisheries resources, its research programmes are innovating in the field of fishing, aquaculture and ecological restoration at a European scale.

It is the flagship of the University of Corsica in the field of marine and coastal environment engineering. Since its inauguration on 11 April 2011, the Stella Mare 3514 (Sustainable Technologies for Littoral Aquaculture and Marine Research) Mixed Services Unit has focused its research and development work on the monitoring and management of fisheries and coastal resources in the Mediterranean. Certified by the CNRS (French National Centre for Scientific Research) in June 2011, this scientific platform joined up with the Institute of Ecology and Environment (INEE) as part of the University of Corsica's research dynamic for efficient and sustainable environmental management.

With nearly 17,000 species documented, the Mediterranean Sea is home to 7.5% of the world's marine fauna and is a real biodiversity hot-spot. However, the impact of human activities and climate change are subjecting this area to strong pressures that are endangering its ecosystem through habitat degradation, overfishing and the disappearance of certain species.

In this context, where the riches of the sea and this unique environment must be managed as a precious heritage, Stella Mare is working on reconciling the preservation of the natural environment and the exploitation of marine resources with an innovative approach on a European scale. Its scientific approach is built around three main pillars: research, technology transfer to professionals and raising public awareness, particularly among the younger generation.

CNRS INNOVATION MEDAL 2021

Professor Antoine Aiello, director of the Stella Mare Platform (University of Corsica/CNRS) is the national winner of the CNRS Innovation Medal for 2021. The Innovation Medal of the French National Centre for Scientific Research (CNRS) honours women and men whose exceptional research has led to a significant technological, therapeutic or social innovation, enhancing French scientific research. The CNRS is one of the most renowned French public research institutions in the world.

This recognition pays tribute to the scientific excellence of the research carried out at Stella Mare, the technological transfer carried out with local stakeholders, and the societal benefits of the results and tangible applications. The award of the CNRS innovation medal distinguishes the quality of the work of an entire team.

"What has been initiated on this platform serves as an example and presents Corsica as a pilot region for the European blue economy policy in the years to come."

Henri MALOSSE, member of the European Economic and Social Committee (EESC), former president of the EESC from 2013 to 2015

A CUTTING-EDGE TECHNOLOGY

STELLA MARE

On the Marana lagoon, near Bastia, in Corsica, an island in the heart of the Mediterranean, in Europe, the Stella Mare technology centre, inaugurated 4th September 2015, houses more than 1,600m² of laboratories, aquaculture hatcheries and study facilities. Unique for its technical nature, this innovative scientific facility has been custom-designed both to respect the environment and to implement vast Research and Development (R&D) programmes on a professional scale. It is within this vast, state-of-the-art building that the platform's scientific teams are paving the way for the sustainable management of fisheries and coastal resources in the Mediterranean.

In close consultation with maritime professionals, the UMS Stella Mare focuses its research work on three major missions to preserve fishing activities while offsetting the human impact on the marine environment:
- promote environmentally-responsible fishing and sustainable aquaculture,
- to develop and diversify their production of species from the Corsican littoral,
- manage natural resources for sustainable exploitation and maintenance of marine biodiversity.

Around fifty engineers, technicians, research teaching staff and computer scientists are involved in the Research and Development (R&D) programmes conducted by Stella Mare. These teams carry out in-depth studies which consist in particular in assessing the natural stocks of Corsica, analysing the interactions within the ecosystem, controlling the reproduction and breeding processes of different local species and restoring populations or habitats degraded by human action in the marine environment.

Specific work is being carried out on the purple sea urchin (*Paracentrotus lividus*), the flat oyster (*Ostrea edulis*), the lobster (*Homarus gammarus*), the denti (*Dentex dentex*) and endangered or vulnerable species, such as the European spiny lobster (*Palinurus elephas*), the corb (*Sciaena umbra*) or the giant limpet (*Patella ferruginea*), of which Corsica remains one of the last deposits in the world. (*See below*)

The technological innovations developed in the Stella Mare laboratories aim to lay the foundations of a knowledge-based economy, shared between the world of research and the maritime professionals. The objective is to develop a new, more sustainable blue economy model by moving from a logic of taking from the ecosystem to a real culture made possible by the control and management of species.

CORSICA : A PILOT REGION IN EUROPE IN THE FIELD OF MARINE ECOLOGY

The concrete progress achieved by the platform positions Corsica as a pilot region in Europe in the field of marine ecology. As part of the work carried out on the blue bioeconomy, Professor Antoine Aiello, director of Stella Mare, was thus appointed as an expert to the European Economic and Social Committee (EESC) in July 2019. That same year and in 2020, two delegations from the European Union visited Stella Mare to discover this work on value creation based on the intelligent and sustainable use of fisheries resources.

Stella Mare is paving the way for the fishing professionals of tomorrow."

Gérard ROMITI, fisherman and president of the regional and national committees for maritime fisheries and marine farming in France

A TRANSFER OF TECHNOLOGY TO MARITIME PROFESSIONALS

The return of this scientific research to the territory is achieved through a transfer of technology to maritime professionals, fishing professionals, aqua-culturists and environmental managers who acquire new skills in the knowledge of the marine environment and species. Since the creation of the platform, this work has enabled the breeding of new local species in aquaculture, the maintenance of overexploited natural stocks, the preservation of threatened species and the diversification of the economic market for fishing and aquaculture professionals.

Stella Mare's work also extends to the ecological restoration of populations or environments degraded by humans. Thus, within the framework of a programme carried out with the island's four governing bodies and the Corsican Regional Committee for Maritime Fisheries and Aquaculture (CRPMEM), ecological restoration of sea urchin populations overexploited by fishing (recreational and professional) has been undertaken on several sites. The aim of this programme is to support the renewal of natural sea urchin stocks to encourage a return to the initial state of degraded areas and maintain sea urchin fishing activity in Corsica. In the same way, controlling the reproduction of the European flat oyster allows tests to be carried out on the use of this organism as a bio-purifier to clean up habitat environments (Bastia 'old port' marina, aquaculture farm in Ajaccio, Corsica). Finally, controlling the reproduction of the giant limpet will help maintain biodiversity by restoring the extinct populations of this endangered species in the Mediterranean.

The impact of this scientific work on the territory is directly visible. The programme carried out on the flat oyster bears witness to this: by controlling the cultivation of a species that occurs naturally in Europe and has been exploited since antiquity in Corsica only by harvesting (Diana lagoon on the eastern coast of Corsica), which has depleted its natural stocks. The species present in Corsica also has specific resistance to certain parasites which decimated it in Europe in the 1970s and which was replaced by an imported Japanese oyster (hollow oyster) controlled in aquaculture and itself currently decimated by the herpes virus.

This control of flat oyster culture would allow an economic rebound in the Corsican and French oyster industry, as well as the maintenance of a natural stock that is clearly decreasing.

KEY FIGURES FOR FISHING IN CORSICA

- 7.5% of the world's marine fauna sheltered in the Mediterranean
- 180 fishing skippers in Corsica
- 1000 km of coastline
- 43 tons of fish caught per year in Corsica for a turnover of 1 000 000€
- 500,000€ sales of purple sea urchins for 30 fishermen
- 7 tons of lobster caught, turnover of 350 000€ /year
- 70 € / kg selling price of the European spiny lobster (= 31 € / lb)
- Rarefaction of European spiny lobster , € 4 million, 70% of fishermen's income
- 61 tonnes of European spiny lobster fished in 2019-2020 in Corsica against 300 tonnes in the 1950s
- 80% of Corsica's aquaculture production is exported

AWARENESS
OF THE MARINE ENVIRONMENT

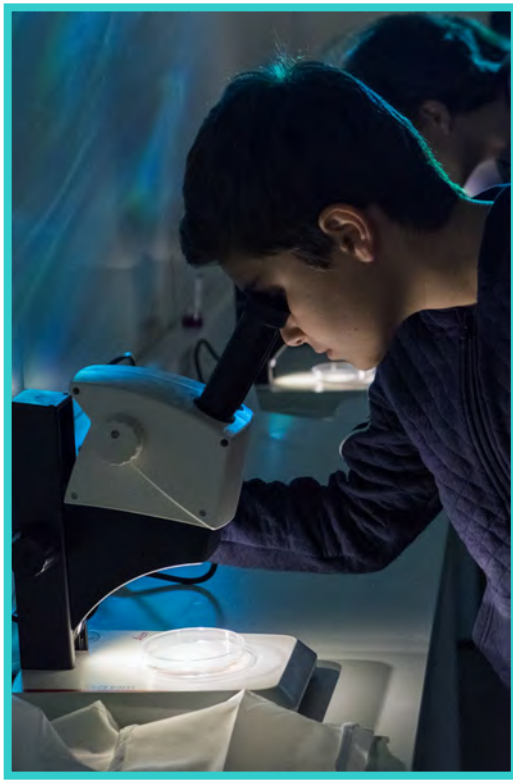
In parallel with these various research activities, Stella Mare is pursuing another long-term mission: raising awareness of the marine environment. The scientific platform has developed educational programmes for the general public and school children. Through the walls of the aquariums and the many portholes in the aqua-labs, visitors to Stella Mare can discover the richness of the island's ecosystem and witness science in action through the species under observation in the tanks.

Every year, hundreds of school children from all over Corsica visit these laboratories and learn about the exceptional biodiversity that surrounds them and the innovative solutions developed to mitigate the damage caused by human activity.

Anxious to pass on this knowledge to as many people as possible, the Stella Mare platform has established a close partnership with the Academy of Corsica and a Permanent Centre of Initiatives for the Environment U Marinu, which has been awarded the UNESCO label for sustainable development, with the aim of raising awareness among future generations of the issues involved in preserving and enhancing the natural marine heritage in the Mediterranean.

"In addition to research and technology transfer, the platform enables young people to be trained for jobs directly related to the environment and the marine environment. This is essential both to ensure the continuity and arrival of new professionals and to educate and raise awareness among new generations. »

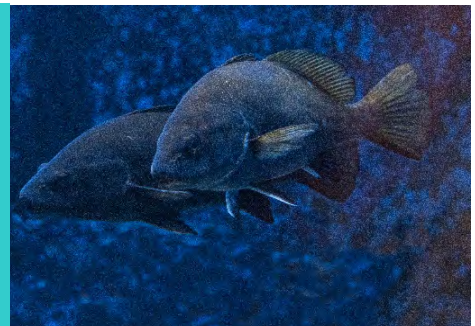
Henri FRANCESCHI, President of the Corsican fish farmers' union "Mare & Stagni" since 2002



RESEARCH
PROGRAMMES

EUROPEAN SPINY LOBSTER

In 2021, after only three months of experiments, researchers and engineers of the research center succeeded in growing juvenile European spiny lobster (*Palinurus elephas*). In 2022, significant improvements were made on the survival rates with the production of stage II juveniles. Stella Mare becomes one of three laboratories in the world to achieve this scientific and technical prowess. Present from Norway to Mauritania and in many area of the Mediterranean, the European spiny lobster is classified as "vulnerable" species in the red list of threatened species of the International Union for the Conservation of Nature (IUCN). Its high selling price is the result of relative scarcity, confirmed by the continued sharp decline in stock in European Union fishing areas. This major scientific breakthrough has an ecological, economic and heritage stake for Corsica and beyond: Preservation of biodiversity, diversify and maintain fishing activity (a centuries-old heritage activity in Corsica), while protecting the presence of the species in its range; transfer of individuals on a European scale for the fishery restoration of degraded stocks (with the necessary genetic precautions); helps stem the decline in catches in Europe due to overfishing; recycling and recovery of crustacean shells are of interest to biotechnology companies



THE CORB (MEAGRE)

The corb (*Sciaena umbra*) has been studied since 2014 under the remit of the Stella Mare platform. Subject to a moratorium banning recreational fishing in France since 2013, this emblematic Mediterranean coastal marine fish is a strictly protected species and is on the International Union for Conservation of Nature (IUCN) red list. The Stella Mare researchers' project focuses on improving knowledge about this relatively unknown species. With the aim of conserving the corb, the scientists, who have mastered the reproduction and breeding of this species through the development of specific procedures, anticipate the eventual restoration of the declining populations. In July 2022, 2000 juveniles of this species were released in an experimental ecological restoration near the port of Saint-Florent, in Northern Corsica

THE FLAT OYSTER

Since 2013, the Stella Mare team have been working on the domestication of the flat oyster (*Ostrea edulis*) in the Diana lagoon on the eastern coast of the island. After four years of experimentation with oyster farmers, the researchers and engineers have succeeded in mastering the reproduction of these species and in raising these oysters to maturity. The scientists are now cultivating flat oyster spat in the natural environment, produced in the laboratory from brood stock from the natural environment. This research programme thus meets a threefold challenge: to offer a new aquaculture resource, to revive the economic activities that depend on it and to protect an identity species that is part of Corsica's natural heritage. Although it currently represents less than 5% of oyster production in France, the flat oyster also appears to be an alternative to the hollow oyster, which is less resistant and faces significant mortality due to the proliferation of the herpes virus. Its taste potential is also recognised. The flat oyster has won several gold medals at the General Agricultural Competition, Paris.

THE PURPLE SEA URCHIN

Faced with the decline of purple sea urchin (*Paracentrotus lividus*) populations on the Mediterranean coast and in Corsica, Stella Mare scientists launched a research programme in 2010 to gain a better understanding of this species. The researchers found that overexploitation, habitat degradation, human predation and pollution have made this species vulnerable, to the point where economic pressure now exceeds its natural capacity for renewal. After two years of research, the marine platform teams have succeeded in mastering the reproduction cycle of these echinoderms. The aim is to compensate for these declining resources in order to ensure the survival of the fishery. For the first time in 2018, sea urchins reproduced at Stella Mare from spawners from the Corsican coastline have thus returned to the natural environment at several restoration sites chosen in collaboration with the fishing professionals. Beyond the ecological aspect, there is a considerable stake for the local economy. The turnover from the sale of sea urchins in Corsica represents 500,000 euros per year for about thirty fishermen.

DENTI

Since 2012, the domestication of the Denti (*Dentex dentex*), an emblematic Mediterranean coastal fish, has been part of Stella Mare's Research and Development (R&D) programmes. Largely fished by local and recreational fishing, the denti is the only sparid species classified as "vulnerable" in the Mediterranean by the International Union for Conservation of Nature (IUCN). The aim of this scientific project is to contribute, in collaboration with fish farmers, to the sustainable management of this resource with high economic potential. Each year, around 43 tonnes of denti are fished on the Corsican coast for a turnover of almost one million euros. In addition to recommending protection measures to regulate fishing, the work of Stella Mare has made it possible, since 2015, to control its reproduction. Researchers are currently studying its diet and reproduction conditions. In the long term, their ambition is to restore denti populations on the Corsican coast using stocks produced at Stella Mare.

LOBSTER

The European lobster (*Homarus gammarus*) is at the heart of a Research and Development (R&D) programme implemented at Stella Mare. Since 2012, its teams have been studying its genetics and behaviour in the natural environment as part of a project to diversify the artisanal fishing of large crustaceans in Corsica. In 2015, the scientists succeeded in controlling the reproduction of this species. They are now focusing their research on juvenile rearing techniques with the aim of creating fishing zones dedicated to fishing professionals so that fishing pressure on the lobster species can be reduced. As of 2018, the first releases of juveniles into the natural environment have been carried out on an experimental basis in a coastal area south of Bastia within suitable habitats. Through this programme, Stella Mare hopes to participate in the diversification of coastal fishing by creating a new demand for this crustacean, which is currently much less targeted by professionals than the highly prized European spiny lobster, which is becoming rarer due in particular to large-scale harvesting.

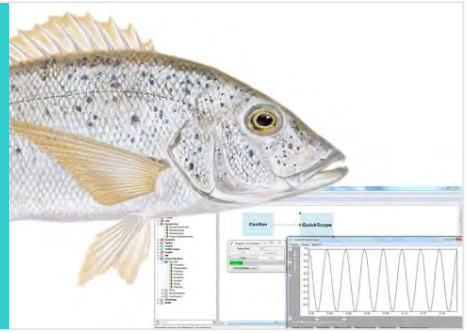
THE GIANT LIMPET

The giant limpet (*Patella ferruginea*), which is highly threatened with extinction, is the subject of in-depth studies at Stella Mare, which consist in particular of assessing the natural stocks and restoring this species, which is banned from fishing and of which Corsica remains one of the last remaining beds on a global scale. Its numbers are particularly low in the marine environment as a whole. The platform's work currently consists of learning more about the behaviour of this protected species and its diet. The aim of these studies is to determine the local resources for feeding the larvae of juveniles, once a reproduction procedure has been developed by the researchers. This work is an essential precursor for pursuing the objectives of this programme: to proceed with the ecological restoration of this threatened species throughout the Mediterranean basin. The larval experiments made in 2022 were achieved with the successful mastering of the entire biological cycle in laboratory and the production of 70 juveniles. The aim of the research project is to use hatchery-reared juveniles in ecological restoration experiments and restore depleted or extirpated populations in the Mediterranean.

THE MEDITERRANEAN SPIDER CRAB

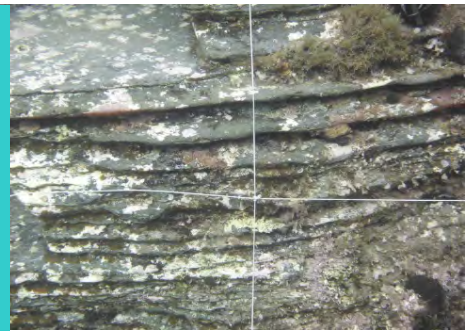
Experiments focusing on the reproduction of the mediterranean spider crab were initiated in 2019 to diversify the Stella Mare research around mediterranean crustaceans of interest. Today, the scientific teams of Stella Mare have completed the entire reproduction cycle of the mediterranean spider crab with more than 2400 juveniles produced in 2022. Some specimens reached a shell size of 10 cm in less than one year.

Maja squinado is an endemic species of the Mediterranean sea and is protected at the European level (appendices III of the Berne and Barcelona conventions). Behavioral studies and experiments on released individuals are already considered by Stella Mare researchers. This new breakthrough is paving the way for restocking techniques and fishing compensation in order to preserve the presence of the Mediterranean spider crab throughout its original distribution area.



BEHAVIOURAL MONITORING OF SPECIES

As part of a behavioural modelling programme, the Stella Mare teams are carrying out experiments to monitor species in the natural environment in real time (lobster, denti, sea urchin, spider crab, corb). Using connected devices, sensor and transmitter networks, and underwater monitoring techniques, this programme has enabled the acquisition of new skills in the field of information collection. The new knowledge gained from this data has led Stella Mare scientists to develop behavioural simulation models of species and has resulted in two invention disclosures.



ECOLOGICAL RESTORATION THROUGH THE CONSTRUCTION OF ARTIFICIAL REEFS

Faced with the erosion of marine biodiversity and the constant decrease in exploitable resources, the Stella Mare platform has launched a programme that proposes several ecological engineering solutions based on the installation, maintenance or natural recruitment of living organisms, aimed at supporting fishing activities and improving the quality of man-made environments. This Research and Development (R&D) project consists of improving biological productivity for fishing and preserving fisheries resources by offering additional and adapted refuge habitats for species of economic interest in poor areas or areas degraded by coastal development. It concerns the design of specific habitats for the various species studied within the other Stella Mare programmes, but also the creation of spawning grounds and nurseries aimed at maintaining local marine biodiversity and, in particular, species subject to economic or recreational exploitation. This programme also envisages the restoration of the environmental quality of man-made environments through bio-purification.

Thus, a pilot project of natural depollution has been undertaken from 2019 with the immersion of metallic cages containing several hundred flat oysters in the Old Port of Bastia in Corsica. This experiment, which is unprecedented on the scale of the Mediterranean, proposes to "bio-purify" the port by using the eco-systemic function of biological filtering of the flat oyster (produced in Stella Mare), which, by capturing the pollutants contained in the sea water, will accumulate them in its flesh and its shell. In the long term, the objective is to evaluate the number of individuals to be used and to evaluate the rate of depollution of a basin, in order to propose rapid solutions to deal with accidental or recurrent pollution that is not managed in the ports.

INTEGRATED MULTI-TROPHIC AQUACULTURE PROJECT (IMTA)

Integrated multi-trophic aquaculture (IMTA) is a practice that contributes to better environmental management while increasing the economic benefits for aquaculture producers. It is based on the concept of recycling, combining the farming of various complementary species from different links in the food chain rather than producing a single species (monoculture). The aim is to recreate an ecosystem in which food residues, waste, nutrients and by-products from one species are recovered and converted into fertiliser, food and energy for the growth of other species. In this context, the AIMT programme at Stella Mare aims to test the natural capacity of certain species produced within the platform and those having different functional roles in the trophic chain: the lobster (carnivorous predator), the flat oyster (filtering particles present in the water column), the sea urchin (plant grazers), and macro-algae (using nutrients for their growth). An initial, very encouraging test carried out with only lobsters on a marine farm in Ajaccio, Corsica, led to a much more ambitious FEAMP (European Maritime Affairs and Fisheries Fund) programme involving all of the above species.

KEY DATES

STELLA MARE

2005 Creation of the scientific advisory council of the University of Corsica

2007 Study trip to Crete and discovery of the laboratory of researcher Pascal Divanach (Hellenic centre for marine research)

2009 Approval of the project for the creation of a marine platform by the Mediterranean Sea Centre (Approved as a competitiveness cluster with a global vocation, it brings together and supports start-ups, SMEs, large groups, research and training organisations)

2010 Purchase of land by the University of Corsica on the lagoon of La Marana, near Bastia in Corsica

2011 Inauguration of the Stella Mare advanced base
Accredited by the CNRS (French National Centre for Scientific Research)

2012 Controlling of purple sea urchin reproduction

2013 Accredited with the Aquimer competitiveness cluster (a resource for companies in the aquatic production sector to help them develop and innovate)

2015 Inauguration of the Stella Mare technology centre
Controlling the reproduction of denti and lobster

2017 Management of flat oyster reproduction

2019 Management of corb reproduction

Appointment of Antoine Aiello, Director of Stella Mare, as an expert to the European Economic and Social Committee (EESC) for an exploratory opinion on the blue bioeconomy
EESC working group on the blue bio-economy visits Stella Mare

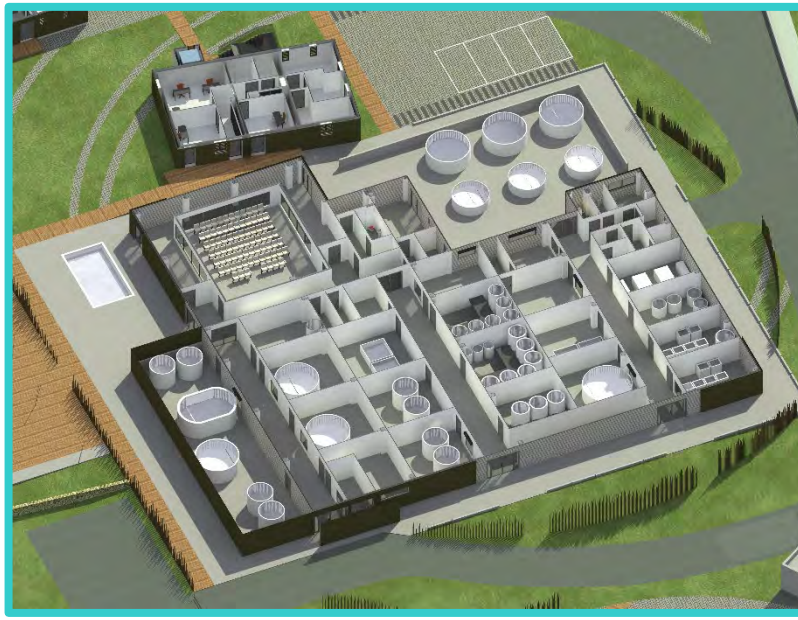
2020 Visit to Stella Mare of the EESC Mission, European Parliament and European Commission (DG MARE)

2021 National Innovation Medal of the CNRS (French National Centre for Scientific Research)
Production of spiny lobster juveniles
Mastering of the reproduction of the Mediterranean spider crab

2022 Improvements on the rate of survival of spiny lobster larval stages and production of stage II juveniles
Inauguration ceremony of a new 12 meters scientific vessel
2000 common corb juveniles released in the sea
Mastering of the reproduction of the giant limpet

KEY FIGURES
STELLA MARE

2 500	m^2 of laboratories, offices and conference rooms
1 200	m^2 hatchery
115	basins
+40	aquariums
47	staff
5	research-teachers
1,000	scientific dives per year and 3 fully-equipped vessels
600	visitors per year received on the platform and made aware of ecological issues (+ 300 school children and nearly 300 visitors from the general public)
4, 000, 000	flat oyster spat produced at Stella Mare
50, 000	flat oysters from the laboratory that have reached maturity in the Diana lagoon in Corsica
90, 000	juvenile sea urchins produced per year at Stella Mare
80, 000	juvenile corbs produced per year at Stella Mare
11, 000	juvenile denti produced per year at Stella Mare
3, 000	juvenile lobsters produced per year at Stella Mare



ABOUT THE UNIVERSITY OF CORSICA PASQUALE PAOLI

The University of Corsica Pasquale Paoli is located on an island of 340 000 inhabitants in the heart of the Mediterranean, in Europe. Founded in 1765, then reopened in 1981, the University of Corsica is a training and research structure anchored in its territory, in direct contact with the major local, national and international issues. With a deliberately multidisciplinary range of courses, the institution has chosen to concentrate its research on niches of excellence recognised at the highest level.

The scientific identity of the University of Corsica is based on multidisciplinary projects approved by the National Centre for Scientific Research (CNRS), one of the most renowned French public research institutions in the world.
The projects combine basic and applied research with a view to territorial development and lead to concrete achievements with high added value, such as the Stella Mare marine platform and the Myrte Paglia-Orba solar platform.
https://stellamare.universita.corsica
https://myrte.universita.corsica
https://paglia-orba.universita.corsica

Due to its exceptional Mediterranean environment, research at the University of Corsica also focuses on the management and development of fresh or marine waters, biodiversity, aquaculture and sustainable fishing; the production and storage of renewable solar and hydrogen energies; the development of Mediterranean natural resources, aromatic and medicinal plants, heritage agri-food products (e.g. olive oil, citrus fruit, honey); sustainable development; the study of wildfires for the protection of people, property and the environment and land use planning.

But equally focus on modelling and artificial intelligence for territorial development and establishment of a smart city concept; virology, epidemiological and genetic surveillance and research on infectious diseases in the Mediterranean, both human and animal.

Or the modelling of the economic development of territories; comparative law in the Mediterranean, digital law. The University of Corsica also plays an essential role in the development, protection, promotion and transmission of the identity, language, culture, heritage and crafts of its territory.

In terms of training, the University of Corsica Pasquale Paoli offers more than 130 multidisciplinary diplomas at undergraduate, bachelor, licence, post-graduate and doctorate levels, delivered by 8 faculties, institutes and schools. The constant interest in the integration of its 5,100 students is based on training courses with a high professional content, in line with the major development issues of its territory: digital, entrepreneurship, international trade, environmental engineering and renewable energies, audio-visual and communication, economics and business management, sustainable tourism, law, teaching, literature, languages, art, civil engineering, health, etc.

The University of Corsica is strongly committed to international mobility and encourages its students to develop a genuine culture of mobility. More than 60 different nationalities are welcomed on campus.

The University of Corsica also organises or hosts high-level international meetings throughout the year, in particular at its Institute of Scientific Studies in Cargèse (University of Corsica/CNRS/University of Côte d'Azur), where 2000 participants from all over the world meet each year.

Through the initiative of the University of Corsica, 28 island universities from all over the world (Mediterranean, Northern Europe, Atlantic Europe, Indian Ocean, Africa, Caribbean, North America, Oceania and Asia) have joined forces within the RETI international network, in order to create a common space for scientific and academic exchanges from the islands and about themes associated with insularity.

WWW.UNIVERSITA.CORSICA/EN

ABOUT THE CNRS

The French National Center for Scientific Research is one of the most recognized and renowned public research institutions in the world. For more than 80 years, it has continued to attract talent at the highest level and to nurture multi-disciplinary and interdisciplinary research projects at the national, European and international levels. Geared towards the public interest, it contributes to the scientific, economic, social and cultural progress of France.

The CNRS is above all 32,000 women and men, more than 1,000 laboratories in partnership with universities and other higher education institutions bringing together more than 120,000 employees and 200 professions that advance knowledge by exploring the living world, matter, the Universe, and the functioning of human societies. The CNRS ensures that this mission is carried out in compliance with ethical rules and with a commitment to professional equality. The close relationship it establishes between its research missions and the transfer of acquired knowledge to the public makes it today a key player in innovation in France and around the world. Partnerships with companies are at the heart of its technology transfer policy, and the start-ups that have emerged from CNRS laboratories bear witness to the economic potential of its research.

The CNRS provides also access to research findings and data, and this sharing of knowledge targets many audiences: scientific communities, the media, decision-makers, economic players and the general public.

WWW.CNRS.FR/EN

Università di Corsica Pasquale Paoli

www.universita.corsica

STELLA MARE LABORATORY
UNIVERSITÀ DI CORSICA PASQUALE PAOLI
Lagoon cordon of the Marana, U Casone
20620 Biguglia - Corsica – France
stellamare@univ-corse.fr
https://stellamare.universita.corsica